

TRANSMITTAL LETTER

August 10, 2026

Illinois Environmental Protection Agency
Bureau of Land – #33
Permit Section
2520 W. Iles Ave.
Springfield, IL 62704

RE: Application for Groundwater Remedial Action Construction Permit – Metal Cleaning Basin and Ash Surge Basin – Powerton Generating Station

Permit Reviewer:

On behalf of Midwest Generation, LLC (MWG), Roux Associates, Inc. (Roux) submits the enclosed Application for Groundwater Corrective Action Construction Permit (Application) for the Metals Cleaning Basin (ID No. W1798010008-03) and the Ash Surge Basin (ID No. W1798010008-01) at the MWG Powerton Generating Station pursuant to 35 Ill. Adm. Code 845.220(a) and (c). As detailed in the Application, the proposed corrective action includes the retrofitting of both noted surface impoundments in accordance with the Application for Retrofit Construction Permit previously submitted to IEPA for each impoundment in July 2023. The retrofits include new composite liners and leachate collection systems compliant with the new CCR surface impoundment construction standards. In addition, a modification to the construction of the Ash Surge Basin weir wall and subsequent monitored natural attenuation of residual groundwater impacts are proposed.

We look forward to working with the Illinois Environmental Protection Agency (IEPA) to successfully complete this corrective action work. If there are any questions, please contact me at 773-710-7191 (tstohner@rouxinc.com) or Mr. Joseph Kotas at the Powerton Generating Station at 309-477-5216 (joseph.kotas@nrg.com).

Sincerely,

Roux Associates, Inc.



Timothy Stohner, P.E.
Principal Engineer

Enclosures:

1. Form CCR 1 – General Provisions
2. Form CCR 2CA – Construction Permit for Corrective Action Construction
3. Application for Groundwater Corrective Action Construction Permit



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 Ill. Adm. Code 845 as required by 35 Ill. Adm. Code 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):

2CN New Construction

2CA Corrective Action Construction

2CC Closure Construction

2N Initial Operating Permit for a New CCR Surface Impoundment and Any Lateral Expansion of a CCR Surface Impoundment

2R Renewal Operating Permit

2E Initial Operating Permit for Existing or Inactive CCR Surface Impoundments that have not completed an Agency-approved closure before July 30, 2021

2OE Initial Operating Permit for Existing or Inactive CCR Surface Impoundments that have completed an Agency-approved closure before July 30, 2021

2OI Initial Operating Permit for Inactive Closed CCR Surface Impoundments

DETERMINING APPLICABILITY

Applicants <u>not</u> required to Submit a Permit Application	
1. Was the CCR generated at a facility that is <u>not</u> part of electric utility or independent power producer, such as manufacturing facilities, universities, and hospitals? If yes, STOP. Do not complete Form CCR 1. You do not need a CCR Surface Impoundment Permit under 35 Ill. Adm. Code 845.	2. Is the CCR placement at active or abandoned underground or surface coal mines? If yes, STOP. Do not complete Form CCR 1. You do not need a CCR Surface Impoundment Permit under 35 Ill. Adm. Code 845.
3. Was the CCR generated primarily from the combustion of fuels other than coal for the purpose of generating electricity? If No, proceed to question 4. If Yes, answer the following question below: Did the fuel burned consist of less than 50% coal on a total heat input or mass input basis, whichever results in the greater mass feed rate of coal? If yes, STOP. Do not complete Form CCR 1. You do not need a CCR Surface Impoundment Permit under 35 Ill. Adm. Code 845.	4. Are you a <u>landfill</u> that receives CCR? If yes, STOP. Do not complete Form CCR 1. You do not need a CCR Surface Impoundment Permit under 35 Ill. Adm. Code 845.

Applicants Required to Submit a Permit Application	
1. Are you an owner and/or operator 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?	2. Are you an owner and/or operator of an inactive CCR surface impoundment at active and inactive electric utilities or independent power producers?
Yes → Complete Form CCR 1	Yes → Complete Form CCR 1

ACTIVITIES REQUIRING A CCR SURFACE IMPOUNDMENT PERMIT (35 Ill. Adm. Code Subpart B)

1. Are you building a new CCR surface impoundment, lateral expansion or a CCR surface impoundment, or retrofitting an existing CCR surface impoundment?	2. Are you performing corrective action under Subpart F of the Rule?
Yes → Complete Forms CCR 1 and 2CN	Yes → Complete Forms CCR 1 and 2CA
3. Are you closing a CCR surface impoundment under Subpart G of the Rule?	4. Are you submitting an Initial Operating Permit for a new CCR surface impoundment and any lateral expansion of a CCR 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 an Initial Operating Permit for an existing or inactive CCR surface impoundment that <u>has not</u> completed an Agency-approved closure prior to July 30, 2021?
Yes → Complete Forms CCR 1 and 2R	Yes → Complete Forms CCR 1 and 2E
7. Are you submitting an Initial Operating Permit for existing or inactive CCR surface impoundment that <u>has</u> completed an Agency-approved closure prior to July 30, 2021, <u>and</u> where the impoundment <u>is not</u> an inactive closed CCR surface impoundment?	8. Are you submitting an Initial Operating Permit for an inactive closed surface impoundment? An inactive closed surface impoundment is an inactive CCR surface impoundment that completed closure prior to October 19, 2015 with an Agency-approved closure <u>plan</u> .
Yes → Complete Forms CCR 1 and 2OE	Yes → Complete Forms CCR 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 a 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 upon your proposed activity as follows:

- If your facility is building a new CCR surface impoundment, lateral expansion of a CCR surface impoundment, or retrofit of an existing CCR surface impoundment; you must also complete Form CCR 2CN for each new CCR surface 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 Ill. Adm. Code 845, you must also complete Form CCR 2CA for each CCR surface impoundment undergoing corrective action.

- If your facility is closing a CCR surface impoundment under Subpart G of 35 Ill. Adm. Code 845, you must also complete Form CCR 2CC for each CCR surface impoundment 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 new CCR surface impoundment and any lateral expansion of a CCR surface impoundment.
- If your facility is renewing an operating permit, you must also complete Form CCR 2R for each CCR surface impoundment subject to the renewal.
- If your facility comprises an existing or inactive CCR surface impoundment that has not completed an Agency-approved closure prior to July 30, 2021; you must also complete Form CCR 2E for each existing or inactive CCR surface impoundment that has not completed an Agency-approved closure prior to July 30, 2021.
- If your facility comprises existing or inactive CCR surface impoundment that has completed an Agency-approved closure prior to July 30, 2021, and where the impoundment is not an inactive closed CCR surface impoundment; you must also complete Form CCR 2OE for each existing or inactive surface impoundment that has completed an Agency-approved closure prior to July 30, 2021.
- If your facility comprises an inactive closed CCR surface impoundment, you must complete Form CCR 2OI for each inactive closed CCR surface impoundment. An inactive closed CCR surface impoundment is an inactive CCR surface impoundment that completed closure prior to October 19, 2015 with an Agency-approved closure plan.

Exhibit 1-1. Filing Dates for CCR Surface Impoundments Permit Applications

Permit Application	When to File
CCR 2R – Renewal Operating Permit	At least 180 days before the expiration of the existing permit unless the Agency has granted a waiver.
CCR 2E – Initial Operating Permit for Existing or Inactive CCR Surface Impoundments that <u>have not</u> completed an Agency-approved closure prior to July 30, 2021.	Must be submitted by October 31, 2021.
CCR 2OE – Initial Operating Permit for Existing or Inactive CCR Surface Impoundments that <u>have</u> completed an Agency-approved closure prior to July 30, 2021, <u>and</u> where the impoundment <u>is not</u> an inactive closed CCR surface impoundment.	Must be submitted by October 31, 2021.
CCR 2OI – Initial Operating Permit for Inactive Closed CCR surface impoundments.	Must be submitted by October 31, 2021.

FORM 1 – LINE-BY-LINE INSTRUCTIONS

Section 1: Facility, Operator, and Owner information

Item 1.1 Enter the facility's official or legal name. Do not use a colloquial name.

Item 1.2 Provide your Illinois EPA CCR Surface Impoundment permit number if you have an existing facility. If your facility is new (i.e., not yet constructed), write or type "New Facility." If your facility is existing, but you are filing an initial permit, write or type "Initial Permit."

Item 1.3 Give the name (first and last), title, work telephone number, and e-mail address of the person who is thoroughly familiar with the operation of the facility and with the facts reported in this application. The IEPA will contact the person listed if they have questions on the material submitted.

Item 1.4 Give the complete mailing address of the office to which the IEPA should send correspondence.

Item 1.5 Give the address or location of the facility identified under Item 3.1. If the facility lacks a street name or route number, give the most accurate, alternative geographic information (e.g., section number or quarter section number from county records or "at intersection of routes 425 and 22"). Also provide the county name, county code (if known), city or town, state, and zip code.

Item 1.6 Give the legal name of the person, firm, public organization, or other entity that operates the facility described in this application. This may or may not be the same as the facility's name. The operator of the facility is the legal entity that controls the facility's operation rather than the plant or site manager. Do not use a colloquial name.

Item 1.7 Give the name (first and last), title, work telephone number, and e-mail address of the person who is thoroughly familiar with the operation of the facility and with the facts reported in this application. The IEPA will contact the person 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 in this application form. 415 ILCS 5/44(a) provides that, "Except as otherwise provided in this Section, it shall be a Class A misdemeanor to violate this Act or regulations thereunder, or any permit or term or condition thereof, or knowingly to submit any false information under this Act or regulations adopted thereunder, or under any permit or term or condition thereof. A court may, in addition to any other penalty herein imposed, order a person convicted of any violation of this Act to perform community service for not less than 100 hours and not more than 300 hours of community service is available in the jurisdiction. It shall be the duty of all State and local law-enforcement officers to enforce such Act and regulations, and all such officers shall have authority to issue citations for such violations."

All permit applications must be signed by the owner, operator, or a duly authorized agent of the operator. 35 Ill. Adm. Code 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 Ill. Adm. Code 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 Environmental Protection Agency
Bureau of Land #33
Attn: Part 845 Coal Combustion Residual Rule Submittal
2520 West Iles Avenue
P.O. Box 19276
Springfield, IL 62794-9276



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 1 – General Provisions

Bureau of Land ID Number:

1798010002

CCR Permit Log Number:

2021-510 (MCB), 2021-507 (ASB)

Facility Name:

Powerton Generating Station

For IEPA Use Only

SECTION 1: FACILITY, OPERATOR, AND OWNER INFORMATION (35 Ill. Adm. Code 845.210(b))

Facility, Operator, and Owner Information	1.1	Facility Name		
		Powerton Generating Station		
	1.2	Illinois EPA CCR Permit Number (if applicable)		
		2024-CO-100029		
	1.3	Facility Contact Information		
		Name (first and last)	Title	Phone Number
		Joseph Kotas	Environmental Specialist	309-477-5216
		Email address		
		joseph.kotas@nrg.com		
	1.4	Facility Mailing Address		
		Street or P.O. Box		
		10382 East Manito Road		
		City or Town	State	Zip Code
		Pekin	IL	61554
1.5	Facility Location			
	Street, Route Number, or Other Specific Identifier			
	10382 East Manito Road			
	County Name	County Code (if known)		
	Tazwell			
	City or Town	State	Zip Code	
	Pekin	IL	61554	
1.6	Name of Owner/Operator			
	Todd Mundorf			

Facility, Operator, and Owner Info	1.7	Owner/Operator Contact Information		
		Name (first and last) Todd Mundorf	Title Plant Manager	Phone Number 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 Princeton	State NJ	Zip Code 08540
SECTION 2: LEGAL DESCRIPTION (35 Ill. Adm. Code 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) N W 1/4 300.7 AC		
SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 Ill. Adm. Code 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.		
		W1798010008-03, -01	☒	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description

		☐	Attached written description
		☐	Attached written description
		☐	Attached written description
		☐	Attached written description

SECTION 5: CHECKLIST AND CERTIFICATION STATEMENT			
Checklist and Certification Statement	5.1	In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing.	
		Column 1	Column 2
		Section 1: Facility, Operator, and Owner Information	☒ w/attachments ☒
		Section 2: Legal Description	☒ w/attachments ☐
		Section 3: Publicly Accessible Internet Site Requirement	☒ w/attachments ☐
		Section 4: Impoundment Identification	☒ w/attachments ☒
	5.2	Certification Statement	
		I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
		Name (print or type first and last name) of Owner/Operator Todd Mundorf	Official Title Plant Manager
		Signature 	Date Signed 8-6-26



Coal Combustion Residual Surface Impoundment Permitting Program

Application Form CCR 2CA:

Construction Permit for Corrective Action Construction

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 Ill. Adm. Code 845, as required by 35 Ill. Adm. Code 845.800(d)(1).

FORM 2CA – GENERAL INSTRUCTIONS

Who must complete Form 2CA?

The owner or operator of the Coal Combustion Residual (CCR) surface impoundment.

FORM 2CA – LINE-BY-LINE INSTRUCTIONS

Section 1: Design and Construction Plans (35 Ill. Adm. Code 845.220)

Item 1.1 Enter the CCR's official or legal name. Do not use a colloquial name.

Item 1.2 If an identification number has been assigned to the CCR surface impoundment, enter it here. If a number has not been assigned, write "N/A".

Item 1.3 Provide the legal description of the CCR surface impoundment's boundary.

Item 1.4 Describe the purpose for which your facility is using the CCR surface impoundment.

Item 1.5 State how many years the CCR surface impoundment has been in operation, or what year it was constructed.

Item 1.6 List the types of CCR that have been placed in the CCR surface impoundment.

Items 1.7 and 1.8 Watershed information may be found on the USGS website.

Item 1.9 Check each box to acknowledge each item has been included with the application. Include written descriptions and engineering plans and specifications as required.

Item 1.10.1 State if there is any record or previous/current knowledge of any type of structural instability of the CCR surface impoundment.

Item 1.10.2 If yes, please describe the instability issues, and if/how they have been resolved.

Section 2: Narrative Description of The Facility (35 Ill. Adm. Code 845.220)

For each of the Narrative Description requirements, fill in the requested information of the form or attach a narrative description page which includes all required information. Requirements found in 35 Ill. Adm. Code 845.220.

Section 3: Maps (35 Ill. Adm. Code 845.220)

Check the box next to each map submission requirement, to acknowledge they have been included with the application submittal.

Section 4: Attachments

Check the box next to each submission requirement, to acknowledge they have been included with the application submittal.

Section 5: Groundwater Monitoring Program

Check the box next to the groundwater monitoring requirements submission requirement, to acknowledge they have been included with the application submittal.

Section 6: Corrective Action (35 Ill. Adm. Code 845.220(c))

Check the box next to the corrective action plan submission requirement to acknowledge they have been included with the application submittal.

Section 7: Groundwater Modeling (35 Ill. Adm. Code 845.220(c))

Check the box next to the groundwater modeling requirements submission requirement, to acknowledge they have been included with the application submittal.



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 2CA – Corrective Action Construction

Bureau of Land ID Number:

1798010002

CCR Permit Log Number:

2021-510 (MCB), 2021-507 (ASB)

Facility Name:

Powerton Generating Station

For IEPA Use Only

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

Design and Construction Plans	1.1	CCR surface impoundment name.
		Metal Cleaning Basin and Ash Surge Basin
	1.2	Identification number of the CCR surface impoundment (if one has been assigned by the Agency).
		W1798010008-03 and W1798010008-01
	1.3	Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).
		SEC 8 T24N R5W E 1/2 OF NE 1/4 (EXC RIVER) & E 1/2 OF SE 1/4 (EXC RIVER & EXC TRACT) 111.65 AC.
	1.4	State the purpose for which the CCR surface impoundment is being used.
		The Metal Cleaning Basin is primarily used for temporarily storing gas-side boiler cleaning wash water. When no wash water is present, the basin is also used to temporarily store dry bottom ash and dry fly ash collected during routine cleaning activities at the Station. The Ash Surge Basin is currently not in use. It was primarily used as a settling pond for bottom ash remaining in decant water from the facility's dewatering bins. It was also used to manage other non-CCR waste streams related to facility operations.
	1.5	How long has the CCR surface impoundment been in operation?
		Both have been in operation for approximately 48 years (1978)
1.6	List the types of CCR that have been placed in the CCR surface impoundment.	
	Metal Cleaning Basin - Gas-side boiler cleaning wash water which may contain boiler slag. When not used for managing wash water, dry bottom ash and dry fly ash are temporarily stored and removed as quickly as possible for off-site disposal/beneficial reuse. Ash Surge Basin - Bottom ash.	
1.7	List the name of the watershed within which the CCR surface impoundment is located.	
	Pekin Lake - Illinois River Watershed	

Design and Construction Plans (Continued)	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?			
		approx. 28,843 acres			
	1.9	Check the corresponding boxes to indicate that you have attached the following:			
	☒	Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).			
	☒	A description of the type, purpose, and location of existing instrumentation.			
	☒	Area capacity curves for the CCR Impoundment.			
	☒	A description of each spillway and diversion design features and capacities and provide the calculations used in their determination.			
	☒	The construction specifications and provisions for surveillance, maintenance, and repair of the CCR surface impoundment.			
	☒	A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.			
	☒	A statement of the type, size, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR surface impoundment.			
☒	A statement of the method of site preparation and construction of each zone of the CCR impoundment.				
☒	A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.				
1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?				
	☐	Yes	☒	No	
1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.				
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.			
		Metal Cleaning Basin - Gas-side boiler cleaning wash water which may include boiler slag, dry bottom ash, dry fly ash. Ash Surge Basin - Bottom ash.			

Narrative Description (Cont.)	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.		
		Metal Cleaning Basin - 12,800 cubic yards, Ash Surge Basin - 162,000 cubic yards		
	2.4	Enter the rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.		
		40,000 and 18.8 million, respectively	GPD	
2.5	Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.			
	Approximately 5 years (May 31, 2031)			
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 States Geological Survey (USGS) quadrangle of the area from the 7 1/2 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.	
		☒	A summary of the issues raised by the public during the public notification and public meetings.	
		☒	A summary of any revisions, determinations, or other considerations made in response to those issues raised by the public during the public notification and public meetings.	
	☒	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in erosion control and environmental remediation.		

		☒	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in the operation of heavy equipment and excavation.
SECTION 5: GROUNDWATER MONITORING PROGRAM			
Groundwater Monitoring	5.1	Indicate that you have attached the following components of a new groundwater monitoring program or any modifications to an existing groundwater monitoring program by checking the corresponding boxes:	
		☒	A hydrogeologic site investigation meeting the requirements of 35 Ill. Adm. Code 845.620, if applicable.
		☒	Design and construction plans of a groundwater monitoring system meeting the requirements of 35 Ill. Adm. Code 845.630.
		☒	A proposed groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by 35 Ill. Adm. Code 845.640 and 845.650.
SECTION 6: CORRECTIVE ACTION (35 Ill. Adm. Code 845.220(c))			
Corrective Action	6.1	Indicate that you have attached a corrective action plan as specified in 35 Ill. Adm. Code 845.670 by checking the box below:	
		☒	Corrective action plan as specified in 35 Ill. Adm. Code 845.670.
		☒	Corrective action groundwater monitoring program, including identification of revisions to the groundwater system for corrective action.
		☒	Any interim measures necessary to reduce the contaminants leaching from the CCR surface impoundment, and/or potential exposures to human or ecological receptors, including an analysis of the factors specified in 35 Ill. Adm. Code 845.680(a)(3).
SECTION 7: GROUNDWATER MODELING (35 Ill. Adm. Code 845.220(c))			
Groundwater Modeling	7.1	Indicate that you have attached the following by checking the corresponding boxes:	
		☒	The results of groundwater contaminant transport modeling and calculations showing how the corrective action will achieve compliance with the applicable groundwater standards.
		☒	All modeling inputs and assumptions.
		☒	Description of the fate and transport of contaminants with the selected corrective action over time.
		☐	Capture zone modeling, if applicable.
		☒	Any necessary licenses and software needed to review and access both the model and the data contained within the models required by 35 Ill. Adm. Code 845.220(c)(2).



Application for Groundwater Corrective Measures Construction Permit – Metal Cleaning Basin and Ash Surge Basin

Midwest Generation, LLC
Powerton Generating Station

13082 Manito Rd.
Pekin, IL 61554

Date: August 10, 2026

Prepared for:

Midwest Generation, LLC
Powerton Generating Station
13082 Manito Rd.
Pekin, IL 61554

Prepared by:

Roux Associates, Inc.
1301 W. 22nd Street
Suite 800
Oak Brook, Illinois 60523

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- C. Design Specifications and Drawings – Capping of ASB Weir Wall
- D. Corrective Action Plan

Introduction

The Midwest Generation, LLC (MWG) Powerton Generating Station (Powerton) is located at 13082 East Manito Road, Pekin, Illinois. It is an active coal-fired, steam electric generating station. It currently operates with four coal-fired boilers and two electric generating units, identified as Units 5 and 6, with an approximate capacity of 1,785 megawatts (MW). Bottom ash, a coal combustion residual (CCR), is sluiced to a set of dewatering bins which mechanically promote sedimentation of the sluiced ash. Decant water from the bins is then drained through a concrete trench into a CCR surface impoundment for additional settling/sedimentation of any remaining suspended ash. Currently, the Powerton Station's dewatering bins are drained to the Ash-By-pass Basin (ABB) which was retrofitted with a double liner in 2024 pursuant to a Retrofit Construction Permit.¹ The Metal Cleaning Basin (MCB) is used intermittently for temporary, short-term storage of CCR materials associated with routine plant maintenance activities. Any ash temporarily stored within the MCB is removed for off-site beneficial reuse or proper landfill disposal. The Ash Surge Basin (ASB) is currently not in use; however, it may be needed for future operational considerations. The MCB and ASB existing liners do not meet the current CCR surface impoundment liner requirements set forth in Ill. Adm. Code (IAC) Title 35, Part 845. In July 2023, MWG submitted Construction Permit Applications to retrofit the MCB and ASB. Powerton also has an old inactive impoundment called the Former Ash Basin (FAB). MWG submitted an Application for Construction Permit to close the FAB on October 26, 2022.

Groundwater monitoring requirements in accordance with an Illinois Environmental Protection Agency (IEPA or "Agency") issued CCR Operating Permit 2024-CO-100029 (Operating Permit), have been completed for the specified ash pond monitoring wells. The Permit was issued on July 3, 2024 and covers the operating and groundwater monitoring requirements for all four CCR Surface Impoundments at the Powerton Station.² Specifically, these are:

- Ash Surge Basin (ASB) – Pond ID W1798010008-01
- Metal Cleaning Basin (MCB) – Pond ID W1798010008-03
- Ash By-pass Basin (ABB) – Pond ID W1798010008-04
- Former Ash Basin (FAB) – Pond ID W1798010008-05

¹ On July 3, 2024 Illinois EPA issued the Retrofit Construction Permit, No. 2024-CC100030 authorizing the retrofit construction of the Ash Bypass Basin (W1798010008-04) in accordance with 35 Illinois Administrative Code Part 845. On November 6, 2024, MWG appealed the Retrofit Construction Permit due to two typographical errors, and to correct Special Conditions 9, 10, and 11. *Midwest Generation LLC. v. Illinois EPA*, PCB 25-3 (Nov. 6, 2024). Special Condition 9 improperly required an Annual Consolidated Report, Special Condition 10 was inconsistent with Special Condition 11 of the Operating Permit (2024CO-100029), and Special Condition 11 was unduly burdensome by requiring three copies of all documents. The Board stayed Special Conditions 9, 10, and 11 pending the appeal. Illinois EPA and MWG have been negotiating the terms of the Construction Permit during the appeal, however, the negotiations have taken longer due to the transfer of the CCR Program from the Bureau of Water to the Bureau of Land.

² On November 6, 2024, MWG appealed Special Conditions 6, 11, 14, 15, 16, 17, 19, 20, 21, 22, 25, 26, and 28 of the Operating Permit. *Midwest Generation LLC. v. Illinois EPA*, PCB 25-4 (Nov. 6, 2024). The appeal was to correct typographical errors, correct internal inconsistencies, correct inconsistencies with Part 845, remedy impractical or unreasonable deadlines, and clarify ambiguous language. The Board stayed Special Conditions 6, 11, 14, 15, 16, 17, 19, 20, 21, 22, 25, 26, and 28 pending the appeal. Illinois EPA and MWG have been negotiating the terms of the Construction Permit during the appeal, however, the negotiations have taken longer due to the transfer of the CCR Program from the Bureau of Water to the Bureau of Land.

Groundwater Protection Standards (GWPSs) were established by the Operating Permit under Special Conditions #21 and #22, for the Silty Clay/Silt Unit and the Sand and Gravel Unit, respectively.³ Groundwater sampling of the permit defined monitoring well network during the 4th quarter 2024 confirmed the following detections above the currently established GWPSs:

Silty Clay/Silt Unit

- MW-14: sulfate, total dissolved solids (TDS), molybdenum and thallium.
- MW-18A: TDS.

Sand and Gravel Unit

- MW-07: arsenic and cobalt.

In addition, during the 1st quarter 2025, the following additional confirmed detections were noted above the currently established GWPS:

Sand and Gravel Unit

- MW-10: boron and cobalt.

MW-14, MWG-18A, MW-07, and MW-10 are in the general vicinity of the MCB and ASB. Based on these confirmed detections above the Permit established GWPSs, MWG made a Notification of Exceedances in accordance with the requirements of Section 845.650(d) and placed in the facility's operating record in accordance with Section 845.800(d)(16). In addition, MWG posted the notification MWG's State CCR compliance website per Section 845.810(e).

In conjunction with this Notification of Exceedances, MWG initiated and completed a nature and extent of impacts evaluation in accordance with Section 845.650(d)(1). MWG used information from the nature and extent of impacts assessment in support of a Corrective Measures Assessment (CMA) which was completed in accordance with requirements set forth in Section 845.660 and submitted to Illinois EPA on August 11, 2025.

The CMA evaluated seven remedial alternatives. The preferred remedy was identified as a combination of the following three alternatives:

- Capping ASB Weir Wall
- Retrofitting of Both Basin Liners (MCB and ASB) to Part 845 Liner Standards
- Monitored Natural Attenuation

MWG presented the results of the CMA and the preferred remedial alternative in a set of public meetings held on the evening of July 6, 2026, and the morning of July 7, 2026.

³ Even though the Board stayed Special Conditions 21 and 22 pending the appeal, because MWG did not object to the GWPS in the Operating Permit, MWG compares the groundwater sampling results to the GWPS.

This Application for Groundwater Corrective Action Construction Permit (Application) is a combined Application for both the MCB and ASB. Because most of the information required for the retrofit portion of the Application has already been submitted and included in the two Applications for Retrofit Construction Permits (Retrofit Applications), both Retrofit Applications will be referenced for the MCB and ASB in this Application, as appropriate. The complete retrofit construction permit applications for the MCB and ASB are included as Appendices A and B, respectively (these were developed for MWG by Sargent & Lundy). It is noted that the Capping of the ASB Weir Wall alternative included as part of the preferred groundwater corrective action remedy was not included as part of the previously submitted retrofit construction permit application. The design specifications and drawings for that portion of the corrective action were developed by the Weaver Consulting Group (Weaver), are included as Appendix C of this Application and will be referenced as appropriate. Also, the groundwater monitoring networks presented in the retrofit construction permit applications for the MCB and ASB have since been updated/modified in accordance with the IEPA issued CCR Surface Impoundment Operating Permit 2024-CO-100029 dated July 3, 2024. The modified groundwater monitoring program is detailed in this Application and supersedes those presented in the two Retrofit Applications.

In addition, the Corrective Action Plan (CAP), which is required under Section 845.670 to be included in an Application for Groundwater Corrective Action Construction Permit, was developed by Weaver, is included as Appendix D and will be referenced within this Application.

1. History of Construction – Design and Construction Plans (845.220(a)(1))

The history of construction addressing all the items required under Section 845.220(a)(1)(A-K) for the MCB and the ASB are provided Sections 1.1 through 1.13 of the Retrofit Applications, which are included as Appendices A and B, respectively, along with supporting documentation found in the Attachments within those submittals.

2. Narrative Description of Facility (845.220(a)(2))

The description of the facility addressing all the items required under Section 845.220(a)(2)(A-E) for the MCB and the ASB is provided in Sections 2.1 through 2.5 of the Retrofit Applications, which are included as Appendices A and B, respectively, along with supporting documentation found in the Attachments within those submittals.

3. Site Location Map (845.220(a)(3))

The site location maps addressing all the items required under Section 845.220(a)(3)(A-G) for the MCB and the ASB are provided in Section 3.0 of the Retrofit Applications, which are included as Appendices A and B, respectively. The maps are provided in Attachment 3 within those submittals.

4. Site Plan Map (845.220(a)(4))

The site plan maps addressing all the items required under Section 845.220(a)(4)(A-D) for the MCB and the ASB are provided in Section 4.0 of the Retrofit Applications, which are included as Appendices A and B, respectively. The maps are provided in Attachment 4 within those submittals.

5. Description of Proposed Retrofit (845.220(a)(5))

A narrative description of the proposed retrofit of the two CCR surface impoundments required under Section 845.220(a)(5) for the MCB and the ASB are provided in Sections 5.1 through 5.5 of the Retrofit Applications, which are included as Appendices A and B, respectively, along with supporting documentation found in the Attachments 5-1 and 5-2 within those submittals.

In addition, the proposed capping/modification of the of the ASB weir wall specifications and drawings were developed by Weaver and are included in Appendix C of this Application.

6. Facility Component Plans and Specifications (845.220(a)(6))

The facility component plans and specifications describing the design, nature, function and interrelationship of facility components as required under Section 845.220(a)(6) for the MCB and the ASB are provided in Section 6.0 of the Retrofit Applications, which are included as Appendices A and B, respectively.

7. Retrofit Construction Standards (845.220(b)(1-3))

The retrofit construction standards addressing all the items required under Section 845.220(b)(1-3)) for the MCB and the ASB are provided Sections 7.1 through 7.5 of the Retrofit Applications, which are included as Appendices A and B, respectively, along with supporting documentation found in the Attachments 7-1 through 7-5 within those submittals. It is noted that Attachment 7-5 of the Retrofit Applications includes a Fugitive Dust Control Plan. The Fugitive Dust Control plan has since been updated. The current Fugitive Dust Control Plan is dated December 3, 2024, a copy of which is provided as Attachment 1 to this Application and is posted on MWG's State CCR compliance website.

8. Retrofit, Closure & Post-closure Care Plans (845.220(b)(4-5) & 845.770(c)(2))

The written retrofit plan and preliminary closure/post-closure care plans as required under Section 845.220(b)(4-5) and 845.770(c)(2) for the MCB and the ASB are provided Sections 8.1 through 8.3 of the Retrofit Applications, which are included as Appendices A and B, respectively, along with supporting documentation found in Attachments 8-1 and 8-2 within those submittals.

9. Groundwater Monitoring Program (845.220(a)(7)(A-C))

MWG submitted the groundwater monitoring program, developed specifically for the individual impoundments, as part of Retrofit Applications were developed prior to the IEPA issuance of the Operating Permit. In the Operating Permit, IEPA modified the groundwater monitoring program by requiring a single monitoring network covering all four impoundments at Powerton.

The Section 9.1 components in Appendices A and B of the Retrofit Applications meet the requirements of site investigation as specified in Section 845.220(a)(7)(A), and are incorporated by reference here. In addition, Subsections 9.3.1 through 9.3.7 in Appendices A and B of the Retrofit

Applications, are incorporated by reference here. Section 9.2 and Subsection 9.3.8 of the Retrofit Applications are superseded by this Application. Section 9.3.9 is new to describe updates of the Groundwater Monitoring Program pursuant to the Operating Permit.

9.1 Hydrogeologic Site Characterization (845.220(a)(7)(A))

9.1.1 Geology

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.1.2 Hydrogeology

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.2 Revised Groundwater Monitoring System Design and Construction Plans (845.220(a)(7)(B))

The groundwater monitoring network specified by IEPA in Special Conditions 12 and 13 of the Operating Permit covers all four site CCR impoundments and consists of the following 13 monitoring wells:

- MW-16 (upgradient for both the silty clay unit and the sand/gravel unit)
- Silty Clay/Silt Unit – MW-06, MW-14, MW-22, and MW-18A
- Sand/Gravel Unit – MW-01 through MW-05, MW-07, MW-10 and MW-21D

The locations of these wells are provided on Figure 1 of this Application. All CCR groundwater monitoring data through first quarter 2026 for the silty clay/silt unit and the sand/gravel unit are summarized in Tables 1 and 2, respectively, of this Application. IEPA has the supporting analytical data packages which are submitted as part of the Part 845 groundwater monitoring requirements.

In addition to the permit groundwater quality monitoring points, there are additional monitoring wells/piezometers (MW-08, MW-09, MW-11, MW-12R, MW-13, MW-15, MW-17, MW-19, MW-21, MW-23, MW-24, P-1 and P-2) used for water level measurements as well as, in some cases, for the nature and extent of impacts evaluation sampling required in support of the Corrective Measures Assessment. A staff gauge has also been installed within Lost Creek on the east side of the FAB and USGS Kingston Mines gauge data for Illinois River levels are also recorded as part of monthly water level measurement. All of these monitoring wells/piezometers are also provided on Figure 1. Water level measurements collected through fourth quarter 2025 are provided in Table 3. Monthly groundwater flow maps for the silty clay/silt unit and for the sand and gravel unit for 2025 are provided as Attachment 2 of this submittal.

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. (recently merged with Roux 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 5 feet or 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 3 of this Application.

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 4 includes an Illinois licensed Professional Engineer certification of the above-defined monitoring system.

9.3 Groundwater Sampling and Analysis Program (845.220)(a)(7))

9.3.1 Sample Frequency

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.3.2 Sampling Preparation and Calibrations

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.3.3 Groundwater Sample Collection

No changes are proposed to the technical discussion submitted as part of the MCB and ASB Retrofit Applications provided in Appendices A and B, respectively.

9.3.4 Equipment Decontamination

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.3.5 Sample Preservation, Chain-of-Custody and Shipment

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.3.6 Quality Assurance and Quality Control

No changes are proposed to the technical discussion submitted as part of the Retrofit Applications provided in Appendices A and B, respectively.

9.3.7 Statistical Methods

As part of the Operating Permit a wording clarification to the Statistical Approach for Groundwater Monitoring Data Evaluation was required. A Revised Statistical Approach for Groundwater Monitoring Data Evaluation was submitted to IEPA on September 23, 2024 and is provided as Attachment 5 of this Application submittal along with a certification of the plan by an Illinois licensed Professional Engineer.

9.3.8 Groundwater Monitoring Program Updates Pursuant to Operating Permit

The Operating Permit issued site specific GWPSs, which are provided in Table 4 of this Application. In accordance with Special Condition 18 of the Operating Permit, site background was statistically re-evaluated using the data from the second quarter 2024 through first quarter 2026 for background well MW-16. The statistical evaluation was completed in accordance with the above referenced Revised Statistical Approach for Groundwater Monitoring Data Evaluation dated September 23, 2024 and submitted to IEPA on May 25, 2026. The completed new background well statistical evaluations did not identify any CCR parameter Prediction Limit (PL) concentrations above the GWPSs in Special Conditions 21 and 22 of the Operating Permit. Therefore, no changes to the site-specific GWPSs were proposed.

The site-specific GWPSs provided in Table 4 are used for all 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 is submitted to Illinois EPA within 60-days of receipt of all analytical data (including resample data, if necessary, as discussed below). The submittal includes data summary tables with a comparison against the established/approved GWPSs. This report will be placed in 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 in the facility's operating record.

10. Additional Corrective Action Construction Permit Application Requirements (845.220(c))

10.1 Corrective Action Plan (845.220(c)(1))

As noted in the Introductory Section above, the CAP meeting the requirements of Section 845.670 was developed by Weaver and is included as Appendix D of this Application.

10.2 Groundwater Modeling (845.220(c)(2) and (c)(3))

A numerical groundwater model was developed to assist in evaluating the effectiveness of the preferred remedial alternative selected. The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths in the vicinity of the ASB and MCB and provide a platform upon which the preferred corrective action groundwater remedy can be overlain and evaluated for short and long-term effectiveness relative to improvements of groundwater quality. The model includes 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 results of a numerical groundwater modeling analysis of groundwater flow in the vicinity of the Ash Surge Basin and the Metals Cleaning Basin are summarized in the Numerical Groundwater Flow Modeling Report developed by BAS Groundwater Consulting which is included as Appendix A of the CAP.

10.3 Corrective Action Groundwater Monitoring Program (845.220(c)(4))

The proposed corrective action groundwater monitoring program will include the quarterly groundwater sampling and analysis required under the Operating permit as specified in Sections 9.2 and 9.4 above. In addition, monitoring well MW-24, which was installed as part of the nature and extent of impacts evaluation, will also be included as part of the quarterly sampling program going forward. This well is located to the northwest of the subject CCR surface impoundments and west of the former intake channel. The location of this well is included on Figure 1 of this Application.

10.4 Interim Measures (845.220(c)(5))

As part of the Corrective Measures Assessment completed by Weaver, integrity testing of the existing liner system for both the MCB and ASB was completed. The testing identified locations where the liners were found to be compromised. These areas were repaired as part of Powerton's

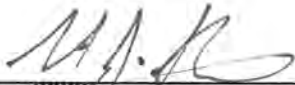
maintenance procedures in accordance with liner manufacturer specifications. Follow-up integrity testing documented the successful repair of these areas of liner compromise. At this time, no additional interim measures are proposed prior to initiation of construction of the liner retrofits.

11. Professional Engineer Certification (845.220(a)(8))

I hereby certify that:

- This Application for Groundwater Corrective Action Construction Permit meets the requirements of 35 Ill. Admin. Code 845.220(a), (b) and (c).
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By:



Date: 8/10/24

Seal:



12. Owner Certification (845.220(a)(9))

A certification stating that the owner or operator of the subject CCR surface impoundments has completed the public notification and public meetings that are required under Ill. Admin. Code 845.240 is included as Attachment 6 to this Application. The following additional information is included in Attachment 7 of this Application:

- A summary of issues and questions raised by attendees of the public meetings.
- A summary of any revisions, determinations and other considerations made in response to the noted issues and questions.
- A list of interested persons who attended the public meetings and would like to be added to the IEPA's listserv for the facility.

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

TABLES

1. Summary of CCR Groundwater Monitoring Data – Silty Clay / Silt Unit
2. Summary of CCR Groundwater Monitoring Data – Sand and Gravel Unit
3. Summary of Water Level Measurements
4. Permit Specified Groundwater Protection Standards

Table 1. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL, Silty Clay/Silt Unit.

Well		Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium	Turbidity	
GWPS			4.7	NSP	200.0	4.0	6.5-9.0	400.0	1200.0	0.006	0.010	2.0	0.0040	0.005	0.1	0.006	0.0075	0.04	0.002	0.10	5.0	0.05	0.002	NSP	
MW-16 upgradient		6/18/2024	0.19	110	21	< 0.10	6.91	39	510	< 0.0030	< 0.0010	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^1+ < 0.010	< 0.00020	< 0.0050	< 0.639	< 0.0025	< 0.0020	13.04	
		9/11/2024	0.18	110	22	< 0.10	7.05	25	500	< 0.0030	< 0.0010	0.039	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.754	< 0.0025	< 0.0020	8.22	
		11/20/2024	0.16	120	28	< 0.10	7.15	25	610	< 0.0030	< 0.0010	0.048	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.755	< 0.0025	< 0.0020	5.80	
		2/25/2025	0.14	120	28	0.11	7.04	32	520	< 0.0030	< 0.0010	0.046	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< -0.101	< 0.0025	< 0.0020	7.63	
		5/19/2025	0.15	120	26	< 0.10	7.14	34	470	< 0.0030	< 0.0010	0.042	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.0213	< 0.0025	< 0.0020	6.74	
		8/14/2025	0.15	120	27	0.13	7.14	40	B 520	< 0.0030	< 0.0010	0.043	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	1.04	< 0.0025	< 0.0020	16.49	
		11/13/2025	0.15	110	32	0.10	7.12	32	530	< 0.0030	< 0.0010	0.038	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.948	< 0.0025	< 0.0020	25.77	
		2/16/2026	0.15	110	30	0.11	7.15	31	490	< 0.0010	0.0016	0.073	< 0.00040	< 0.00050	< 0.0050	0.0067	0.0033	< 0.010	< 0.00020	< 0.0050	< 0.697	< 0.0025	< 0.00040	44.53	
	3/16/2026 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.0010	NA	NA	NA	NA	NA	NA	NA		
MW-06 downgradient		6/18/2024	0.39	94	140	0.49	7.64	220	820	< 0.0030	0.0021	0.059	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^1+ < 0.010	< 0.00020	0.010	< 0.722	< 0.0025	< 0.0020	11.22	
		9/10/2024	0.40	96	130	0.48	7.64	270	880	< 0.0030	0.0032	0.075	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.010	< 0.00020	0.011	1.94	< 0.0025	< 0.0020	12.45	
		11/19/2024	0.27	96	150	0.43	7.65	290	950	< 0.0030	0.0028	0.071	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.00050	< 0.00020	0.011	< 0.19	< 0.0025	< 0.0020	8.99	
		2/26/2025	0.24	100	150	0.38	7.66	220	750	< 0.0030	0.0024	0.063	^1+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.011	< 0.364	< 0.0025	< 0.0020	6.26	
		5/19/2025	0.36	94	150	0.45	7.66	210	760	< 0.0030	0.0025	0.065	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.011	< 0.296	< 0.0025	< 0.0020	18.20	
		8/12/2025	0.42	100	150	0.80	7.50	220	940	< 0.0030	0.0042	0.080	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.011	< 0.00020	0.013	1.35	< 0.0025	< 0.0020	15.16	
		11/12/2025	0.26	97	160	0.64	7.56	200	790	< 0.0030	0.0029	0.073	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.011	< 0.00020	0.012	< 0.268	< 0.0025	< 0.0020	20.51	
		2/17/2026	0.24	98	160	0.51	7.89	240	920	< 0.0010	0.0023	0.065	< 0.00040	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0082	< 0.380	< 0.0025	< 0.00040	38.42	
MW-14 downgradient		4/8/2021	2.1	200	98	1.1	7.33	630	1600	< 0.0030	0.0028	0.036	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.028	< 0.0002	0.035	< 0.605	0.029	0.0022	13.90	
		5/12/2021	2.6	210	100	1.1	7.13	640	1700	< 0.0030	0.0047	0.038	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.028	< 0.0002	0.034	< 0.430	0.0039	0.0028	5.39	
		6/3/2021	2.1	200	26	1.0	6.79	590	1600	< 0.0030	0.0025	0.036	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.025	< 0.0002	0.028	< 0.357	0.094	0.0025	1.22	
		6/28/2021	B 2.0	210	93	0.99	6.90	570	1700	^+ < 0.0030	0.0014	0.034	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.028	< 0.0002	0.03	0.758	0.034	0.0023	2.63	
		7/20/2021	2.0	190	81	0.89	6.88	500	1700	< 0.0030	0.0025	0.057	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.027	< 0.0002	0.021	< 0.434	< 0.0025	< 0.002	3.74	
		8/23/2021	2.1	210	91	0.96	6.91	560	1800	< 0.0030	0.0022	0.035	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.030	< 0.0002	0.031	0.515	0.010	0.0021	4.34	
		10/1/2021	1.9	200	100	0.95	7.06	640	1700	< 0.0030	0.0045	0.039	< 0.0010	0.00050	< 0.0050	< 0.0010	0.00065	^1+ 0.034	< 0.0002	0.037	< 0.581	< 0.0025	0.002	4.26	
		11/29/2021	2.0	180	94	1.10	7.01	^ 480	1400	< 0.0030	0.0025	0.032	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.026	< 0.0002	0.033	< 0.442	0.010	< 0.002	10.27	
		2/9/2022	1.9	180	67	1.10	6.91	430	1500	< 0.0030	0.013	0.046	< 0.0010	0.00056	< 0.0050	< 0.0010	< 0.00050	0.026	< 0.0002	0.03	0.724	< 0.0025	0.0022	12.29	
		6/8/2022	2.2	220	87	0.96	7.12	810	2100	< 0.0030	0.0041	0.057	< 0.0010	0.00056	< 0.0050	< 0.0010	< 0.00050	0.022	< 0.0002	0.038	< 0.429	0.013	0.0033	8.66	
		8/31/2022	2.2	B 200	120	0.86	6.74	610	1800	< 0.0030	0.0040	0.056	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.027	< 0.0002	0.024	0.743	< 0.0025	< 0.002	19.54	
		11/17/2022	NA	NA	NA	NA	6.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40.75
		2/22/2023	2.2	190	120	0.76	7.40	600	1700	< 0.0030	0.015	0.067	^1+ ^+ < 0.0010	0.00085	< 0.0050	< 0.0010	0.0015	0.00022	0.025	< 0.552	0.024	0.0020	31.69		
		5/17/2023	2.3	280	100	1.0	7.02	1100	2600	< 0.0030	0.0016	0.054	^1+ ^+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.021	< 0.00020	0.044	< 0.712	0.090	0.0027	7.33	
		8/29/2023	1.5	180	150	1.0	6.84	880	2300	< 0.0020	< 0.0020	0.041	0.00010	< 0.00020	< 0.0050	< 0.00050	0.00056	0.024	< 0.00020	0.034	0.816	< 0.005	0.0022	7.08	
		11/6/2023	1.5	190</																					

Table 2. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL, Sand and Gravel Unit.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium + 226	Selenium	Thallium	Turbidity
MW-16 upgradient	GWPS	4.7	NSP	200	4.0	6.5-9.0	400	1200	0.006	0.010	2.0	0.004	0.005	0.1	0.006	0.0075	0.04	0.002	0.1	5	0.05	0.002	NSP
	6/18/2024	0.19	110	21	< 0.10	6.91	39	510	< 0.0030	< 0.0010	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^1+ < 0.010	< 0.00020	< 0.0050	< 0.639	< 0.0025	< 0.0020	13.04
	9/11/2024	0.18	110	22	< 0.10	7.05	25	500	< 0.0030	< 0.0010	0.039	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.754	< 0.0025	< 0.0020	8.22
	11/20/2024	0.16	120	28	< 0.10	7.15	25	610	< 0.0030	< 0.0010	0.048	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.755	< 0.0025	< 0.0020	5.80
	2/25/2025	0.14	120	28	0.11	7.04	32	520	< 0.0030	< 0.0010	0.046	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< -0.101	< 0.0025	< 0.0020	7.63
	5/19/2025	0.15	120	26	< 0.10	7.14	34	470	< 0.0030	< 0.0010	0.042	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.0213	< 0.0025	< 0.0020	6.74
	8/14/2025	0.15	120	27	0.13	7.14	40	B 520	< 0.0030	< 0.0010	0.043	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	1.04	< 0.0025	< 0.0020	16.49
	11/13/2025	0.15	110	32	0.10	7.12	32	530	< 0.0030	< 0.0010	0.038	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.948	< 0.0025	< 0.0020	25.77
	2/16/2026	0.15	110	30	0.11	7.15	31	490	< 0.0010	0.0016	0.073	< 0.00040	< 0.00050	< 0.0050	0.0067	0.0033	< 0.010	< 0.00020	< 0.0050	< 0.697	< 0.0025	< 0.00040	44.53
3/16/2026 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0067	0.0033	< 0.010	< 0.00020	< 0.0050	NA	NA	NA	NA
MW-01 downgradient	1/16/2015	1.0	98	44	0.17	7.07	93	530	< 0.0030	< 0.0010	0.057	^ < 0.0010	< 0.00050	< 0.0050	< 0.0010	* < 0.00050	< 0.010	< 0.00020	< 0.0050	0.744	< 0.0025	* < 0.0020	NA
	2/25/2016	0.20	110	42	0.16	7.23	54	460	< 0.0030	0.0025	0.053	< 0.0010	< 0.00050	< 0.0050	0.0014	< 0.0019	< 0.010	< 0.00020	< 0.0050	< 0.722	0.0029	< 0.0020	NA
	5/20/2016	0.34	100	44	0.17	6.95	65	430	< 0.0030	0.0081	0.062	< 0.0010	< 0.00050	0.0070	0.0053	0.011	< 0.010	< 0.00020	< 0.0050	< 0.953	< 0.0025	< 0.0020	NA
	8/17/2016	0.27	78	39	0.25	7.16	50	530	< 0.0030	0.0014	0.048	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.0014	< 0.010	< 0.00020	0.0057	< 0.491	< 0.0025	< 0.0020	NA
	11/16/2016	0.18	97	39	0.21	7.22	32	500	< 0.0030	0.0051	0.056	< 0.0010	< 0.00050	< 0.0050	0.0044	0.0082	< 0.010	< 0.00020	0.0059	< 0.618	< 0.0025	< 0.0020	NA
	2/14/2017	0.18	120	55	0.17	7.30	60	550	< 0.0030	0.0041	0.056	< 0.0010	< 0.00050	< 0.0050	0.0045	0.0076	< 0.010	< 0.00020	0.0056	< 0.837	< 0.0025	< 0.0020	NA
	5/3/2017	0.19	86	66	0.16	7.41	45	460	< 0.0030	0.0015	0.045	< 0.0010	< 0.00050	< 0.0050	0.0033	0.0067	< 0.010	< 0.00020	< 0.0050	0.574	< 0.0025	< 0.0020	NA
	6/21/2017	0.18	85	58	0.18	7.60	47	540	< 0.0030	< 0.0010	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0061	< 0.418	< 0.0025	< 0.0020	NA
	8/25/2017	0.56	86	41	0.18	7.41	63	490	< 0.0030	< 0.0010	0.049	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0059	0.775	< 0.0025	< 0.0020	NA
	11/8/2017	0.57	130	38	0.12	6.69	61	640	< 0.0030	< 0.0010	0.083	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.343	< 0.0025	< 0.0020	NA
	5/17/2018	0.15	88	50	0.12	6.70	48	540	< 0.0030	< 0.0010	0.045	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00068	< 0.010	< 0.00020	< 0.0050	< 0.396	< 0.0025	< 0.0020	NA
	8/8/2018	0.14	86	48	0.13	6.80	43	430	< 0.0030	< 0.0010	0.051	^ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.579	< 0.0025	< 0.0020	NA
	4/30/2019	0.07	78	54	0.17	7.20	27	450	< 0.0030	0.0014	0.039	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.0017	< 0.010	< 0.00020	< 0.0050	< 0.656	< 0.0025	< 0.0020	NA
	8/26/2019	0.57	100	39	0.13	7.15	71	550	< 0.0030	< 0.0010	0.053	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.802	< 0.0025	< 0.0020	NA
	2/24/2020	0.28	87	53	0.21	7.19	34	410	< 0.0030	< 0.0010	0.044	^ < 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00057	< 0.010	< 0.00020	< 0.0050	< 0.478	< 0.0025	< 0.0020	NA
	4/28/2020	0.33	110	46	0.19	7.17	41	470	NS	< 0.0010	0.051	NS	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.628	< 0.0025	< 0.0020	NA
	12/7/2020	0.59	100	54	0.25	7.22	55	640	NS	< 0.0010	0.058	NS	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0052	< 0.542	< 0.0025	< 0.0020	NA
	5/11/2021	0.21	85	51	0.21	7.52	37	450	< 0.0030	< 0.0010	0.043	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.010	0.521	< 0.0025	< 0.0020	NA
	8/24/2021	0.27	99	40	0.18	7.19	56	430	< 0.0030	< 0.0010	0.061	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00088	< 0.010	< 0.00020	0.0070	< 0.463	< 0.0025	< 0.0020	3.34
	11/30/2021	0.35	84	41	0.19	7.14	^ 28	410	< 0.0030	< 0.0010	0.060	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.0050	< 0.00020	0.0072	< 0.434	0.0026	< 0.0020	5.43
	2/9/2022	0.18	96	47	0.17	7.33	48	520	< 0.0030	0.0017	0.052	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.0012	0.0030	< 0.00020	0.0074	< 0.527	< 0.0025	< 0.0020	11.50
	6/7/2022	0.21	81	51	0.14	7.62	27	430	< 0.0030	< 0.0010	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0057	0.531	< 0.0025	< 0.0020	3.63
	8/30/2022	0.59	92	44	0.15	7.10	66	810	< 0.0030	< 0.0010	0.073	^+ < 0.0010	< 0.00050	< 0.0050	< 0.001								

Table 2. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL, Sand and Gravel Unit.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium	Turbidity
MW-03 downgradient	GWPS	4.7	NSP	200	4.0	6.5-9.0	400	1200	0.006	0.010	2.0	0.004	0.005	0.1	0.006	0.0075	0.04	0.002	0.1	5	0.05	0.002	NSP
	6/20/2017	0.37	76	54	0.29	7.26	49	480	< 0.0030	0.0013	0.066	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.325	< 0.0025	< 0.0020	NA
	8/23/2017	0.40	79	52	0.28	7.44	52	430	< 0.0030	0.0010	0.066	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	1.20	< 0.0025	< 0.0020	NA
	11/7/2017	0.31	79	62	0.26	7.04	61	460	< 0.0030	0.0013	0.068	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.588	< 0.0025	< 0.0020	NA
	5/15/2018	0.35	87	66	0.27	7.53	77	520	< 0.0030	0.0010	0.059	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.489	< 0.0025	< 0.0020	NA
	8/7/2018	0.40	82	67	0.22	6.60	49	500	< 0.0030	0.0015	0.067	^< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.341	< 0.0025	< 0.0020	NA
	10/30/2018	0.20	74	44	0.25	7.84	26	400	< 0.0030	0.0014	0.056	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.354	< 0.0025	< 0.0020	NA
	2/26/2019	0.056	74	56	0.24	7.49	25	410	< 0.0030	0.0013	0.054	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00072	< 0.010	< 0.00020	< 0.0050	< 0.399	< 0.0025	< 0.0020	NA
	4/30/2019	0.28	74	49	0.22	7.17	38	390	< 0.0030	< 0.0010	0.060	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.668	< 0.0025	< 0.0020	NA
	8/26/2019	0.31	75	50	0.26	7.17	14	380	< 0.0030	0.0014	0.069	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.444	< 0.0025	< 0.0020	NA
	2/24/2020	0.33	87	53	0.22	7.10	65	470	< 0.0030	< 0.0010	0.066	^< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.400	< 0.0025	< 0.0020	NA
	4/28/2020	0.24	86	46	0.22	7.03	79	410	NA	0.0013	0.066	NA	NA	< 0.0050	< 0.0010	< 0.00050	NA	NA	< 0.0050	< 0.498	0.0036	NA	NA
	12/9/2020	0.86	92	45	0.28	7.46	60	390	NA	< 0.0010	0.086	NA	NA	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.432	< 0.0025	NA	NA
	5/11/2021	0.22	75	49	0.21	7.33	38	390	< 0.0030	< 0.0010	0.070	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.519	< 0.0025	< 0.0020	2.68
	8/24/2021	0.41	81	46	0.25	7.15	32	310	< 0.0030	0.0012	0.072	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.444	< 0.0025	< 0.0020	5.75
	11/30/2021	0.30	76	47	0.26	7.20	^ 23	350	< 0.0030	0.0014	0.063	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.004	< 0.00020	< 0.0050	< 0.436	< 0.0025	< 0.0020	0.00
	2/8/2022	0.20	94	47	0.21	7.22	50	550	< 0.0030	0.0010	0.058	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.003	< 0.00020	< 0.0050	0.593	< 0.0025	< 0.0020	0.00
	6/7/2022	0.37	79	45	0.22	7.37	47	370	< 0.0030	0.0012	0.064	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.851	< 0.0025	< 0.0020	1.72
	8/30/2022	0.57	87	50	0.21	7.10	51	710	< 0.0030	< 0.0010	0.10	^+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^+ < 0.010	< 0.00020	< 0.0050	0.589	< 0.0025	< 0.0020	2.67
	11/14/2022	0.42	81	49	0.28	7.23	44	430	< 0.0030	< 0.0010	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.540	< 0.0025	< 0.0020	4.03
	2/21/2023	1.0	96	53	0.20	7.75	70	550	< 0.0030	< 0.0010	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.493	< 0.0025	< 0.0020	2.33
	5/16/2023	0.15	80	69	0.21	7.42	31	420	< 0.0030	< 0.0010	0.068	^1+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.993	0.0038	< 0.0020	6.94
	8/28/2023	0.32	73	82	0.20	7.28	36	430	< 0.0020	< 0.0020	0.096	< 0.0010	< 0.00020	< 0.0050	< 0.0005	< 0.00050	< 0.010	< 0.00020	0.0023	< 0.742	0.0070	0.0030	1.45
	11/7/2023	1.1	90	59	0.19	7.29	91	530	< 0.0030	< 0.0010	0.12	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^+ < 0.010	< 0.00020	< 0.0050	< 0.0758	0.0055	< 0.0020	2.29
	2/22/2024	0.19	88	64	0.20	7.51	66	520	< 0.0030	< 0.0010	0.064	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.698	0.0058	< 0.0020	10.24
	6/19/2024	0.93	100	54	0.24	6.80	73	540	< 0.0030	0.0011	0.078	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^1+ < 0.010	< 0.00020	< 0.0050	< 0.727	< 0.0025	< 0.0020	7.26
	9/10/2024	0.21	78	68	0.19	7.27	21	420	< 0.0030	< 0.0010	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.684	< 0.0025	< 0.0020	8.64
	11/19/2024	0.67	84	58	0.18	7.18	48	510	< 0.0030	< 0.0010	0.12	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.0657	< 0.0025	< 0.0020	3.83
	2/25/2025	0.35	92	64	0.18	7.14	39	470	< 0.0030	< 0.0010	0.13	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.331	0.0047	< 0.0020	6.12
	5/20/2025	0.18	84	92	0.21	7.27	32	460	< 0.0030	< 0.0010	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< -0.0579	0.0059	< 0.0020	5.27
	8/13/2025	0.19	87	86	0.28	7.40	34	530	< 0.0030	< 0.0010	0.12	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.930	0.0059	< 0.0020	13.60
	11/11/2025	0.42	97	63	0.21	7.19	60	460	< 0.0030	< 0.0010	0.14	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.626	< 0.0025	< 0.0020	21.95
2/17/2026	1.0	90	65	0.23	7.27	55	480	< 0.0010	< 0.0010	0.12	< 0.00040	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.0472	0.0048	< 0.00040	21.21	
MW-04 downgradient	6/20/2017	0.47	77	55	0.29	7.45	53	480	< 0.0030	< 0.0010	0.0025	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.343	< 0.0025	< 0.0020	NA
	8/28/2017	V 0.73	90	89	0.33	7.13	110	680	< 0.0030	< 0.0010	0.028	< 0.0010	< 0.00050	< 0.0050	< 0.0010								

Table 2. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL, Sand and Gravel Unit.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium	Turbidity
downgradient	GWPS	4.7	NSP	200	4.0	6.5-9.0	400	1200	0.006	0.010	2.0	0.004	0.005	0.1	0.006	0.0075	0.04	0.002	0.1	5	0.05	0.002	13.00
	5/17/2016	0.70	100	85	0.35	7.08	120	660	< 0.0030	< 0.0010	0.051	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	< 0.0050	< 0.373	< 0.0025	< 0.0020	NA
	8/16/2016	0.69	110	97	0.30	6.85	150	830	< 0.0030	< 0.0010	0.060	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	< 0.0050	< 0.452	< 0.0025	< 0.0020	NA
	11/15/2016	0.93	94	66	0.23	6.96	77	620	< 0.0030	< 0.0010	0.051	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	< 0.0050	0.449	< 0.0025	< 0.0020	NA
	2/14/2017	0.79	100	100	0.25	7.25	170	760	< 0.0030	< 0.0010	0.062	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00091	< 0.010	< 0.0002	< 0.0050	< 0.359	< 0.0025	< 0.0020	NA
	5/1/2017	0.70	100	92	0.28	7.60	170	710	< 0.0030	< 0.0010	0.059	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0066	< 0.439	< 0.0025	< 0.0020	NA
	6/20/2017	0.64	89	63	0.28	7.32	78	550	< 0.0030	< 0.0010	0.048	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0061	< 0.365	< 0.0025	< 0.0020	NA
	8/28/2017	0.62	110	120	0.33	7.05	210	870	< 0.0030	< 0.0010	0.064	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0085	0.381	< 0.0025	< 0.0020	NA
	11/7/2017	0.51	99	110	0.31	6.87	160	990	< 0.0030	< 0.0010	0.058	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	< 0.0050	< 0.341	< 0.0025	< 0.0020	NA
	5/15/2018	0.61	130	89	0.29	7.70	210	910	< 0.0030	< 0.0010	0.062	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	< 0.0050	< 0.390	< 0.0025	< 0.0020	NA
	8/7/2018	0.49	110	120	0.32	6.56	180	890	< 0.0030	< 0.0010	0.054	^< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0069	0.523	< 0.0025	< 0.0020	NA
	4/30/2019	0.56	84	73	0.36	6.96	120	590	< 0.0030	< 0.0010	0.041	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0061	< 0.709	< 0.0025	< 0.0020	NA
	8/26/2019	0.57	110	75	0.29	7.01	110	660	< 0.0030	< 0.0010	0.050	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0067	0.651	< 0.0025	< 0.0020	NA
	2/24/2020	0.54	110	70	0.36	6.90	120	H 700	< 0.0030	< 0.0010	0.057	^< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0061	0.506	< 0.0025	< 0.0020	NA
	4/28/2020	0.49	110	56	0.37	6.87	130	620	NA	0.0010	0.052	NA	NA	< 0.0050	< 0.0010	< 0.00050	NA	NA	0.0074	0.508	< 0.0025	NA	NA
	12/9/2020	0.53	98	78	0.31	6.91	110	670	NA	< 0.0010	0.050	NA	NA	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0072	0.569	< 0.0025	NA	NA
	5/11/2021	0.50	83	52	0.38	7.20	100	530	< 0.0030	< 0.0010	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0062	< 0.525	< 0.0025	< 0.0020	1.82
	8/24/2021	0.55	88	69	0.32	6.84	99	500	< 0.0030	< 0.0010	0.041	< 0.0010	< 0.00050	0.0070	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0073	0.863	< 0.0025	< 0.0020	3.20
	11/30/2021	0.68	99	67	0.3	6.92	^ 92	620	< 0.0030	0.0011	0.048	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.0052	< 0.0002	0.0051	0.632	< 0.0025	< 0.0020	0.00
	2/8/2022	0.56	88	68	0.36	6.95	91	650	< 0.0030	< 0.0010	0.043	< 0.0010	0.00066	< 0.0050	0.0023	0.0017	0.0051	< 0.0002	0.0070	< 0.438	< 0.0025	< 0.0020	0.00
	6/7/2022	0.59	110	58	0.27	7.15	120	650	< 0.0030	< 0.0010	0.052	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	0.00034	< 0.0050	< 0.468	< 0.0025	< 0.0020	2.33
	8/30/2022	0.69	79	73	0.38	6.94	86	720	< 0.0030	< 0.0010	0.029	^+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^+ < 0.010	< 0.0002	0.0073	< 0.538	< 0.0025	< 0.0020	2.70
	11/14/2022	1.1	96	64	0.29	6.87	93	600	< 0.0030	< 0.0010	0.072	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.0064	< 0.573	< 0.0025	< 0.0020	2.05
	2/21/2023	0.68	100	93	0.29	7.34	97	760	< 0.0030	< 0.0010	0.052	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.528	0.0031	< 0.0020	2.16
	5/16/2023	0.78	110	79	0.30	7.04	130	690	< 0.0030	< 0.0010	0.053	^1+ < 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	< 0.648	< 0.0025	< 0.0020	2.55
	8/29/2023	1.1	98	80	0.29	6.99	83	660	< 0.0020	< 0.0020	0.037	< 0.0010	< 0.00020	< 0.0050	< 0.0005	< 0.00050	< 0.010	< 0.00020	0.0040	0.817	< 0.005	< 0.0010	1.50
	11/7/2023	1.5	110	98	0.26	6.96	150	700	< 0.0030	< 0.0010	0.039	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^+ < 0.010	< 0.00020	< 0.0050	0.428	0.0025	< 0.0020	2.50
	2/22/2024	3.3	120	93	0.30	7.17	190	830	< 0.0030	< 0.0010	0.056	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.965	< 0.0025	< 0.0020	7.08
	6/19/2024	1.8	140	82	0.33	6.74	190	850	< 0.0030	< 0.0010	0.057	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	^1+ < 0.010	< 0.00020	< 0.0050	< 0.797	< 0.0025	< 0.0020	7.56
	9/10/2024	2.3	100	61	0.26	7.10	120	670	< 0.0030	< 0.0010	0.060	< 0.0010	0.00059	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.0065	2.74	< 0.0025	< 0.0020	8.70
	11/19/2024	1.8	120	74	0.27	6.90	120	730	< 0.0030	< 0.0010	0.044	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	< 0.0050	0.844	< 0.0025	< 0.0020</	

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-06 down-gradient	5/11/2015	464.47	17.26	447.21	11.61	438.78
	8/18/2015	464.47	15.65	448.82	4.62	431.79
	11/16/2015	464.47	19.11	445.36	4.38	431.55
	2/22/2016	464.50	17.11	447.39	7.97	435.14
	5/16/2016	464.50	17.80	446.70	14.53	441.7
	8/15/2016	464.50	14.13	450.37	7.11	434.28
	11/14/2016	464.50	15.06	449.44	6.35	433.52
	2/13/2017	464.50	13.77	450.73	NA	NA
	5/2/2017	464.50	14.15	450.35	17.09	444.26
	8/24/2017	464.50	16.09	448.41	3.86	431.03
	11/8/2017	464.50	16.76	447.74	6.89	434.06
	3/6/2018	464.50	15.00	449.50	NA	NA
	5/18/2018	464.50	15.82	448.68	9.93	437.1
	8/10/2018	464.50	14.29	450.21	2.13	429.3
	10/29/2018	464.50	16.67	447.83	4.21	431.38
	2/25/2019	464.50	14.98	449.52	16.74	443.91
	4/29/2019	464.50	15.87	448.63	14.04	441.21
	8/26/2019	464.50	15.31	449.19	3.61	430.78
	11/11/2019	464.50	15.16	449.34	15.92	443.09
	2/24/2020	464.50	15.83	448.67	12.84	440.01
	4/27/2020	464.50	15.36	449.14	12.64	439.81
	8/10/2020	464.50	17.70	446.80	4.29	431.46
	12/7/2020	464.50	16.00	448.50	2.97	430.14
	2/22/2021	464.50	15.58	448.92	6.21	433.38
	5/10/2021	464.50	15.35	449.15	10.71	437.88
	8/23/2021	464.50	16.05	448.45	3.49	430.66
	11/29/2021	464.50	16.85	447.65	5.17	432.34
	2/7/2022	464.50	17.14	447.36	4.4	431.57
	6/6/2022	464.50	17.06	447.44	8.21	429.59
	8/29/2022	464.50	17.50	447.00	2.55	429.72
	11/14/2022	464.50	17.96	446.54	3.2	430.37
	2/20/2023	464.50	17.27	447.23	7.6	434.77
	5/15/2023	464.50	17.17	447.33	8.78	435.95
	8/28/2023	464.50	17.86	446.64	3.26	430.43
	11/6/2023	464.50	18.85	445.65	3.65	430.82
	1/24/2024	464.50	18.59	445.91	12.92	440.09
	2/19/2024	464.50	18.13	446.37	12.74	439.91
	3/26/2024	464.50	17.28	447.22	10.1	437.27
	4/12/2024	464.50	16.94	447.56	16.79	443.96
	5/15/2024	464.50	16.20	448.30	15.9	443.07
	6/17/2024	464.50	16.26	448.24	12.03	439.2
	7/25/2024	464.50	16.00	448.50	12.63	439.8
	8/21/2024	464.50	15.91	448.59	11.76	438.93
	9/9/2024	464.50	16.09	448.41	11.82	438.99
	10/29/2024	464.50	16.16	448.34	2.16	429.33
	11/18/2024	464.50	16.26	448.24	4.14	431.31
	12/10/2024	464.50	17.26	447.24	2.8	429.97
	1/7/2025	464.50	17.14	447.36	5.95	433.12
	2/24/2025	464.50	15.71	448.79	2.98	430.15
	3/28/2025	464.50	16.25	448.25	7.45	434.62
	4/24/2025	464.50	15.98	448.52	7.68	434.85
	5/19/2025	464.50	15.27	449.23	4.38	431.55
	6/27/2025	464.50	15.84	448.66	6.52	433.69
	7/22/2025	464.50	16.26	448.24	5.66	432.83
	8/11/2025	464.50	16.37	448.13	3.41	430.58
	9/16/2025	464.50	16.78	447.72	2.17	429.34
	10/21/2025	464.50	18.81	445.69	2.58	429.75
	11/10/2025	464.50	16.22	448.28	3.60	430.77
	12/18/2025	464.50	15.94	448.56	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-12 / 12R down-gradient	11/16/2015	473.38	24.48	448.90	4.38	431.55
	2/22/2016	473.38	21.41	451.97	7.97	435.14
	5/16/2016	473.38	22.94	450.44	14.53	441.7
	8/15/2016	473.38	23.85	449.53	7.11	434.28
	11/14/2016	473.38	23.89	449.49	6.35	433.52
	2/13/2017	473.38	21.93	451.45	NA	NA
	5/1/2017	473.38	22.26	451.12	17.09	444.26
	6/20/2017	473.38	22.76	450.62	11.93	439.1
	8/26/2017	473.38	23.92	449.46	3.86	431.03
	11/10/2017	473.38	24.29	449.09	6.89	434.06
	5/16/2018	473.38	22.46	450.92	9.93	437.1
	8/9/2018	473.38	23.78	449.60	2.13	429.3
	11/1/2018	473.38	23.74	449.64	4.21	431.38
	4/29/2019	473.38	22.05	451.33	14.04	441.21
	11/11/2019	473.38	22.85	450.53	15.92	443.09
	4/27/2020	473.38	21.44	451.94	12.64	439.81
	12/7/2020	473.38	22.70	450.68	2.97	430.14
	2/22/2021	473.38	21.00	452.38	6.21	433.38
	4/7/2021	473.38	21.91	451.47	10.23	437.4
	5/10/2021	473.38	22.50	450.88	10.71	437.88
	6/2/2021	473.38	22.60	450.78	10.7	437.87
	6/28/2021	473.38	22.95	450.43	12.11	439.28
	7/19/2021	473.38	22.99	450.39	15.06	442.23
	8/23/2021	473.38	23.48	449.90	3.49	430.66
	9/30/2021	473.38	23.87	449.51	2.49	429.66
	10/27/2021	473.38	23.90	449.48	13.08	440.25
	11/29/2021	473.38	23.33	450.05	5.17	432.34
	12/30/2021	473.38	22.95	450.43	6.68	433.85
	1/6/2022	473.38	22.77	450.61	6.45	433.62
	2/7/2022	473.38	22.03	451.35	4.4	431.57
	3/1/2022	473.38	21.74	451.64	16.04	443.21
	4/22/2022	473.38	22.03	451.35	NA	NA
	5/24/2022	473.38	22.36	451.02	11.42	438.59
	6/6/2022	473.38	22.65	450.73	8.21	435.38
	7/25/2022	473.38	23.29	450.09	5.36	432.53
	8/29/2022	473.38	23.84	449.54	2.55	429.72
	9/28/2022	473.38	24.13	449.25	2.37	429.54
	10/26/2022	473.38	24.28	449.10	4.36	431.53
	11/14/2022	473.38	24.15	449.23	3.2	430.37
	12/28/2022	473.38	22.41	450.97	NA	NA
	1/24/2023	473.38	21.68	451.70	7.29	434.46
	2/20/2023	473.38	21.36	452.02	7.6	434.77
	3/28/2023	473.38	21.07	452.31	14.9	442.07
	4/25/2023	473.38	21.53	451.85	9.4	436.57
	5/15/2023	473.38	21.88	451.50	8.78	435.95
	6/26/2023	473.38	22.87	450.51	2.42	429.59
	7/25/2023	473.38	22.99	450.39	3.67	430.84
	8/28/2023	473.38	23.12	450.26	3.26	430.43
	9/28/2023	473.38	23.50	449.88	3.35	430.52
	10/27/2023	473.38	23.88	449.50	3.98	431.15
	11/6/2023	473.38	23.88	449.50	3.65	430.82
	12/21/2023	473.38	22.72	450.66	6.12	433.29
	1/24/2024	473.38	21.70	451.68	12.92	440.09
	2/19/2024	473.38	21.51	451.87	12.74	439.91
	3/26/2024	473.38	21.67	451.71	10.10	437.27
	4/12/2024	473.38	21.51	451.87	16.79	443.96
	5/15/2024	472.95	21.30	451.65	15.9	443.07
	6/17/2024	472.95	22.10	450.85	12.03	439.2
	7/25/2024	472.95	22.60	450.35	12.63	439.8
	8/21/2024	472.95	22.92	450.03	11.76	438.93
	9/9/2024	472.95	22.72	450.23	11.82	438.99
	10/29/2024	472.95	23.80	449.15	2.16	429.33
	11/18/2024	472.95	23.27	449.68	4.14	431.31
	12/10/2024	472.95	23.56	449.39	2.8	429.97
	1/7/2025	472.95	23.84	449.11	5.95	433.12
	2/24/2025	472.95	23.74	449.21	2.98	430.15
	3/28/2025	472.95	24.30	448.65	7.45	434.62
	4/24/2025	472.95	24.36	448.59	7.68	434.85
	5/19/2025	472.95	24.70	448.25	4.38	431.55
	6/27/2025	472.95	24.30	448.65	6.52	433.69
	7/22/2025	472.95	24.15	448.80	5.66	432.83
	8/11/2025	472.95	24.04	448.91	3.41	430.58
	9/16/2025	472.95	24.83	448.12	2.17	429.34
	10/21/2025	472.95	24.88	448.07	2.58	429.75
	11/10/2025	472.95	24.41	448.54	3.60	430.77
	12/18/2025	472.95	24.62	448.33	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-14 down-gradient	2/22/2021	470.79	25.43	445.36	6.21	433.38
	4/7/2021	470.79	24.46	446.33	10.23	437.4
	5/10/2021	470.79	24.86	445.93	10.71	437.88
	6/2/2021	470.79	24.20	446.59	10.7	437.87
	6/28/2021	470.79	24.45	446.34	12.11	439.28
	7/19/2021	470.79	24.04	446.75	15.06	442.23
	8/23/2021	470.79	24.58	446.21	3.49	430.66
	9/30/2021	470.79	25.35	445.44	2.49	429.66
	10/25/2021	470.79	25.41	445.38	13.08	440.25
	11/29/2021	470.79	24.68	446.11	5.17	432.34
	12/30/2021	470.79	25.05	445.74	6.68	433.85
	1/6/2022	470.90	22.02	448.88	6.45	433.62
	2/7/2022	470.90	25.64	445.26	4.4	431.57
	3/1/2022	470.90	25.36	445.54	16.04	443.21
	4/22/2022	470.90	23.82	447.08	NA	NA
	5/24/2022	470.90	24.08	446.82	11.42	438.59
	6/6/2022	470.90	24.10	446.80	8.21	435.38
	7/25/2022	470.90	25.07	445.83	5.36	432.53
	8/29/2022	470.90	28.30	442.60	2.55	429.72
	9/28/2022	470.90	30.29	440.61	2.37	429.54
	10/26/2022	470.90	31.23	439.67	4.36	431.53
	11/14/2022	470.90	31.58	439.32	3.2	430.37
	12/28/2022	470.90	32.05	438.85	NA	NA
	1/24/2023	470.90	31.48	439.42	7.29	434.46
	2/20/2023	470.90	30.91	439.99	7.6	434.77
	3/28/2023	470.90	25.14	445.76	14.9	442.07
	4/25/2023	470.90	24.56	446.34	9.4	436.57
	5/15/2023	470.90	24.41	446.49	8.78	435.95
	6/26/2023	470.90	25.18	445.72	2.42	429.59
	7/25/2023	470.90	25.61	445.29	3.67	430.84
	8/28/2023	470.90	29.02	441.88	3.26	430.43
	9/28/2023	470.90	31.94	438.96	3.35	430.52
	10/27/2023	470.90	31.18	439.72	3.98	431.15
	11/6/2023	470.90	31.26	439.64	3.65	430.82
	12/21/2023	470.90	31.63	439.27	6.12	433.29
	1/24/2024	470.90	30.33	440.57	12.92	440.09
	2/19/2024	470.90	24.73	446.17	12.74	439.91
	3/26/2024	470.90	24.81	446.09	10.1	437.27
	4/12/2024	470.90	24.62	446.28	16.79	443.96
	5/15/2024	470.90	23.72	447.18	15.9	443.07
	6/17/2024	470.90	24.07	446.83	12.03	439.2
	7/25/2024	470.90	24.40	446.50	12.63	439.8
	8/21/2024	470.90	24.56	446.34	11.76	438.93
	9/9/2024	470.90	24.85	446.05	11.82	438.99
	10/29/2024	470.90	25.74	445.16	2.16	429.33
	11/18/2024	470.90	25.91	444.99	4.14	431.31
	12/10/2024	470.90	25.77	445.13	2.8	429.97
	1/7/2025	470.90	27.68	445.13	5.95	433.12
	2/24/2025	470.90	29.10	445.13	2.98	430.15
	3/28/2025	470.90	25.23	445.67	7.45	434.62
	4/24/2025	470.90	25.30	445.60	7.68	434.85
	5/19/2025	470.90	25.51	445.39	4.38	431.55
	6/27/2025	470.90	25.60	445.30	6.52	433.69
	7/22/2025	470.90	25.94	444.96	5.66	432.83
	8/11/2025	470.90	29.13	441.77	3.41	430.58
	9/16/2025	470.90	31.08	439.82	2.17	429.34
	10/21/2025	470.90	31.87	439.03	2.58	429.75
	11/10/2025	470.90	32.12	438.78	3.60	430.77
	12/18/2025	470.90	32.81	438.09	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-15 down-gradient	11/16/2015	471.37	25.33	446.04	4.38	431.55
	2/22/2016	471.37	22.91	448.46	7.97	435.14
	5/16/2016	471.37	24.71	446.66	14.53	441.7
	8/15/2016	471.37	23.45	447.92	7.11	434.28
	11/14/2016	471.37	23.94	447.43	6.35	433.52
	2/13/2017	471.37	23.73	447.64	NA	NA
	5/1/2017	471.37	23.27	448.10	17.09	444.26
	6/20/2017	471.37	22.86	448.51	11.93	439.1
	8/29/2017	471.37	23.13	448.24	3.86	431.03
	11/10/2017	471.37	25.13	446.24	6.89	434.06
	5/17/2018	471.37	23.85	447.52	9.93	437.1
	8/9/2018	471.37	23.96	447.41	2.13	429.3
	10/31/2018	471.37	24.55	446.82	4.21	431.38
	4/29/2019	471.37	23.57	447.80	14.04	441.21
	11/11/2019	471.37	23.79	447.58	15.92	443.09
	4/27/2020	471.37	23.95	447.42	12.64	439.81
	12/7/2020	471.37	25.01	446.36	2.97	430.14
	2/22/2021	471.37	27.74	443.63	6.21	433.38
	4/7/2021	471.37	24.44	446.93	10.23	437.4
	5/10/2021	471.37	24.62	446.75	10.71	437.88
	6/2/2021	471.37	24.12	447.25	10.7	437.87
	6/28/2021	471.37	24.19	447.18	12.11	439.28
	7/19/2021	471.37	24.01	447.36	15.06	442.23
	8/23/2021	471.37	24.38	446.99	3.49	430.66
	9/30/2021	471.37	24.91	446.46	2.49	429.66
	4/22/2022	471.37	24.18	447.19	NA	NA
	5/24/2022	471.37	24.27	447.10	11.42	438.59
	6/6/2022	471.37	24.29	447.08	8.21	435.38
	7/25/2022	471.37	25.05	446.32	5.36	432.53
	8/29/2022	471.37	25.45	445.92	2.55	429.72
	9/28/2022	471.37	25.54	445.83	2.37	429.54
	10/26/2022	471.37	26.00	445.37	4.36	431.53
	11/14/2022	471.37	26.14	445.23	3.2	430.37
	12/28/2022	471.37	27.84	443.53	NA	NA
	1/24/2023	471.37	25.26	446.11	7.29	434.46
	2/20/2023	471.37	25.24	446.13	7.6	434.77
	3/28/2023	471.37	24.81	446.56	14.9	442.07
	4/25/2023	471.37	24.56	446.81	9.4	436.57
	5/15/2023	471.37	24.64	446.73	8.78	435.95
	6/26/2023	471.37	25.18	446.19	2.42	429.59
	7/25/2023	471.37	25.53	445.84	3.67	430.84
	8/28/2023	471.37	25.60	445.77	3.26	430.43
	9/28/2023	471.37	25.78	445.59	3.35	430.52
	10/27/2023	471.37	26.00	445.37	3.98	431.15
	11/6/2023	471.37	26.04	445.33	3.65	430.82
	12/21/2023	471.37	25.86	445.51	6.12	433.29
	1/24/2024	471.37	25.19	446.18	12.92	440.09
	2/19/2024	471.37	24.52	446.85	12.74	439.91
	3/26/2024	471.37	24.44	446.93	10.10	437.27
	4/12/2024	471.37	24.35	447.02	16.79	443.96
	5/15/2024	471.37	23.89	447.48	15.9	443.07
	6/17/2024	471.37	24.08	447.29	12.03	439.2
	7/25/2024	471.37	24.23	447.14	12.63	439.8
	8/21/2024	471.37	24.28	447.09	11.76	438.93
	9/9/2024	471.37	24.48	446.89	11.82	438.99
	10/29/2024	471.37	25.12	446.25	2.16	429.33
	11/18/2024	471.37	25.01	446.36	4.14	431.31
	12/10/2024	471.37	25.13	446.24	2.8	429.97
	1/7/2025	471.37	25.34	446.03	5.95	433.12
	2/24/2025	471.37	25.23	446.14	2.98	430.15
	3/28/2025	471.37	25.02	446.35	7.45	434.62
	4/24/2025	471.37	24.97	446.40	7.68	434.85
	5/19/2025	471.37	25.06	446.31	4.38	431.55
	6/27/2025	471.37	24.82	446.55	6.52	433.69
	7/22/2025	471.37	24.95	446.42	5.66	432.83
	8/11/2025	471.37	25.20	446.17	3.41	430.58
	9/16/2025	471.37	25.45	445.92	2.17	429.34
	10/21/2025	471.37	25.79	445.58	2.58	429.75
	11/10/2025	471.37	25.93	445.44	3.60	430.77
	12/18/2025	471.37	26.02	445.35	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-17 down-gradient	11/16/2015	467.75	26.92	440.83	4.38	431.55
	2/22/2016	467.75	19.86	447.89	7.97	435.14
	5/16/2016	467.75	20.42	447.33	14.53	441.7
	8/15/2016	467.75	21.61	446.14	7.11	434.28
	11/14/2016	467.75	21.39	446.36	6.35	433.52
	2/13/2017	467.75	19.66	448.09	NA	NA
	5/1/2017	467.75	18.78	448.97	17.09	444.26
	6/20/2017	467.75	19.42	448.33	11.93	439.1
	8/29/2017	467.75	22.68	445.07	3.86	431.03
	11/6/2017	467.75	24.66	443.09	6.89	434.06
	5/14/2018	467.75	19.79	447.96	9.93	437.1
	8/6/2018	467.75	21.03	446.72	2.13	429.3
	10/29/2018	467.75	21.98	445.77	4.21	431.38
	4/29/2019	467.75	18.75	449.00	14.04	441.21
	11/11/2019	467.75	19.60	448.15	15.92	443.09
	4/27/2020	467.75	19.15	448.60	12.64	439.81
	12/7/2020	467.75	24.12	443.63	2.97	430.14
	2/22/2021	467.75	20.22	447.53	6.21	433.38
	4/7/2021	467.75	19.69	448.06	10.23	437.4
	5/10/2021	467.75	20.00	447.75	10.71	437.88
	6/2/2021	467.75	19.65	448.10	10.7	437.87
	6/28/2021	467.75	19.98	447.77	12.11	439.28
	7/19/2021	467.75	19.57	448.18	15.06	442.23
	8/23/2021	467.75	20.15	447.60	3.49	430.66
	9/30/2021	467.75	23.25	444.50	2.49	429.66
	10/28/2021	467.75	23.35	444.40	13.08	440.25
	11/29/2021	467.75	20.64	447.11	5.17	432.34
	12/30/2021	467.75	22.61	445.14	6.68	433.85
	1/6/2022	467.75	23.19	444.56	6.45	433.62
	2/7/2022	467.75	22.03	445.72	4.4	431.57
	3/1/2022	467.75	19.97	447.78	16.04	443.21
	4/22/2022	467.75	19.36	448.39	NA	NA
	5/24/2022	467.75	19.38	448.37	11.42	438.59
	6/6/2022	467.75	19.45	448.30	8.21	435.38
	7/25/2022	467.75	20.39	447.36	5.36	432.53
	8/29/2022	467.75	23.75	444.00	2.55	429.72
	9/28/2022	467.75	25.38	442.37	2.37	429.54
	10/26/2022	467.75	27.49	440.26	4.36	431.53
	11/14/2022	467.75	27.73	440.02	3.2	430.37
	12/28/2022	467.75	27.47	440.28	NA	NA
	1/24/2023	467.75	23.08	444.67	7.29	434.46
	2/20/2023	467.75	20.29	447.46	7.6	434.77
	3/28/2023	467.75	19.43	448.32	14.9	442.07
	4/25/2023	467.75	19.31	448.44	9.4	436.57
	5/15/2023	467.75	19.60	448.15	8.78	435.95
	6/26/2023	467.75	20.42	447.33	2.42	429.59
	7/25/2023	467.75	21.26	446.49	3.67	430.84
	8/28/2023	467.75	21.13	446.62	3.26	430.43
	9/28/2023	467.75	23.65	444.10	3.35	430.52
	10/27/2023	467.75	24.26	443.49	3.98	431.15
	11/6/2023	467.75	24.42	443.33	3.65	430.82
	12/21/2023	467.75	24.85	442.90	6.12	433.29
	1/24/2024	467.75	20.92	446.83	12.92	440.09
	2/19/2024	467.75	19.49	448.26	12.74	439.91
	3/26/2024	467.75	19.69	448.06	10.10	437.27
	4/12/2024	467.75	19.48	448.27	16.79	443.96
	5/15/2024	467.75	19.04	448.71	15.9	443.07
	6/17/2024	467.75	19.42	448.33	12.03	439.2
	7/25/2024	467.75	19.95	447.80	12.63	439.8
	8/21/2024	467.75	20.29	447.46	11.76	438.93
	9/9/2024	467.75	20.75	447.00	11.82	438.99
	10/29/2024	467.75	24.40	443.35	2.16	429.33
	11/18/2024	467.75	25.00	442.75	4.14	431.31
	12/10/2024	467.75	25.21	442.54	2.8	429.97
	1/7/2025	467.75	DRY	DRY	5.95	433.12
	2/24/2025	467.75	DRY	DRY	2.98	430.15
	3/28/2025	467.75	27.46	440.29	7.45	434.62
	4/24/2025	467.75	26.46	441.29	7.68	434.85
	5/19/2025	467.75	28.28	439.47	4.38	431.55
	6/27/2025	467.75	28.03	439.72	6.52	433.69
	7/22/2025	467.75	DRY	DRY	5.66	432.83
	8/11/2025	467.75	DRY	DRY	3.41	430.58
	9/16/2025	467.75	DRY	DRY	2.17	429.34
	10/21/2025	467.75	DRY	DRY	2.58	429.75
	11/10/2025	467.75	DRY	DRY	3.60	430.77
	12/18/2025	467.75	DRY	DRY	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-18 down-gradient	11/16/2015	469.28	28.42	440.86	4.38	431.55
	2/22/2016	469.28	27.96	441.32	7.97	435.14
	5/16/2016	469.28	25.57	443.71	14.53	441.7
	8/15/2016	469.28	27.86	441.42	7.11	434.28
	11/14/2016	469.28	27.39	441.89	6.35	433.52
	2/13/2017	469.28	25.06	444.22	NA	NA
	5/1/2017	469.28	22.49	446.79	17.09	444.26
	6/20/2017	469.28	24.97	444.31	11.93	439.1
	8/28/2017	469.28	27.30	441.98	3.86	431.03
	11/6/2017	469.28	26.33	442.95	6.89	434.06
	5/14/2018	469.28	24.65	444.63	9.93	437.1
	8/6/2018	469.28	25.67	443.61	2.13	429.3
	10/29/2018	469.28	25.79	443.49	4.21	431.38
	4/29/2019	469.28	23.00	446.28	14.04	441.21
	11/11/2019	469.28	23.94	445.34	15.92	443.09
	4/27/2020	469.28	23.97	445.31	12.64	439.81
	12/7/2020	469.28	27.82	441.46	2.97	430.14
	2/22/2021	469.28	26.69	442.59	6.21	433.38
	4/7/2021	469.28	24.94	444.34	10.23	437.4
	5/10/2021	469.28	25.96	443.32	10.71	437.88
	6/2/2021	469.28	24.70	444.58	10.7	437.87
	6/28/2021	469.28	25.60	443.68	12.11	439.28
	7/19/2021	469.28	23.50	445.78	15.06	442.23
	8/23/2021	469.28	27.35	441.93	3.49	430.66
	9/30/2021	469.28	29.70	439.58	2.49	429.66
	10/25/2021	469.28	27.35	441.93	13.08	440.25
	11/29/2021	469.28	26.81	442.47	5.17	432.34
	12/30/2021	469.28	27.14	442.14	6.68	433.85
	1/6/2022	469.28	26.57	442.71	6.45	433.62
	2/7/2022	469.28	27.83	441.45	4.4	431.57
	3/1/2022	469.28	24.45	444.83	16.04	443.21
	4/22/2022	469.28	23.77	445.51	NA	NA
	5/24/2022	469.28	25.04	444.24	11.42	438.59
	6/6/2022	469.28	25.71	443.57	8.21	435.38
	7/25/2022	469.28	28.62	440.66	5.36	432.53
	8/29/2022	469.28	28.66	440.62	2.55	429.72
	9/28/2022	469.28	32.19	437.09	2.37	429.54
	10/26/2022	469.28	33.26	436.02	4.36	431.53
	11/14/2022	469.28	32.95	436.33	3.2	430.37
	12/28/2022	469.28	28.44	440.84	NA	NA
	1/24/2023	469.28	28.65	440.63	7.29	434.46
	2/20/2023	469.28	28.44	440.84	7.6	434.77
	3/28/2023	469.28	26.78	442.50	14.9	442.07
	4/25/2023	469.28	25.35	443.93	9.4	436.57
	5/15/2023	469.28	26.46	442.82	8.78	435.95
	6/26/2023	469.28	30.11	439.17	2.42	429.59
	7/25/2023	469.28	28.93	440.35	3.67	430.84
	8/28/2023	469.28	29.87	439.41	3.26	430.43
	9/28/2023	469.28	30.02	439.26	3.35	430.52
	10/27/2023	469.28	29.29	439.99	3.98	431.15
	11/6/2023	469.28	29.54	439.74	3.65	430.82
	12/21/2023	469.28	28.68	440.60	6.12	433.29
	1/24/2024	469.28	26.47	442.81	12.92	440.09
	2/19/2024	469.28	24.46	444.82	12.74	439.91
	3/26/2024	469.28	26.46	442.82	10.10	437.27
	4/12/2024	469.28	23.98	445.30	16.79	443.96
	5/15/2024	469.28	23.36	445.92	15.9	443.07
	6/17/2024	469.28	26.71	442.57	12.03	439.2
	7/25/2024	469.28	26.15	443.13	12.63	439.8
	8/21/2024	469.28	28.88	440.40	11.76	438.93
	9/9/2024	469.28	30.78	438.50	11.82	438.99
	10/29/2024	469.28	29.16	440.12	2.16	429.33
	11/18/2024	469.28	28.83	440.45	4.14	431.31
	12/10/2024	469.28	30.18	439.10	2.8	429.97
	1/7/2025	469.28	29.73	439.55	5.95	433.12
	2/24/2025	469.28	28.81	440.47	2.98	430.15
	3/28/2025	469.28	27.19	442.09	7.45	434.62
	4/24/2025	469.28	26.81	442.47	7.68	434.85
	5/19/2025	469.28	28.68	440.60	4.38	431.55
	6/27/2025	469.28	27.61	441.67	6.52	433.69
	7/22/2025	469.28	28.68	440.60	5.66	432.83
	8/11/2025	469.28	28.51	440.77	3.41	430.58
	9/16/2025	469.28	31.02	438.26	2.17	429.34
	10/21/2025	469.28	32.27	437.01	2.58	429.75
	11/10/2025	469.28	31.49	437.79	3.60	430.77
	12/18/2025	469.28	32.83	436.45	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-18A down-gradient	8/21/2024	469.54	35.60	433.94	11.76	438.93
	9/9/2024	469.54	33.53	436.01	11.82	438.99
	10/29/2024	469.54	31.31	438.23	2.16	429.33
	11/18/2024	469.54	30.90	438.64	4.14	431.31
	12/10/2024	469.54	32.72	436.82	2.8	429.97
	1/7/2025	469.54	30.98	438.56	5.95	433.12
	2/24/2025	469.54	30.63	438.91	2.98	430.15
	3/28/2025	469.54	30.06	439.48	7.45	434.62
	4/24/2025	469.54	27.99	441.55	7.68	434.85
	5/19/2025	469.54	29.36	440.18	4.38	431.55
	6/27/2025	469.54	29.22	440.32	6.49	433.66
	7/22/2025	469.54	29.91	439.63	3.93	431.10
	8/11/2025	469.54	30.50	439.04	3.41	430.58
	9/16/2025	469.54	31.97	437.57	2.17	429.34
	10/21/2025	469.54	31.17	438.37	2.58	429.75
	11/10/2025	469.54	31.40	438.14	3.60	430.77
	12/18/2025	469.54	32.00	437.54	2.93	430.10
MW-22 down-gradient	4/12/2024	457.18	12.73	444.45	16.79	443.96
	5/15/2024	457.18	11.66	445.52	15.9	443.07
	6/17/2024	457.18	16.04	441.14	12.03	439.2
	7/25/2024	457.18	16.22	440.96	12.63	439.8
	8/21/2024	457.18	19.28	437.90	11.76	438.93
	9/9/2024	457.18	21.18	436.00	11.82	438.99
	10/29/2024	457.18	21.81	435.37	2.16	429.33
	11/18/2024	457.18	21.41	435.77	4.14	431.31
	12/10/2024	457.18	21.86	435.32	2.8	429.97
	1/7/2025	457.18	20.71	435.32	5.95	433.12
	2/24/2025	457.18	22.11	435.32	2.98	430.15
	3/28/2025	457.18	18.45	438.73	7.45	434.62
	4/24/2025	457.18	17.58	439.60	7.68	434.85
	5/19/2025	457.18	20.49	436.69	4.38	431.55
	6/27/2025	457.18	18.20	438.98	6.52	433.69
	7/22/2025	457.18	21.20	435.98	5.66	432.83
	8/11/2025	457.18	21.52	435.66	3.41	430.58
	9/16/2025	457.18	22.51	434.67	2.17	429.34
	10/21/2025	457.18	23.10	434.08	2.58	429.75
	11/10/2025	457.18	22.52	434.66	3.60	430.77
	12/18/2025	457.18	22.66	434.52	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-16 down-gradient	5/12/2015	471.56	27.02	444.54	12.15	415.02
	8/18/2015	471.56	22.83	448.73	4.62	422.55
	11/16/2015	471.56	27.63	443.93	4.38	422.79
	2/24/2016	471.55	24.12	447.43	8.02	419.15
	5/16/2016	471.55	25.09	446.46	14.53	412.64
	8/15/2016	471.55	26.42	445.13	7.11	420.06
	11/14/2016	471.55	26.27	445.28	6.35	420.82
	2/13/2017	471.55	25.38	446.17	NA	NA
	5/2/2017	471.55	23.30	448.25	18.50	408.67
	8/23/2017	471.55	27.11	444.44	3.86	423.31
	11/9/2017	471.55	27.49	444.06	6.70	420.47
	3/8/2018	471.55	25.56	445.99	19.72	407.45
	5/17/2018	471.55	25.64	445.91	9.93	417.24
	8/8/2018	471.55	27.19	444.36	2.13	425.04
	10/31/2018	471.55	27.72	443.83	4.76	422.41
	2/25/2019	471.55	23.60	447.95	16.74	410.43
	4/29/2019	471.55	22.97	448.58	14.04	413.13
	8/26/2019	471.55	25.50	446.05	3.61	423.56
	11/11/2019	471.55	23.10	448.45	15.92	411.25
	2/24/2020	471.55	23.59	447.96	12.84	414.33
	4/27/2020	471.55	23.50	448.05	12.64	414.53
	8/10/2020	471.55	24.70	446.85	4.38	422.79
	12/7/2020	471.55	27.69	443.86	2.97	424.2
	2/22/2021	471.55	27.60	443.95	6.21	420.96
	5/10/2021	471.55	26.25	445.30	10.71	416.46
	8/23/2021	471.55	26.20	445.35	3.49	423.68
	11/29/2021	471.55	25.71	445.84	5.17	422
	2/7/2022	471.55	27.52	444.03	4.40	422.77
	6/6/2022	471.55	24.50	447.05	8.21	418.96
	8/29/2022	471.55	27.91	443.64	2.55	424.62
	11/14/2022	471.55	29.34	442.21	3.20	423.97
	2/20/2023	471.55	29.92	441.63	7.60	419.57
	5/15/2023	471.55	26.66	444.89	8.78	418.39
	8/28/2023	471.55	29.30	442.25	3.26	423.91
	11/6/2023	471.55	30.04	441.51	3.65	423.52
	01/24/24	471.56	26.24	445.32	12.92	440.09
	02/19/24	471.56	20.33	451.23	12.74	439.91
	03/26/24	471.56	26.92	444.64	10.10	437.27
	04/12/24	471.56	26.24	445.32	16.79	443.96
	05/15/24	471.56	24.32	447.24	15.90	443.07
	06/17/24	471.56	25.41	446.15	12.03	439.2
	07/25/24	471.56	26.50	445.06	12.63	439.8
	08/21/24	471.56	27.41	444.15	11.76	438.93
	09/09/24	471.56	28.24	443.32	11.82	438.99
	10/29/24	471.56	29.54	442.02	2.16	429.33
	11/18/24	471.56	29.46	442.1	4.14	431.31
	12/10/24	471.56	29.74	441.82	2.80	429.97
	01/07/25	471.56	29.7	441.86	5.95	433.12
	2/24/2025	471.56	30.15	441.41	2.98	430.15
	03/28/25	471.56	28.98	442.58	7.45	434.62
	4/24/2025	471.56	28.37	443.19	7.68	434.85
	5/19/2025	471.56	28.93	442.63	4.38	431.55
	6/27/2025	471.56	28.45	443.11	6.52	433.69
	7/22/2025	471.56	29.26	442.30	5.66	432.83
	8/11/2025	471.56	29.5	442.06	3.41	430.58
	9/16/2025	471.56	30.37	441.19	2.17	429.34
	10/21/2025	471.56	31.01	440.55	2.58	429.75
	11/10/2025	471.56	31.07	440.49	3.60	430.77
	12/18/2025	471.56	31.21	440.35	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-01 down-gradient	11/16/2015	465.24	26.04	439.20	4.38	431.55
	2/22/2016	465.24	21.90	443.34	7.97	435.14
	5/16/2016	465.24	21.83	443.41	14.53	441.7
	8/15/2016	465.24	23.89	441.35	7.11	434.28
	11/14/2016	465.24	23.38	441.86	6.35	433.52
	2/13/2017	465.24	21.71	443.53	NA	NA
	5/1/2017	465.24	18.87	446.37	17.09	444.26
	6/20/2017	465.24	21.54	443.70	11.93	439.1
	8/25/2017	465.24	24.70	440.54	3.86	431.03
	11/8/2017	465.24	24.92	440.32	6.89	434.06
	5/17/2018	465.24	22.66	442.58	9.93	437.1
	8/8/2018	465.24	26.05	439.19	2.13	429.3
	10/30/2018	465.24	24.69	440.55	4.21	431.38
	4/29/2019	465.24	20.15	445.09	14.04	441.21
	11/11/2019	465.24	19.49	445.75	15.92	443.09
	4/27/2020	465.24	20.90	444.34	12.64	439.81
	12/7/2020	465.24	25.69	439.55	2.97	430.14
	2/22/2021	465.24	25.18	440.06	6.21	433.38
	4/7/2021	465.24	22.20	443.04	10.23	437.4
	5/10/2021	465.24	23.41	441.83	10.71	437.88
	6/2/2021	465.24	22.00	443.24	10.7	437.87
	6/28/2021	465.24	23.18	442.06	12.11	439.28
	7/19/2021	465.24	20.43	444.81	15.06	442.23
	8/23/2021	465.24	24.42	440.82	3.49	430.66
	9/30/2021	465.24	26.89	438.35	2.49	429.66
	10/27/2021	465.24	24.53	440.71	13.08	440.25
	11/29/2021	465.24	23.31	441.93	5.17	432.34
	12/30/2021	465.24	24.31	440.93	6.68	433.85
	1/6/2022	465.24	24.86	440.38	6.45	433.62
	2/7/2022	465.24	25.57	439.67	4.4	431.57
	3/1/2022	465.24	21.96	443.28	16.04	443.21
	4/22/2022	465.24	20.03	445.21	NA	NA
	5/24/2022	465.24	21.37	443.87	11.42	438.59
	6/6/2022	465.24	22.13	443.11	8.21	435.38
	7/25/2022	465.24	25.48	439.76	5.36	432.53
	8/29/2022	465.24	27.53	437.71	2.55	429.72
	9/28/2022	465.24	28.58	436.66	2.37	429.54
	10/26/2022	465.24	29.75	435.49	4.36	431.53
	11/14/2022	465.24	29.58	435.66	3.2	430.37
	12/28/2022	465.24	26.63	438.61	NA	NA
	1/24/2023	465.24	27.91	437.33	7.29	434.46
	2/20/2023	465.24	26.94	438.30	7.6	434.77
	3/28/2023	465.24	21.74	443.50	14.9	442.07
	4/25/2023	465.24	22.22	443.02	9.4	436.57
	5/15/2023	465.24	23.91	441.33	8.78	435.95
	6/26/2023	465.24	28.66	436.58	2.42	429.59
	7/25/2023	465.24	28.06	437.18	3.67	430.84
	8/28/2023	465.24	28.85	436.39	3.26	430.43
	9/28/2023	465.24	29.42	435.82	3.35	430.52
	10/27/2023	465.24	29.16	436.08	3.98	431.15
	11/6/2023	465.24	29.23	436.01	3.65	430.82
	12/21/2023	465.24	29.21	436.03	6.12	433.29
	1/24/2024	465.24	25.03	440.21	12.92	440.09
	2/19/2024	465.24	21.02	444.22	12.74	439.91
	3/26/2024	465.24	23.38	441.86	10.10	437.27
	4/12/2024	465.24	20.9	444.34	16.79	443.96
	5/15/2024	465.24	19.9	445.34	15.90	443.07
	6/17/2024	465.24	23.31	441.93	12.03	439.2
	7/25/2024	465.24	23.94	441.30	12.63	439.8
	8/21/2024	465.24	26.36	438.88	11.76	438.93
	9/9/2024	465.24	28.58	436.66	11.82	438.99
	10/25/2024	465.24	29.54	435.70	2.16	429.33
	11/18/2024	465.24	29.19	436.05	4.14	431.31
	12/10/2024	465.24	29.55	435.69	2.8	429.97
	1/7/2025	465.24	28.63	436.61	5.95	433.12
	2/24/2025	465.24	29.84	435.40	2.98	430.15
	3/28/2025	465.24	26.35	438.89	7.45	434.62
	4/24/2025	465.24	24.67	440.57	7.68	434.85
	5/19/2025	465.24	27.96	437.28	4.38	431.55
	6/27/2025	465.24	24.78	440.46	6.52	433.69
	7/22/2025	465.24	28.7	436.54	5.66	432.83
	8/11/2025	465.24	29.11	436.13	3.41	430.58
	9/16/2025	465.24	30.19	435.05	2.17	429.34
	10/21/2025	465.24	30.90	434.34	2.58	429.75
	11/10/2025	465.24	30.52	434.72	3.60	430.77
	12/18/2025	465.24	30.47	434.77	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-02 down-gradient	6/20/2017	462.60	22.04	440.56	11.93	439.1
	8/23/2017	462.60	28.42	434.18	3.86	431.03
	11/7/2017	462.60	26.08	436.52	6.89	434.06
	5/17/2018	462.60	23.26	439.34	9.93	437.1
	8/7/2018	462.60	29.70	432.90	2.13	429.3
	10/30/2018	462.60	26.77	435.83	4.21	431.38
	2/25/2019	462.60	17.02	445.58	16.74	443.91
	4/29/2019	462.60	19.26	443.34	14.04	441.21
	8/26/2019	462.60	27.45	435.15	3.61	430.78
	2/24/2020	462.60	20.35	442.25	12.84	440.01
	4/27/2020	462.60	20.51	442.09	12.64	439.81
	12/7/2020	462.60	28.71	433.89	2.97	430.14
	2/22/2021	462.60	25.90	436.70	6.21	433.38
	4/7/2021	462.60	21.95	440.65	10.23	437.4
	5/10/2021	462.60	23.01	439.59	10.71	437.88
	6/2/2021	462.60	21.74	440.86	10.7	437.87
	6/28/2021	462.60	22.24	440.36	12.11	439.28
	7/19/2021	462.60	18.66	443.94	15.06	442.23
	8/23/2021	462.60	27.95	434.65	3.49	430.66
	9/30/2021	462.60	30.44	432.16	2.49	429.66
	10/27/2021	462.60	22.74	439.86	13.08	440.25
	11/29/2021	462.60	25.57	437.03	5.17	432.34
	12/30/2021	462.60	25.11	437.49	6.68	433.85
	1/6/2022	462.60	24.96	437.64	6.45	433.62
	2/7/2022	462.60	27.47	435.13	4.4	431.57
	3/1/2022	462.60	18.06	444.54	16.04	443.21
	4/22/2022	462.60	18.63	443.97	NA	NA
	5/24/2022	462.60	21.44	441.16	11.42	438.59
	6/6/2022	462.60	21.14	441.46	8.21	435.38
	7/25/2022	462.60	29.28	433.32	5.36	432.53
	8/29/2022	462.60	30.28	432.32	2.55	429.72
	9/28/2022	462.60	31.81	430.79	2.37	429.54
	10/26/2022	462.60	32.84	429.76	4.36	431.53
	11/14/2022	462.60	32.03	430.57	3.2	430.37
	12/28/2022	462.60	29.35	433.25	NA	NA
	1/24/2023	462.60	28.25	434.35	7.29	434.46
	2/20/2023	462.60	27.12	435.48	7.6	434.77
	3/28/2023	462.60	19.46	443.14	14.9	442.07
	4/25/2023	462.60	22.50	440.10	9.4	436.57
	5/15/2023	462.60	24.26	438.34	8.78	435.95
	6/26/2023	462.60	31.12	431.48	2.42	429.59
	7/25/2023	462.60	30.16	432.44	3.67	430.84
	8/28/2023	462.60	31.25	431.35	3.26	430.43
	9/27/2023	462.60	31.46	431.14	3.35	430.52
	10/27/2023	462.60	30.02	432.58	3.98	431.15
	11/6/2023	462.60	30.52	432.08	3.65	430.82
	12/21/2023	462.60	30.44	432.16	6.12	433.29
	1/24/2024	462.60	21.69	440.91	12.92	440.09
	2/19/2024	462.60	20.33	442.27	12.74	439.91
	3/26/2024	462.60	22.91	439.69	10.10	437.27
	4/12/2024	462.60	17.11	445.49	16.79	443.96
	5/15/2024	462.60	17.68	444.92	15.90	443.07
	6/17/2024	462.60	25.79	436.81	12.03	439.2
	7/25/2024	462.60	23.13	439.47	12.63	439.8
	8/21/2024	462.60	29.40	433.20	11.76	438.93
	9/9/2024	462.60	31.72	430.88	11.82	438.99
	10/29/2024	462.60	31.04	431.56	2.16	429.33
	11/18/2024	462.60	30.77	431.83	4.14	431.31
	12/10/2024	462.60	31.32	431.28	2.8	429.97
	1/7/2025	462.60	28.38	434.22	5.95	433.12
	2/24/2025	462.60	31.51	431.09	2.98	430.15
	3/28/2025	462.60	25.47	437.13	7.45	434.62
	4/24/2025	462.60	25.01	437.59	7.68	434.85
	5/19/2025	462.60	29.86	432.74	4.38	431.55
	6/27/2025	462.60	26.42	436.18	6.52	433.69
	7/22/2025	462.60	30.86	431.74	5.66	432.83
	8/11/2025	462.60	31.46	431.14	3.41	430.58
	9/16/2025	462.60	32.62	429.98	2.17	429.34
	10/21/2025	462.60	33.02	429.58	2.58	429.75
	11/10/2025	462.60	31.38	431.22	3.60	430.77
	12/18/2025	462.60	31.51	431.09	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-03 down-gradient	6/20/2017	462.48	22.31	440.17	11.93	439.1
	8/23/2017	462.48	28.18	434.30	3.86	431.03
	11/7/2017	462.48	25.38	437.10	6.89	434.06
	5/17/2018	462.48	22.62	439.86	9.93	437.1
	8/7/2018	462.48	29.17	433.31	2.13	429.3
	10/30/2018	462.48	24.71	437.77	4.21	431.38
	2/25/2019	462.48	17.20	445.28	16.74	443.91
	4/29/2019	462.48	18.85	443.63	14.04	441.21
	8/26/2019	462.48	27.65	434.83	3.61	430.78
	2/24/2020	462.48	20.18	442.30	12.84	440.01
	4/27/2020	462.48	20.43	442.05	12.64	439.81
	12/7/2020	462.48	28.61	433.87	2.97	430.14
	2/22/2021	462.48	23.48	439.00	6.21	433.38
	4/7/2021	462.48	21.73	440.75	10.23	437.4
	5/10/2021	462.48	22.98	439.50	10.71	437.88
	6/2/2021	462.48	21.53	440.95	10.7	437.87
	6/28/2021	462.48	21.98	440.50	12.11	439.28
	7/19/2021	462.48	18.35	444.13	15.06	442.23
	8/23/2021	462.48	27.85	434.63	3.49	430.66
	9/30/2021	462.48	30.32	432.16	2.49	429.66
	10/27/2021	462.48	22.34	440.14	13.08	440.25
	11/29/2021	462.48	22.86	439.62	5.17	432.34
	12/30/2021	462.48	23.14	439.34	6.68	433.85
	1/6/2022	462.48	23.13	439.34	6.45	433.62
	2/7/2022	462.48	24.08	438.40	4.4	431.57
	3/1/2022	462.48	18.92	443.56	16.04	443.21
	4/22/2022	462.48	17.98	444.50	NA	NA
	5/24/2022	462.48	21.14	441.34	11.42	438.59
	6/6/2022	462.48	22.50	439.98	8.21	435.38
	7/25/2022	462.48	29.11	433.37	5.36	432.53
	8/29/2022	462.48	30.31	432.17	2.55	429.72
	9/28/2022	462.48	32.27	430.21	2.37	429.54
	10/26/2022	462.48	33.83	428.65	4.36	431.53
	11/14/2022	462.48	33.51	428.97	3.2	430.37
	12/28/2022	462.48	30.21	432.27	NA	NA
	1/24/2023	462.48	30.19	432.29	7.29	434.46
	2/20/2023	462.48	28.45	434.03	7.6	434.77
	3/28/2023	462.48	19.55	442.93	14.9	442.07
	4/25/2023	462.48	22.15	440.33	9.4	436.57
	5/15/2023	462.48	23.46	439.02	8.78	435.95
	6/26/2023	462.48	31.47	431.01	2.42	429.59
	7/25/2023	462.48	30.42	432.06	3.67	430.84
	8/28/2023	462.48	31.29	431.19	3.26	430.43
	9/27/2023	462.48	32.32	430.16	3.35	430.52
	10/27/2023	462.48	31.72	430.76	3.98	431.15
	11/6/2023	462.48	31.45	431.03	3.65	430.82
	12/21/2023	462.48	31.50	430.98	6.12	433.29
	1/24/2024	462.48	21.49	440.99	12.92	440.09
	2/19/2024	462.48	19.10	443.38	12.74	439.91
	3/26/2024	462.48	22.72	439.76	10.10	437.27
	4/12/2024	462.48	17.92	444.56	16.79	443.96
	5/15/2024	462.48	17.37	445.11	15.90	443.07
	6/17/2024	462.48	25.51	436.97	12.03	439.2
	7/25/2024	462.48	23.52	438.96	12.63	439.8
	8/21/2024	462.48	28.38	434.10	11.76	438.93
	9/9/2024	462.48	31.53	430.95	11.82	438.99
	10/29/2024	462.48	32.31	430.17	2.16	429.33
	11/18/2024	462.48	31.65	430.83	4.14	431.31
	12/10/2024	462.48	31.85	430.63	2.8	429.97
	1/7/2025	462.48	31.36	431.12	5.95	433.12
	2/24/2025	462.48	32.02	430.46	2.98	430.15
	3/28/2025	462.48	26.06	436.42	7.45	434.62
	4/24/2025	462.48	24.57	437.91	7.68	434.85
	5/19/2025	462.48	29.64	432.84	4.38	431.55
	6/27/2025	462.48	25.40	437.08	6.52	433.69
	7/22/2025	462.48	31.00	431.48	5.66	432.83
	8/11/2025	462.48	31.70	430.78	3.41	430.58
	9/16/2025	462.48	32.70	429.78	2.17	429.34
	10/21/2025	462.48	34.06	428.42	2.58	429.75
	11/10/2025	462.48	33.25	429.23	3.60	430.77
	12/18/2025	462.48	32.79	429.69	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-04 down-gradient	6/20/2017	460.57	22.15	438.42	11.93	439.1
	8/28/2017	460.57	28.49	432.08	3.86	431.03
	11/7/2017	460.57	25.62	434.95	6.89	434.06
	5/17/2018	460.57	24.13	436.44	9.93	437.1
	8/7/2018	460.57	29.23	431.34	2.13	429.3
	10/30/2018	460.57	26.58	433.99	4.21	431.38
	2/25/2019	460.57	15.45	445.12	16.74	443.91
	4/29/2019	460.57	15.88	444.69	14.04	441.21
	8/26/2019	460.57	27.35	433.22	3.61	430.78
	2/24/2020	460.57	19.81	440.76	12.84	440.01
	4/27/2020	460.57	19.76	440.81	12.64	439.81
	12/7/2020	460.57	28.50	432.07	2.97	430.14
	2/22/2021	460.57	26.44	434.13	6.21	433.38
	4/7/2021	460.57	21.90	438.67	10.23	437.4
	5/10/2021	460.57	23.92	436.65	10.71	437.88
	6/2/2021	460.57	21.41	439.16	10.7	437.87
	6/28/2021	460.57	22.40	438.17	12.11	439.28
	7/19/2021	460.57	17.22	443.35	15.06	442.23
	8/23/2021	460.57	27.81	432.76	3.49	430.66
	9/30/2021	460.57	30.01	430.56	2.49	429.66
	10/27/2021	460.57	22.29	438.28	13.08	440.25
	11/29/2021	460.57	25.83	434.74	5.17	432.34
	12/30/2021	460.57	25.79	434.78	6.68	433.85
	1/6/2022	460.57	25.30	435.27	6.45	433.62
	2/7/2022	460.57	27.95	432.62	4.4	431.57
	3/1/2022	460.57	16.63	443.94	16.04	443.21
	4/22/2022	460.57	16.81	443.76	NA	NA
	5/24/2022	460.57	20.89	439.68	11.42	438.59
	6/6/2022	460.57	22.89	437.68	8.21	435.38
	7/25/2022	460.57	29.18	431.39	5.36	432.53
	8/29/2022	460.57	29.71	430.86	2.55	429.72
	9/28/2022	460.57	31.42	429.15	2.37	429.54
	10/26/2022	460.57	32.38	428.19	4.36	431.53
	11/14/2022	460.57	32.80	427.77	3.2	430.37
	12/28/2022	460.57	29.21	431.36	NA	NA
	1/24/2023	460.57	27.79	432.78	7.29	434.46
	2/20/2023	460.57	26.46	434.11	7.6	434.77
	3/28/2023	460.57	17.49	443.08	14.9	442.07
	4/25/2023	460.57	22.01	438.56	9.4	436.57
	5/15/2023	460.57	24.29	436.28	8.78	435.95
	6/26/2023	460.57	30.13	430.44	2.42	429.59
	7/25/2023	460.57	29.88	430.69	3.67	430.84
	8/28/2023	460.57	30.60	429.97	3.26	430.43
	9/27/2023	460.57	30.90	429.67	3.35	430.52
	10/27/2023	460.57	28.72	431.85	3.98	431.15
	11/6/2023	460.57	29.99	430.58	3.65	430.82
	12/21/2023	460.57	30.02	430.55	6.12	433.29
	1/24/2024	460.57	21.07	439.50	12.92	440.09
	2/19/2024	460.57	18.39	442.18	12.74	439.91
	3/26/2024	460.57	22.53	438.04	10.10	437.27
	4/12/2024	460.57	15.44	445.13	16.79	443.96
	5/15/2024	460.57	15.82	444.75	15.90	443.07
	6/17/2024	460.57	25.68	434.89	12.03	439.2
	7/25/2024	460.57	23.30	437.27	12.63	439.8
	8/21/2024	460.57	29.40	431.17	11.76	438.93
	9/9/2024	460.57	31.19	429.38	11.82	438.99
	10/29/2024	460.57	29.89	430.68	2.16	429.33
	11/18/2024	460.57	29.98	430.59	4.14	431.31
	12/10/2024	460.57	30.51	430.06	2.8	429.97
	1/7/2025	460.57	27.68	432.89	5.95	433.12
	2/24/2025	460.57	30.76	429.81	2.98	430.15
	3/28/2025	460.57	24.88	435.69	7.45	434.62
	4/24/2025	460.57	25.48	435.09	7.68	434.85
	5/19/2025	460.57	29.17	431.40	4.38	431.55
	6/27/2025	460.57	26.67	433.90	6.52	433.69
	7/22/2025	460.57	30.54	430.03	5.66	432.83
	8/11/2025	460.57	30.98	429.59	3.41	430.58
	9/16/2025	460.57	31.89	428.68	2.17	429.34
	10/21/2025	460.57	32.32	428.25	2.58	429.75
	11/10/2025	460.57	29.88	430.69	3.60	430.77
	12/18/2025	460.57	30.50	430.07	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-05 down-gradient	11/16/2015	458.58	26.39	432.19	4.38	431.55
	2/22/2016	458.66	21.12	437.54	7.97	435.14
	5/16/2016	458.66	16.58	442.08	14.53	441.7
	8/15/2016	458.66	23.59	435.07	7.11	434.28
	11/14/2016	458.66	22.72	435.94	6.35	433.52
	2/13/2017	458.66	19.13	439.53	NA	NA
	5/1/2017	458.66	13.09	445.57	17.09	444.26
	6/20/2017	458.66	19.43	439.15	11.93	439.1
	8/28/2017	458.66	25.38	433.20	3.86	431.03
	11/7/2017	458.66	22.91	435.67	6.89	434.06
	5/17/2018	458.66	21.54	437.04	9.93	437.1
	8/7/2018	458.66	26.17	432.41	2.13	429.3
	10/30/2018	458.66	23.97	434.61	4.21	431.38
	2/25/2019	458.66	13.21	445.45	16.74	443.91
	4/29/2019	458.66	15.40	443.26	14.04	441.21
	8/26/2019	458.66	24.35	434.31	3.61	430.78
	2/24/2020	458.66	17.25	441.41	12.84	440.01
	4/27/2020	458.66	17.41	441.25	12.64	439.81
	12/7/2020	458.66	25.65	433.01	2.97	430.14
	2/22/2021	458.66	23.82	434.84	6.21	433.38
	4/7/2021	458.66	19.40	439.26	10.23	437.4
	5/10/2021	458.66	21.38	437.28	10.71	437.88
	6/2/2021	458.66	18.99	439.67	10.7	437.87
	6/28/2021	458.66	22.20	436.46	12.11	439.28
	7/19/2021	458.66	14.98	443.68	15.06	442.23
	8/23/2021	458.66	24.85	433.81	3.49	430.66
	9/30/2021	458.66	26.98	431.68	2.49	429.66
	10/27/2021	458.66	20.00	438.66	13.08	440.25
	11/29/2021	458.66	23.13	435.53	5.17	432.34
	12/30/2021	458.66	23.20	435.46	6.68	433.85
	1/6/2022	458.66	22.80	435.86	6.45	433.62
	2/7/2022	458.66	25.22	433.44	4.4	431.57
	3/1/2022	458.66	14.52	444.14	16.04	443.21
	4/22/2022	458.66	14.59	444.07	NA	NA
	5/24/2022	458.66	18.32	440.34	11.42	438.59
	6/6/2022	458.66	17.06	441.60	8.21	435.38
	7/25/2022	458.66	26.02	432.64	5.36	432.53
	8/29/2022	458.66	26.70	431.96	2.55	429.72
	9/28/2022	458.66	28.10	430.56	2.37	429.54
	10/26/2022	458.66	28.96	429.70	4.36	431.53
	11/14/2022	458.66	28.44	430.22	3.2	430.37
	12/28/2022	458.66	26.04	432.62	NA	NA
	1/24/2023	458.66	24.93	433.73	7.29	434.46
	2/20/2023	458.66	23.72	434.94	7.6	434.77
	3/28/2023	458.66	16.49	442.17	14.9	442.07
	4/25/2023	458.66	19.50	439.16	9.4	436.57
	5/15/2023	458.66	21.71	436.95	8.78	435.95
	6/26/2023	458.66	27.11	431.55	2.42	429.59
	7/25/2023	458.66	26.76	431.90	3.67	430.84
	8/28/2023	458.66	27.46	431.20	3.26	430.43
	9/27/2023	458.66	27.73	430.93	3.35	430.52
	10/27/2023	458.66	26.00	432.66	3.98	431.15
	11/6/2023	458.66	26.98	431.68	3.65	430.82
	12/21/2023	458.66	26.91	431.75	6.12	433.29
	1/24/2024	458.66	18.87	439.79	12.92	440.09
	2/19/2024	458.66	15.88	442.78	12.74	439.91
	3/26/2024	458.66	19.99	438.67	10.10	437.27
	4/12/2024	458.66	13.35	445.31	16.79	443.96
	5/15/2024	458.66	13.73	444.93	15.90	443.07
	6/17/2024	458.66	22.64	436.02	12.03	439.2
	7/25/2024	458.66	20.59	438.07	12.63	439.8
	8/21/2024	458.66	26.17	432.49	11.76	438.93
	9/9/2024	458.66	27.95	430.71	11.82	438.99
	10/29/2024	458.66	27.05	431.61	2.16	429.33
	11/18/2024	458.66	26.98	431.68	4.14	431.31
	12/10/2024	458.66	27.51	431.15	2.8	429.97
	1/7/2025	458.66	25.01	433.65	5.95	433.12
	2/24/2025	458.66	27.79	430.87	2.98	430.15
	3/28/2025	458.66	22.38	436.28	7.45	434.62
	4/24/2025	458.66	22.79	435.87	7.68	434.85
	5/19/2025	458.66	26.22	432.44	4.38	431.55
	6/27/2025	458.66	23.88	434.78	6.52	433.69
	7/22/2025	458.66	27.40	431.26	5.66	432.83
	8/11/2025	458.66	27.77	430.89	3.41	430.58
	9/16/2025	458.66	28.66	430.00	2.17	429.34
	10/21/2025	458.66	29.04	429.62	2.58	429.75
	11/10/2025	458.66	27.07	431.59	3.60	430.77
	12/18/2025	458.66	27.61	431.05	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-07 down-gradient	5/11/2015	463.23	24.40	438.83	11.61	438.78
	8/18/2015	463.23	27.13	436.10	4.62	431.79
	11/16/2015	463.23	30.43	432.80	4.38	431.55
	2/22/2016	463.27	25.68	437.59	7.97	435.14
	5/16/2016	463.27	20.96	442.31	14.53	441.7
	8/15/2016	463.27	27.63	435.64	7.11	434.28
	11/14/2016	463.27	26.98	436.29	6.35	433.52
	2/13/2017	463.27	23.46	439.81	NA	NA
	5/2/2017	463.27	17.78	445.49	17.09	444.26
	8/24/2017	463.27	29.15	434.12	3.86	431.03
	11/8/2017	463.27	27.10	436.17	6.89	434.06
	3/6/2018	463.27	13.96	449.31	20.43	447.6
	5/18/2018	463.27	25.87	437.40	9.93	437.1
	8/10/2018	463.27	30.12	433.15	2.13	429.3
	10/29/2018	463.27	28.37	434.90	4.21	431.38
	2/25/2019	463.27	17.88	445.39	16.74	443.91
	4/29/2019	463.27	19.98	443.29	14.04	441.21
	8/26/2019	463.27	28.54	434.73	3.61	430.78
	11/11/2019	463.27	18.14	445.13	15.92	443.09
	2/24/2020	463.27	21.64	441.63	12.84	440.01
	4/27/2020	463.27	21.90	441.37	12.64	439.81
	8/10/2020	463.27	27.15	436.12	3.49	430.66
	12/7/2020	463.27	29.84	433.43	2.97	430.14
	2/22/2021	463.27	28.09	435.18	6.21	433.38
	5/10/2021	463.27	25.54	437.73	10.71	437.88
	8/23/2021	463.27	28.92	434.35	3.49	430.66
	11/29/2021	463.27	27.40	435.87	5.17	432.34
	2/7/2022	463.27	29.37	433.90	4.40	431.57
	6/6/2022	463.27	24.65	438.62	8.21	435.38
	8/29/2022	463.27	30.79	432.48	2.55	429.72
	11/14/2022	463.27	32.16	431.11	3.20	430.37
	2/20/2023	463.27	27.81	435.46	7.60	434.77
	5/15/2023	463.27	25.94	437.33	8.78	435.95
	8/28/2023	463.27	31.22	432.05	3.26	430.43
	11/6/2023	463.27	30.90	432.37	3.65	430.82
	1/24/2024	463.27	23.13	440.14	12.92	440.09
	2/19/2024	463.27	20.57	442.70	12.74	439.91
	3/26/2024	463.27	24.27	439.00	10.10	437.27
	4/12/2024	463.27	17.99	445.28	16.79	443.96
	5/15/2024	463.27	18.31	444.96	15.9	443.07
	6/17/2024	463.27	26.64	436.63	12.03	439.2
	7/25/2024	463.27	24.59	438.68	12.63	439.8
	8/21/2024	463.27	30.00	433.27	11.76	438.93
	9/9/2024	463.27	31.78	431.49	11.82	438.99
	10/29/2024	463.27	31.16	432.11	2.16	429.33
	11/18/2024	463.27	30.92	432.35	4.14	431.31
	12/10/2024	463.27	31.48	431.79	2.8	429.97
	1/7/2025	463.27	29.19	434.08	5.95	433.12
	2/24/2025	463.27	31.76	431.51	2.98	430.15
	3/28/2025	463.27	26.64	436.63	7.45	434.62
	4/24/2025	463.27	26.28	436.99	7.68	434.85
	5/19/2025	463.27	30.18	433.09	4.38	431.55
	6/27/2025	463.27	28.04	435.23	6.52	433.69
	7/22/2025	463.27	31.20	432.07	5.66	432.83
	8/11/2025	463.27	31.59	431.68	3.41	430.58
	9/16/2025	463.27	32.46	430.81	2.17	429.34
	10/21/2025	463.27	32.78	430.49	2.58	429.75
	11/10/2025	463.27	31.15	432.12	3.60	430.77
	12/18/2025	463.27	31.64	431.63	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-09 up-gradient	11/16/2015	469.14	26.07	443.07	4.38	431.55
	2/22/2016	469.14	22.83	446.31	7.97	435.14
	5/16/2016	469.14	23.06	446.08	14.53	441.7
	8/15/2016	469.14	24.50	444.64	7.11	434.28
	11/14/2016	469.14	24.33	444.81	6.35	433.52
	2/13/2017	469.14	23.43	445.71	NA	NA
	5/1/2017	469.14	20.77	448.37	17.09	444.26
	6/20/2017	469.14	22.15	446.99	11.93	439.1
	8/25/2017	469.14	24.79	444.35	3.86	431.03
	11/8/2017	469.14	25.74	443.40	6.89	434.06
	5/16/2018	469.14	23.89	445.25	9.93	437.1
	8/8/2018	469.14	25.49	443.65	2.13	429.3
	11/1/2018	469.14	26.02	443.12	4.21	431.38
	4/29/2019	469.14	21.30	447.84	14.04	441.21
	11/11/2019	469.14	21.31	447.83	15.92	443.09
	4/27/2020	469.14	21.80	447.34	12.64	439.81
	12/7/2020	469.14	26.19	442.95	2.97	430.14
	2/22/2021	469.14	26.08	443.06	6.21	433.38
	4/7/2021	469.14	23.75	445.39	10.23	437.4
	5/10/2021	469.14	24.55	444.59	10.71	437.88
	6/2/2021	469.14	23.31	445.83	10.7	437.87
	6/28/2021	469.14	24.18	444.96	12.11	439.28
	7/19/2021	469.14	22.20	446.94	15.06	442.23
	8/23/2021	469.14	24.75	444.39	3.49	430.66
	9/30/2021	469.14	26.28	442.86	2.49	429.66
	10/25/2021	469.14	25.42	443.72	13.08	440.25
	11/29/2021	469.14	24.50	444.64	5.17	432.34
	12/30/2021	469.14	25.35	443.79	6.68	433.85
	1/6/2022	469.14	28.11	441.03	6.45	433.62
	2/7/2022	469.14	26.15	442.99	4.4	431.57
	3/1/2022	469.14	23.88	445.26	16.04	443.21
	4/22/2022	469.14	21.75	447.39	NA	NA
	5/24/2022	469.14	22.40	446.74	11.42	438.59
	6/6/2022	469.14	22.95	446.19	8.21	435.38
	7/25/2022	469.14	25.51	443.63	5.36	432.53
	8/29/2022	469.14	26.56	442.58	2.55	429.72
	9/28/2022	469.14	27.52	441.62	2.37	429.54
	10/26/2022	469.14	28.38	440.76	4.36	431.53
	11/14/2022	469.14	28.44	440.70	3.2	430.37
	12/28/2022	469.14	27.96	441.18	NA	NA
	1/24/2023	469.14	27.93	441.21	7.29	434.46
	2/20/2023	469.14	27.62	441.52	7.6	434.77
	3/28/2023	469.14	24.05	445.09	14.9	442.07
	4/25/2023	469.14	23.76	445.38	9.4	436.57
	5/15/2023	469.14	24.90	444.24	8.78	435.95
	6/26/2023	469.14	27.40	441.74	2.42	429.59
	7/25/2023	469.14	27.55	441.59	3.67	430.84
	8/28/2023	469.14	28.00	441.14	3.26	430.43
	9/28/2023	469.14	28.64	440.50	3.35	430.52
	10/27/2023	469.14	28.85	440.29	3.98	431.15
	11/6/2023	469.14	28.98	440.16	3.65	430.82
	12/21/2023	469.14	29.12	440.02	6.12	433.29
	1/24/2024	469.14	26.76	442.38	12.92	440.09
	2/19/2024	469.14	23.94	445.20	12.74	439.91
	3/26/2024	469.14	24.98	444.16	10.10	437.27
	4/12/2024	469.14	23.78	445.36	16.79	443.96
	5/15/2024	469.14	22.17	446.97	15.9	443.07
	6/17/2024	469.14	23.87	445.27	12.03	439.2
	7/25/2024	469.14	24.81	444.33	12.63	439.8
	8/21/2024	469.14	26.00	443.14	11.76	438.93
	9/9/2024	469.14	27.13	442.01	11.82	438.99
	10/25/2024	469.14	28.55	440.59	2.16	429.33
	11/18/2024	469.14	28.36	440.78	4.14	431.31
	12/10/2024	469.14	28.73	440.41	2.8	429.97
	1/7/2025	469.14	28.69	440.45	5.95	433.12
	2/24/2025	469.14	29.17	439.97	2.98	430.15
	3/28/2025	469.14	27.47	441.67	7.45	434.62
	4/24/2025	469.14	26.50	442.64	7.68	434.85
	5/19/2025	469.14	27.70	441.44	4.38	431.55
	6/27/2025	469.14	26.60	442.54	6.52	433.69
	7/22/2025	469.14	28.06	441.08	5.66	432.83
	8/11/2025	469.14	28.45	440.69	3.41	430.58
	9/16/2025	469.14	29.26	439.88	2.17	429.34
	10/21/2025	469.14	29.91	439.23	2.58	429.75
	11/10/2025	469.14	29.94	439.20	3.60	430.77
	12/18/2025	469.14	30.11	439.03	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-10 down-gradient	6/22/2017	457.31	13.46	443.85	NA	NA
	8/24/2017	457.31	16.39	440.92	3.79	430.96
	11/9/2017	457.31	16.86	440.45	6.7	433.87
	5/16/2018	457.31	14.88	442.43	9.67	436.84
	8/8/2018	457.31	17.88	439.43	2.13	429.3
	10/30/2018	457.31	17.04	440.27	4.21	431.38
	2/25/2019	457.31	11.28	446.03	16.74	443.91
	4/29/2019	457.31	11.88	445.43	14.84	441.21
	8/26/2019	457.31	15.89	441.42	3.61	430.78
	2/24/2020	457.31	12.64	444.67	12.84	440.01
	4/27/2020	457.31	12.75	444.56	12.64	439.81
	12/7/2020	457.31	17.80	439.51	2.97	430.14
	2/22/2021	457.31	17.25	440.06	6.21	433.38
	4/7/2021	457.31	14.21	443.10	10.23	437.4
	5/10/2021	457.31	15.58	441.73	10.71	437.88
	6/2/2021	457.31	13.98	443.33	10.7	437.87
	6/28/2021	457.31	15.28	442.03	12.11	439.28
	7/19/2021	457.31	12.30	445.01	15.06	442.23
	8/23/2021	457.31	16.61	440.70	3.49	430.66
	9/30/2021	457.31	18.67	438.64	2.49	429.66
	10/25/2021	457.31	16.23	441.08	10.56	437.73
	11/29/2021	457.31	15.52	441.79	5.17	432.34
	12/30/2021	457.31	16.50	440.81	6.68	433.85
	1/6/2022	457.31	16.82	440.49	6.45	433.62
	2/7/2022	457.31	17.70	439.61	4.4	431.57
	3/1/2022	457.31	13.77	443.54	16.04	443.21
	4/22/2022	457.31	11.80	445.51	NA	NA
	5/24/2022	457.31	13.20	444.11	11.42	438.59
	6/6/2022	457.31	14.07	443.24	8.21	435.38
	7/25/2022	457.31	17.53	439.78	5.36	432.53
	8/29/2022	457.31	19.08	438.23	2.55	429.72
	9/28/2022	457.31	20.16	437.15	2.37	429.54
	10/26/2022	457.31	21.23	436.08	4.36	431.53
	11/14/2022	457.31	21.06	436.25	3.2	430.37
	12/28/2022	457.31	18.71	438.60	NA	NA
	1/24/2023	457.31	19.50	437.81	7.29	434.46
	2/20/2023	457.31	18.65	438.66	7.6	434.77
	3/28/2023	457.31	13.66	443.65	14.9	442.07
	4/25/2023	457.31	14.14	443.17	9.4	436.57
	5/15/2023	457.31	15.90	441.41	8.78	435.95
	6/26/2023	457.31	20.10	437.21	2.42	429.59
	7/25/2023	457.31	19.69	437.62	3.67	430.84
	8/28/2023	457.31	20.38	436.93	3.26	430.43
	9/28/2023	457.31	20.93	436.38	3.35	430.52
	10/27/2023	457.31	20.67	436.64	3.98	431.15
	11/6/2023	457.31	20.81	436.50	3.65	430.82
	12/21/2023	457.31	20.80	436.51	6.12	433.29
	1/24/2024	457.31	16.73	440.58	12.92	440.09
	2/19/2024	457.31	13.05	444.26	12.74	439.91
	3/26/2024	457.31	15.33	441.98	10.10	437.27
	4/12/2024	457.31	12.93	444.38	16.79	443.96
	5/15/2024	457.31	11.78	445.53	15.90	443.07
	6/17/2024	457.31	15.18	442.13	12.03	439.2
	7/25/2024	457.31	15.78	441.53	12.63	439.8
	8/21/2024	457.31	18.15	439.16	11.76	438.93
	9/9/2024	457.31	18.15	439.16	11.82	438.99
	10/29/2024	457.31	20.96	436.35	2.16	429.33
	11/18/2024	457.31	20.64	436.67	4.14	431.31
	12/10/2024	457.31	21.01	436.30	2.8	429.97
	1/7/2025	457.31	20.19	437.12	5.95	433.12
	2/24/2025	457.31	21.31	436.00	2.98	430.15
	3/28/2025	457.31	18.11	439.20	7.45	434.62
	4/24/2025	457.31	16.76	440.55	7.68	434.85
	5/19/2025	457.31	19.60	437.71	4.38	431.55
	6/27/2025	457.31	17.14	440.17	6.52	433.69
	7/22/2025	457.31	20.31	437.00	5.66	432.83
	8/11/2025	457.31	20.67	436.64	3.41	430.58
	9/16/2025	457.31	21.64	435.67	2.17	429.34
	10/21/2025	457.31	22.27	435.04	2.58	429.75
	11/10/2025	457.31	21.92	435.39	3.60	430.77
	12/18/2025	457.31	21.95	435.36	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-11 down-gradient	11/16/2015	471.62	31.67	439.95	4.38	431.55
	2/22/2016	471.62	28.34	443.28	7.97	435.14
	5/16/2016	471.62	27.11	444.51	14.53	441.7
	8/15/2016	471.62	29.64	441.98	7.11	434.28
	11/14/2016	471.62	29.19	442.43	6.35	433.52
	2/13/2017	471.62	27.49	444.13	NA	NA
	5/1/2017	471.62	24.34	447.28	17.09	444.26
	6/20/2017	471.62	26.94	444.68	11.93	439.1
	8/29/2017	471.62	30.42	441.20	3.86	431.03
	11/9/2017	471.62	30.27	441.35	6.89	434.06
	5/16/2018	471.62	28.58	443.04	9.93	437.1
	8/9/2018	471.62	31.04	440.58	2.13	429.3
	11/1/2018	471.62	30.82	440.80	4.21	431.38
	4/29/2019	471.62	25.38	446.24	14.04	441.21
	11/11/2019	471.62	24.88	446.74	15.92	443.09
	4/27/2020	471.62	26.35	445.27	12.64	439.81
	12/7/2020	471.62	31.35	440.27	2.97	430.14
	2/22/2021	471.62	30.78	440.84	6.21	433.38
	4/7/2021	471.62	27.85	443.77	10.23	437.4
	5/10/2021	471.62	29.19	442.43	10.71	437.88
	6/2/2021	471.62	27.57	444.05	10.7	437.87
	6/28/2021	471.62	28.84	442.78	12.11	439.28
	7/19/2021	471.62	25.82	445.80	15.06	442.23
	8/23/2021	471.62	30.10	441.52	3.49	430.66
	9/30/2021	471.62	31.78	439.84	2.49	429.66
	10/25/2021	471.62	30.12	441.50	13.08	440.25
	11/29/2021	471.62	29.40	442.22	5.17	432.34
	12/30/2021	471.62	30.22	441.40	6.68	433.85
	1/6/2022	471.62	30.09	441.53	6.45	433.62
	2/7/2022	471.62	31.19	440.43	4.4	431.57
	3/1/2022	471.62	26.92	444.70	16.04	443.21
	4/22/2022	471.62	25.43	446.19	NA	NA
	5/24/2022	471.62	26.69	444.93	11.42	438.59
	6/6/2022	471.62	27.55	444.07	8.21	435.38
	7/25/2022	471.62	30.77	440.85	5.36	432.53
	8/29/2022	471.62	31.95	439.67	2.55	429.72
	9/28/2022	471.62	32.99	438.63	2.37	429.54
	10/26/2022	471.62	33.86	437.76	4.36	431.53
	11/14/2022	471.62	33.79	437.83	3.2	430.37
	12/28/2022	471.62	32.41	439.21	NA	NA
	1/24/2023	471.62	32.57	439.05	7.29	434.46
	2/20/2023	471.62	31.91	439.71	7.6	434.77
	3/28/2023	471.62	27.32	444.30	14.9	442.07
	4/25/2023	471.62	27.80	443.82	9.4	436.57
	5/15/2023	471.62	29.25	442.37	8.78	435.95
	6/26/2023	471.62	32.81	438.81	2.42	429.59
	7/25/2023	471.62	32.55	439.07	3.67	430.84
	8/28/2023	471.62	33.15	438.47	3.26	430.43
	9/28/2023	471.62	33.76	437.86	3.35	430.52
	10/27/2023	471.62	33.68	437.94	3.98	431.15
	11/6/2023	471.62	33.79	437.83	3.65	430.82
	12/21/2023	471.62	33.81	437.81	6.12	433.29
	1/24/2024	471.62	29.99	441.63	12.92	440.09
	2/19/2024	471.62	27.13	444.49	12.74	439.91
	3/26/2024	471.62	28.92	442.70	10.10	437.27
	4/12/2024	471.62	26.50	445.12	16.79	443.96
	5/15/2024	471.62	25.47	446.15	15.9	443.07
	6/17/2024	471.62	28.61	443.01	12.03	439.2
	7/25/2024	471.62	29.00	442.62	12.63	439.8
	8/21/2024	471.62	31.19	440.43	11.76	438.93
	9/9/2024	471.62	32.69	438.93	11.82	438.99
	10/25/2024	471.62	33.73	437.89	2.16	429.33
	11/18/2024	471.62	33.43	438.19	4.14	431.31
	12/10/2024	471.62	33.79	437.83	2.8	429.97
	1/7/2025	471.62	33.24	438.38	5.95	433.12
	2/24/2025	471.62	33.97	437.65	2.98	430.15
	3/28/2025	471.62	22.40	449.22	7.45	434.62
	4/24/2025	471.62	30.49	441.13	7.68	434.85
	5/19/2025	471.62	32.60	439.02	4.38	431.55
	6/27/2025	471.62	30.92	440.70	6.52	433.69
	7/22/2025	471.62	33.18	438.44	5.66	432.83
	8/11/2025	471.62	33.52	438.10	3.41	430.58
	9/16/2025	471.62	34.41	437.21	2.17	429.34
	10/21/2025	471.62	35.02	436.60	2.58	429.75
	11/10/2025	471.62	34.80	436.82	3.60	430.77
	12/18/2025	471.62	34.88	436.74	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-19 up-gradient	11/14/2016	465.07	22.65	442.42	6.35	433.52
	2/13/2017	465.07	21.27	443.80	NA	NA
	5/1/2017	465.07	18.39	446.68	17.09	444.26
	6/20/2017	465.07	20.44	444.63	11.93	439.1
	8/28/2017	465.07	23.60	441.47	3.86	431.03
	11/9/2017	465.07	23.80	441.27	6.89	434.06
	5/14/2018	465.07	22.08	442.99	9.93	437.1
	8/6/2018	465.07	24.14	440.93	2.13	429.3
	10/29/2018	465.07	24.31	440.76	4.21	431.38
	4/29/2019	465.07	19.12	445.95	14.04	441.21
	11/11/2019	465.07	18.80	446.27	15.92	443.09
	4/27/2020	465.07	19.94	445.13	12.64	439.81
	12/7/2020	465.07	24.63	440.44	2.97	430.14
	2/22/2021	465.07	24.23	440.84	6.21	433.38
	4/7/2021	465.07	21.60	443.47	10.23	437.4
	5/10/2021	465.07	22.75	442.32	10.71	437.88
	6/2/2021	465.07	21.24	443.83	10.7	437.87
	6/28/2021	465.07	22.41	442.66	12.11	439.28
	7/19/2021	465.07	19.75	445.32	15.06	442.23
	8/23/2021	465.07	23.31	441.76	3.49	430.66
	9/30/2021	465.07	24.85	440.22	2.49	429.66
	10/27/2021	465.07	23.36	441.71	13.08	440.25
	11/29/2021	465.07	22.75	442.32	5.17	432.34
	12/30/2021	465.07	23.65	441.42	6.68	433.85
	1/6/2022	465.07	24.04	441.03	6.45	433.62
	2/7/2022	465.07	24.46	440.61	4.4	431.57
	3/1/2022	465.07	21.05	444.02	16.04	443.21
	4/22/2022	465.07	19.34	445.73	NA	NA
	5/24/2022	465.07	20.34	444.73	11.42	438.59
	6/6/2022	465.07	21.05	444.02	8.21	435.38
	7/25/2022	465.07	23.98	441.09	5.36	432.53
	8/29/2022	465.07	25.08	439.99	2.55	429.72
	9/28/2022	465.07	25.97	439.10	2.37	429.54
	10/26/2022	465.07	26.81	438.26	4.36	431.53
	11/14/2022	465.07	26.79	438.28	3.2	430.37
	12/28/2022	465.07	25.95	439.12	NA	NA
	1/24/2023	465.07	25.93	439.14	7.29	434.46
	2/20/2023	465.07	25.29	439.78	7.6	434.77
	3/28/2023	465.07	21.40	443.67	14.9	442.07
	4/25/2023	465.07	21.52	443.55	9.4	436.57
	5/15/2023	465.07	22.94	442.13	8.78	435.95
	6/26/2023	465.07	25.76	439.31	2.42	429.59
	7/25/2023	465.07	25.69	439.38	3.67	430.84
	8/28/2023	465.07	26.24	438.83	3.26	430.43
	9/28/2023	465.07	26.86	438.21	3.35	430.52
	10/27/2023	465.07	26.97	438.10	3.98	431.15
	11/6/2023	465.07	27.07	438.00	3.65	430.82
	12/21/2023	465.07	27.13	437.94	6.12	433.29
	1/24/2024	465.07	23.97	441.10	12.92	440.09
	2/19/2024	465.07	21.30	443.77	12.74	439.91
	3/26/2024	465.07	22.70	442.37	10.10	437.27
	4/12/2024	465.07	20.81	444.26	16.79	443.96
	5/15/2024	465.07	19.52	445.55	15.9	443.07
	6/17/2024	465.07	22.02	443.05	12.03	439.2
	7/25/2024	465.07	22.62	442.45	12.63	439.8
	8/21/2024	465.07	24.35	440.72	11.76	438.93
	9/9/2024	465.07	25.57	439.50	11.82	438.99
	10/25/2024	465.07	26.82	438.25	2.16	429.33
	11/18/2024	465.07	26.52	438.55	4.14	431.31
	12/10/2024	465.07	26.92	438.15	2.8	429.97
	1/7/2025	465.07	26.63	438.44	5.95	433.12
	2/24/2025	465.07	27.26	437.81	2.98	430.15
	3/28/2025	465.07	25.10	439.97	7.45	434.62
	4/24/2025	465.07	24.26	440.81	7.68	434.85
	5/19/2025	465.07	25.83	439.24	4.38	431.55
	6/27/2025	465.07	24.58	440.49	6.52	433.69
	7/22/2025	465.07	26.29	438.78	5.66	432.83
	8/11/2025	465.07	26.63	438.44	3.41	430.58
	9/16/2025	465.07	27.50	437.57	2.17	429.34
	10/21/2025	465.07	28.06	437.01	2.58	429.75
	11/10/2025	465.07	28.03	437.04	3.60	430.77
	12/18/2025	465.07	28.20	436.87	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
MW-21D down-gradient	4/12/2024	469.93	24.76	445.17	16.79	443.96
	5/15/2024	469.93	24.08	445.85	15.9	443.07
	6/17/2024	469.93	29.56	440.37	12.03	439.2
	7/25/2024	469.93	28.95	440.98	12.63	439.8
	8/21/2024	469.93	32.47	437.46	11.76	438.93
	9/9/2024	469.93	33.80	436.13	11.82	438.99
	10/29/2024	469.93	34.34	435.59	2.16	429.33
	11/18/2024	469.93	33.84	436.09	4.14	431.31
	12/10/2024	469.93	34.23	435.70	2.8	429.97
	1/7/2025	469.93	33.31	436.62	5.95	433.12
	2/24/2025	469.93	34.45	435.48	2.98	430.15
	3/28/2025	469.93	31.00	438.93	7.45	434.62
	4/24/2025	469.93	30.75	439.18	7.68	434.85
	5/19/2025	469.93	33.14	436.79	4.38	431.55
	6/27/2025	469.93	31.72	438.21	6.52	433.69
	7/22/2025	469.93	33.65	436.28	5.66	432.83
	8/11/2025	469.93	33.81	436.12	3.41	430.58
	9/16/2025	469.93	34.76	435.17	2.17	429.34
	10/21/2025	469.93	35.24	434.69	2.58	429.75
	11/10/2025	469.93	34.88	435.05	3.60	430.77
	12/18/2025	469.93	34.93	435.00	2.93	430.10
MW-23 up-gradient	4/12/2024	465.03	19.83	445.20	16.79	443.96
	5/15/2024	465.03	18.60	446.43	15.9	443.07
	6/17/2024	465.03	21.23	443.80	12.03	439.2
	7/25/2024	465.03	21.83	443.20	12.63	439.8
	8/21/2024	465.03	23.66	441.37	11.76	438.93
	9/9/2024	465.03	25.05	439.98	11.82	438.99
	10/25/2024	465.03	26.24	438.79	2.16	429.33
	11/18/2024	465.03	25.96	439.07	4.14	431.31
	12/10/2024	465.03	23.36	441.67	2.8	429.97
	1/7/2025	465.03	25.97	439.06	5.95	433.12
	2/24/2025	465.03	26.69	438.34	2.98	430.15
	3/28/2025	465.03	24.33	440.70	7.45	434.62
	4/24/2025	465.03	23.37	441.66	7.68	434.85
	5/19/2025	465.03	25.20	439.83	4.38	431.55
	6/27/2025	465.03	23.67	441.36	6.52	433.69
	7/22/2025	465.03	25.71	439.32	5.66	432.83
	8/11/2025	465.03	26.09	438.94	3.41	430.58
	9/16/2025	465.03	26.94	438.09	2.17	429.34
	10/21/2025	465.03	27.55	437.48	2.58	429.75
	11/10/2025	465.03	27.44	437.59	3.60	430.77
	12/18/2025	465.03	27.57	437.46	2.93	430.10

Table 3. Groundwater Elevations for CCR Permit Wells and Piezometers - 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)	Illinois River Gage Reading* (ft above datum)	Illinois River Gage Reading* (ft above MSL)
P-2 up-gradient	04/12/24	463.65	19.12	444.53	16.79	443.96
	5/15/2024	463.65	17.33	446.32	15.9	443.07
	6/17/2024	463.65	18.23	445.42	12.03	439.2
	7/25/2024	463.65	19.73	443.92	12.63	439.8
	8/21/2024	463.65	20.17	443.48	11.76	438.93
	9/9/2024	463.65	20.75	442.90	11.82	438.99
	10/29/2024	463.65	21.68	441.97	2.16	429.33
	11/18/2024	463.65	21.63	442.02	4.14	431.31
	12/10/2024	463.65	21.70	441.95	2.8	429.97
	1/7/2025	463.65	NM	NM	5.95	433.12
	2/24/2025	463.65	21.88	441.77	2.98	430.15
	3/28/2025	463.65	13.53	450.12	7.45	434.62
	4/24/2025	463.65	21.85	441.80	7.68	434.85
	5/19/2025	463.65	DRY	DRY	4.38	431.55
	6/27/2025	463.65	DRY	DRY	6.52	433.69
	7/22/2025	463.65	DRY	DRY	5.66	432.83
	8/11/2025	463.65	DRY	DRY	3.41	430.58
	9/16/2025	463.65	21.93	441.72	2.17	429.34
	10/21/2025	463.65	21.90	441.75	2.58	429.75
	11/10/2025	463.65	13.75	449.90	3.60	430.77
	12/18/2025	463.65	13.41	450.24	2.93	430.10
P-1 down-gradient	4/12/2024	460.08	13.62	446.46	16.79	443.96
	5/15/2024	460.08	13.08	447.00	15.9	443.07
	6/17/2024	460.08	13.46	446.62	12.03	439.2
	7/25/2024	460.08	13.22	446.86	12.63	439.8
	8/21/2024	460.08	13.17	446.91	11.76	438.93
	9/9/2024	460.08	15.32	444.76	11.82	438.99
	10/29/2024	460.08	13.44	446.64	2.16	429.33
	11/18/2024	460.08	13.42	446.66	4.14	431.31
	12/10/2024	460.08	13.98	446.10	2.8	429.97
	1/7/2025	460.08	NM	NM	5.95	433.12
	2/24/2025	460.08	13.27	446.81	2.98	430.15
	3/28/2025	460.08	DRY	DRY	7.45	434.62
	4/24/2025	460.08	13.35	446.73	7.68	434.85
	5/19/2025	460.08	13.08	447.00	4.38	431.55
	6/27/2025	460.08	13.13	446.95	6.52	433.69
	7/22/2025	460.08	13.51	446.57	5.66	432.83
	8/11/2025	460.08	13.67	446.41	3.41	430.58
	9/16/2025	460.08	13.91	446.17	2.17	429.34
	10/21/2025	460.08	13.96	446.12	2.58	429.75
	11/10/2025	460.08	DRY	DRY	3.60	430.77
	12/18/2025	460.08	DRY	DRY	2.93	430.10

Notes: Elevations are in feet above mean sea level and depths are in feet below top of casing.

* - Data obtained from USGS Kingston Mine Gage

MSL - Mean Sea Level

TOC - Top of Casing

BOLD - River elevation above groundwater elevation

Dry - Less than 6" of water in well.

NA - Data not available.

Table 4. Site-Specific Groundwater Protection Standards - Powerton Station CCR Operating Permit.

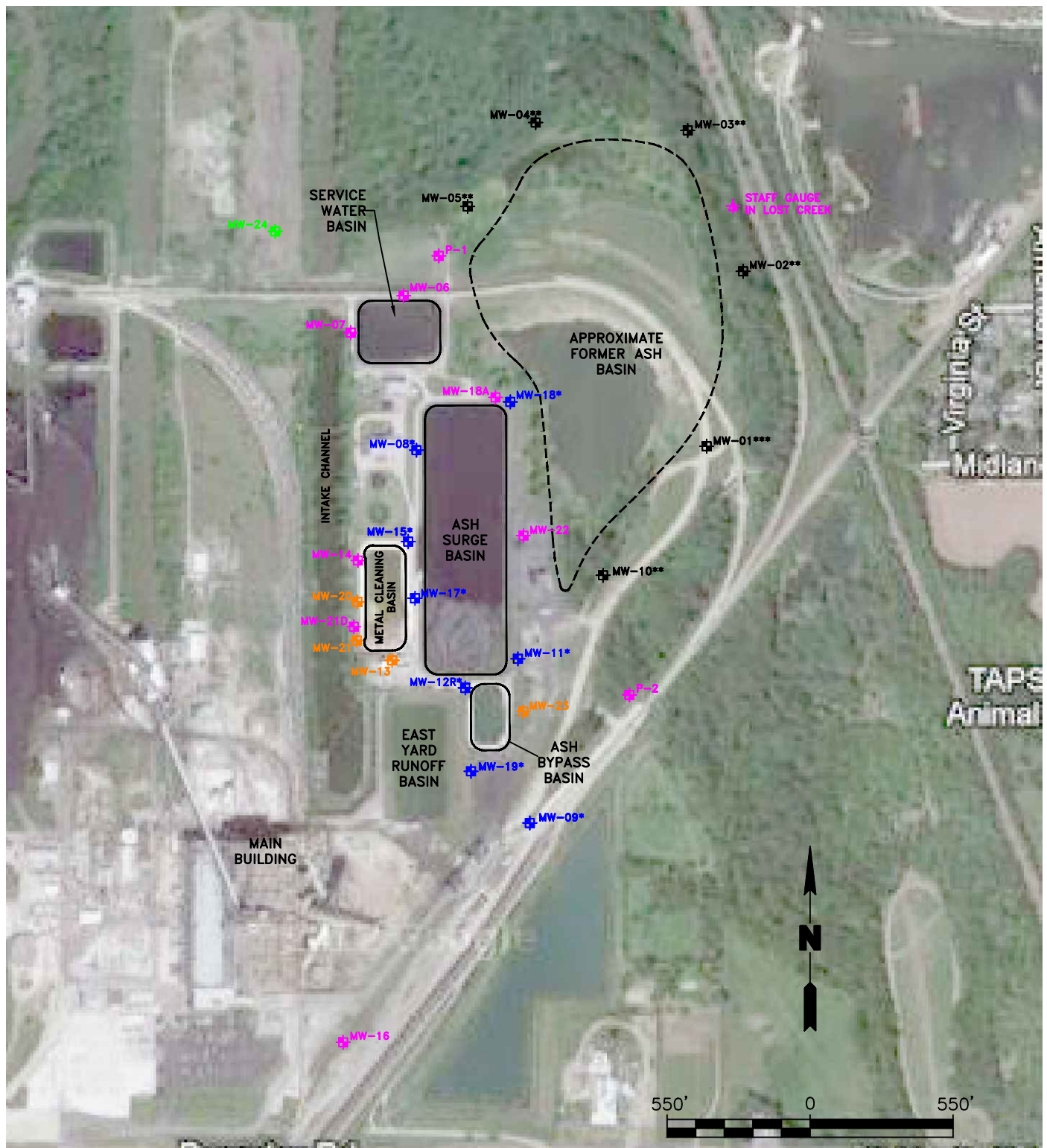
PARAMETER	SITE-SPECIFIC GROUNDWATER PROTECTION STANDARD
Antimony	0.006
Arsenic	0.01
Barium	2.0
Beryllium	0.004
Boron	4.7
Cadmium	0.005
Chloride	200
Chromium	0.1
Cobalt	0.006
Fluoride	4.0
Lead	0.0075
Lithium	0.04
Mercury	0.002
Molybdenum	0.1
pH	6.5 - 9.0 units
Selenium	0.05
Sulfate	400
Thallium	0.002
Total Dissolved Solids	1,200
Radium 226/228 Combined	5 pCi/L

All values in mg/l unless otherwise noted.

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

FIGURES

1. Groundwater Monitoring Well Locations



LEGEND

- | | | |
|--|---|----------------------------------|
| | MW-04 BOTH STATE PERMIT AND FEDERAL CCR MONITORING WELL | *FEDERAL ABB/ASB |
| | MW-09 FEDERAL CCR MONITORING WELL | **FEDERAL FAB |
| | MW-16 STATE PERMIT CCR MONITORING WELL | *** BOTH FEDERAL ABB/ASB AND FAB |
| | MW-24 CCR ASSESSMENT MONITORING WELL | |
| | MW-13 NON-CCR MONITORING WELL | |

Title:

MONITORING WELLS

POWERTON STATION

PEKIN, ILLINOIS

Prepared for:

MIDWEST GENERATION



Compiled by: RG	Date: 07/21/2026
Prepared by: JM	Scale: AS SHOWN
Project Mgr: TS	Project: 2873.00081007
File: POWERTON CCR GW MAPS 2026.DWG	

FIGURE

1

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

ATTACHMENTS

1. Updated Fugitive Dust Control Plan (12/3/24)
2. Monthly Groundwater Flow Maps (2025)
3. Boring Logs and Well Construction Summaries
4. IL Professional Engineer Certification of Monitoring Well Network
5. Revised Statistical Approach for Groundwater Monitoring Data Evaluation and P.E. Certification
6. Owner Certification
7. Public Meeting Information

ATTACHMENT 1

Updated Fugitive Dust Control Plan (12/3/24)

CCR COMPLIANCE FUGITIVE DUST CONTROL PLAN

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

PREPARED BY:

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

December 3, 2024

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Appendix A - Site Diagram/Potential Fugitive Dust Sources

Appendix B – Example Assessment Record

Appendix C – Example Plan Review and Amendment Record

Appendix D – Example Citizen Complaint Log

1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency published a final rule regulating coal combustion residuals (CCR) as part of 40 CFR 257 (the Federal CCR Rule). The CCR Rule specifically requires that “the owner or operator of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit adopt measures that will effectively minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR units, roads, and other CCR management and material handling activities”. As a result, each regulated facility must develop a fugitive dust control plan that complies with 40 CFR 257.80(b).

On April 15, 2021, the Illinois Environmental Protection Agency adopted a new waste disposal regulation creating statewide standards for the disposal of coal combustion residuals (CCR) in surface impoundments, created by the generation of electricity by coal-fired power plants. The Illinois CCR Rule, 35 Ill. Adm. Code Part 845 specifically requires that “the owner or operator of a CCR surface impoundment, or any lateral expansion of a CCR surface impoundment, must adopt measures that will effectively minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR surface impoundments, roads, and other CCR management and material handling activities”. As a result, each regulated facility must develop a CCR fugitive dust control plan that complies with 35 Ill. Adm. Code 845.500(b).

This site-specific Fugitive Dust Control Plan (Plan) has been developed to comply with the requirements specified in both 40 CFR 257.80 and 35 Ill. Adm. Code 845.500. In general, the Plan identifies the potential CCR fugitive dust sources and describes the control measures that will be implemented to minimize CCR fugitive dust emissions. The Plan also includes a procedure for the periodic assessment of the Plan’s effectiveness, documentation of any Plan amendments deemed necessary to assure continued compliance, a record of any citizen complaints received pertaining to CCR fugitive dust emissions, and an outline of the required reporting and recordkeeping requirements in both regulations.

This Plan has been revised to note the Ash Surge Basin has been taken out of service and that the newly retrofitted Bypass Basin is now the primary ash settling basin.

2.0 SITE INFORMATION

2.1 Owner/Operator and Address:

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

2.2 Owner Representative/Responsible Person Contact Information:

Plant Manager
309-346-2165

2.3 Location and Description of Facility Operations

The 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 which occupies approximately 1,440 acres and provides cooling water to the facility.

The general vicinity is a primarily mixed industrial and agricultural area with limited commercial and residential developments.

3.0 POTENTIAL FUGITIVE DUST SOURCES

Potential fugitive dust sources associated with the bottom ash and slag and fly ash systems have been identified at the facility; however, some of these are regulated by the facility's air operating permit and are adequately addressed within the required fugitive dust operating program. The potential CCR fugitive dust sources generally include exterior ash distribution systems, temporary ash storage locations, ash bulk loading/unloading operations and ash truck transportation routes. Fugitive dust could potentially be generated from these sources as a result of equipment malfunctions, wind erosion, housekeeping issues and/or the nature of the operation. Specifically, these identified sources were further evaluated to determine the probability of CCR fugitive dust being generated and to determine the level of emission controls that are warranted to mitigate fugitive dust emissions. The findings of the evaluation are individually discussed in the following sections.

3.1 Bottom Ash and Slag Distribution System

Collected bottom ash and slag in the boilers is transported as a liquid mixture through an enclosed piping system to the dewatering bins. Some of this piping is located inside a building; however, a portion is situated above ground and in the outside environment. Although not an anticipated occurrence, a breach in the exterior piping could result in the accidental release of bottom ash and slag and potential fugitive dust emissions if the material were to accumulate and dry out.

3.2 Dewatering Bins

The dewatering bins are designed to remove water from the bottom ash and slag. Bottom ash and slag that is relatively wet is drop loaded through the bins into open top trucks for removal off-site for beneficial reuse purposes. The water removed from the dewatering bins is gravity-fed to the Bypass Basin where settling occurs prior to discharge of the water from the facility. The loading operation has the potential for fugitive dust emissions if bottom ash and slag is not properly loaded and is allowed to accumulate and dry out on the ground surface beneath the dewatering bins.

3.3 Ash Surge Basin, Bypass Basin, and Metal Cleaning Basin

Extracted water from the dewatering bins is gravity-fed through a concrete trough to the newly retrofitted Bypass Basin. Occasionally, CCR material is placed in the Metal Cleaning Basin. The Ash Surge Basin has ceased receiving CCR and non-CCR waste streams. After settling occurs, water from the Bypass Basin and the Metal Cleaning Basin is ultimately discharged through a regulated NPDES outfall. These basins are normally filled with water; however, dredging occasionally may be required to remove the settled material from each basin. When this requirement occurs, the basins are dewatered and the dredged material is allowed to dry within each basin. When the material is suitable for transport, it

is loaded into open top trucks, covered if necessary, and sent off site to a mine reclamation site. Potential fugitive dust emissions could occur if dry bottom ash and slag residual is exposed or loaded during excessive windy and dry weather conditions.

3.4 Former Ash Basin

This basin was formerly used for the routine disposal of bottom ash and slag; however, this procedure ceased in the 1970s. The bottom ash and slag is completely submerged within the basin. Water level fluctuations in the basin are attributable to precipitation and other weather-related conditions. In rare emergency operational situations, overflow from the Ash Surge Basin to the Former Ash Basin could occur by gravity through the spillway. This discharge is not expected to contain significant quantities of CCR and is allowed through the existing NPDES permit. It is noted that a new railroad spur was constructed through the middle of the Former Ash Basin.

3.5 Concrete Storage Pad

This partially below-grade concrete structure is used for the temporary storage of residual CCR materials generated at as a result of routine ash-related maintenance activities. The staged CCR materials are allowed to partially dry within the structure until they are suitable for removal. The material is placed in temporary storage, loaded into open top trucks, covered and sent off site to a mine reclamation site. Dry material that is exposed during excessively windy and dry weather conditions has the potential for becoming fugitive dust emissions.

3.6 Fly Ash Equipment

Collected fly ash in the precipitator hoppers is initially transported in a closed vacuum piping system to a cyclone and bag filter at either of two fly ash silos. At the silos, the fly ash is drop-loaded into trucks through a telescopic pipe contained within a drop chute. The loading of fly ash occurs within a partially enclosed, three-sided structure. After the trucks containing fly ash have been loaded and the truck's rear gate is water sprayed to remove dust, they proceed to a nearby platform to allow the truck driver to secure the truck and to broom sweep or water spray any residual fly ash remaining on the truck. This entire process is covered by the fugitive dust operating program for the facility.

3.7 Ash Transport Roadways

Both gravel covered and asphalt paved roads within the facility are used by trucks hauling bottom ash, slag, and fly ash to the mine reclamation site as well as by other vehicles entering and exiting the facility. Fugitive CCR dust emissions could occur during transit if CCR material is not properly cleaned from the trucks

or if there is a release of CCR material from the vehicle due to a malfunction or accident.

These potential fugitive dust sources are identified on the Site Diagram included in Appendix A.

4.0 DESCRIPTION OF CONTROL MEASURES

4.1 Purpose

The purpose of developing appropriate control measures is to minimize and reduce the emissions of CCR fugitive dust from the identified potential emission sources. The control measures and work practices implemented at the facility are described in the following sections.

4.2 Bottom Ash and Slag Distribution System

Bottom ash and slag is in a liquid mixture within a closed system until the point of discharge at the dewatering bins. A significant portion of the piping system is contained within a building, which eliminates dust emissions to the outside environment. An assessment of the exterior distribution system is performed on a quarterly basis to verify the integrity of the system or when a breach in the system is detected. If a leak is noted, resulting in the release of bottom ash and slag, the affected area will be restored to original conditions and repair of the pipe will be performed as soon as feasible. The CCR will be sent off site to a mine reclamation site.

4.3 Dewatering Bins

The bottom ash and slag is drop loaded from the dewatering bins in a wet state and into trucks positioned beneath the bins. The bottom ash and slag has sufficient moisture to preclude this material from becoming airborne during loading. An assessment of the dewatering bin loading operation will be performed on a quarterly basis to verify if there has been an equipment malfunction resulting in an accumulation of released material. Should there be a malfunction in the dewatering equipment that results in a spill of the material, repair of any malfunctioning equipment and clean up and transfer of the material to the concrete storage pad will be performed as soon as feasible.

4.4 Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin

During normal operations, the Bypass Basin is filled with water thereby suppressing any potential fugitive dust emissions. The Ash Surge Basin contains water until such time as the accumulated sediment will be removed. Infrequently, the basins will need to be dewatered and the sediment removed for proper off-site disposition. While the bottom ash and slag residue is drying, there is the potential for this material to become airborne especially during excessively dry and windy conditions. Loading of this material under these adverse conditions also has the potential for generating fugitive dust. Dewatered basins will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag, the height of the staged material will be minimized and the material piles will be

either sprayed with water or covered. Loading activities also will be limited during such occasions.

4.5 Former Ash Basin

The Former Ash Basin was used for the disposal of bottom ash and slag in the past; however, this procedure is no longer occurring. The previously deposited material is completely submerged within the basin with the typical water level at approximately 10-15 feet below grade, thereby, making the bottom ash and slag not readily susceptible to wind erosion and generation of potential fugitive dust emissions.

4.6 Concrete Storage Pad

The concrete pad only periodically contains bottom ash and slag and other CCR-related materials generated from routine plant maintenance activities. Typically, these materials are in a wet state but are allowed to partially dry to facilitate removal. When sufficiently dry, the material is promptly removed off site. The concrete pad will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag and other CCR-related materials, the height of the staged material will be minimized and the material piles will be either sprayed with water or covered.

4.7 Fly Ash Equipment

Fly ash from the mechanical separators is sent to the silos within an enclosed structure. The fly ash is drop loaded into an opening within the tarp covering the truck trailer through a telescopic pipe contained within a drop chute. This loading mechanism minimizes the potential for fly ash to become airborne during the loading process. The loading of trucks also occurs within a partial enclosure. At the completion of loading but prior to leaving the enclosure, the rear of each truck trailer is sprayed with water. The truck is then broom swept or water sprayed at the truck stand to remove any accumulated fly ash. Accumulated CCR is promptly transferred to the concrete storage pad.

This process is covered by the facility's fugitive dust operating program. Under the program, the facility must maintain control measures, including enclosures, covers and dust collection devices. Additionally, the facility is required to conduct weekly inspections of the process to confirm compliance. A record of the inspections is maintained at the facility.

4.8 Ash Transport Roadways

Truck drivers are instructed on the proper procedure for cleaning trucks and a vehicle speed limit is enforced at the facility. Ash material that may not have been adequately removed from the trucks has the potential to become airborne and ultimately be deposited on haul roads. To minimize fugitive dust emissions, these roads will be assessed on a quarterly basis and any observed accumulated ash material will be promptly cleaned up and collected for off-site removal.

5.0 PLAN ASSESSMENTS/AMENDMENTS

To assure that the work practices being implemented adequately control the dust from the identified potential fugitive dust emission sources at the facility, routine assessments and record keeping are performed. These procedures include the following:

5.1 Fugitive CCR Dust Assessments

Pursuant to 257.80(b)(4) and 845.500(b)(3), assessments of the potential fugitive dust emission sources identified within this Plan will be conducted to assess the effectiveness of this Plan. The assessment will include observation of ash removal from basins, temporary storage and transport activities at the facility to confirm the adequacy of the control measures. The assessments will be conducted on a quarterly basis by an individual designated by the contact identified in Section 2.2 of this Plan. Observations made during each assessment are recorded on a form similar to the one included in Appendix B; however, the station may create their own form.

If the results of the assessment determine that ash-related equipment has malfunctioned or the integrity of the equipment has been compromised, the necessary repairs or replacement will be performed as soon as feasible. If the assessment finds that this Plan does not effectively minimize the CCR from becoming airborne, this Plan will be amended to include additional control measures.

5.2 Plan Amendments

This Fugitive Dust Plan will be reviewed whenever there is a change in conditions that would substantially affect the written Plan currently in place. A record of the reviews and any modifications or amendments made to the Plan currently in place will be kept on a form similar to the one included in Appendix C; however, the station may create their own form. The amended Plan will be reviewed by a Registered Professional Engineer and, if deemed acceptable, will be recertified.

5.3 Citizen Complaints

Any written or verbal complaints received from a citizen involving alleged CCR fugitive dust emission events at the facility will be recorded by an individual designated by the contact identified in Section 2.2 of this Plan. The complaints will be recorded on a form similar to the one included in Appendix D; however, the station may create their own form. Upon receipt of the complaint, an investigation of the alleged source of the fugitive dust emissions will be performed and the results of that investigation recorded on the form. If the fugitive dust emission event is confirmed, any necessary repairs or changes in operation required to mitigate the fugitive dust emissions will be implemented as soon as practicable.

6.0 CCR FUGITIVE DUST PLAN REPORTING/RECORDKEEPING REQUIREMENTS

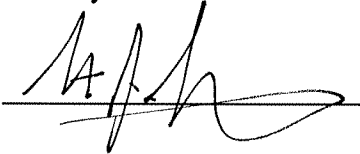
This section outlines the Plan reports that must be prepared, submitted, and records that must be maintained to meet the requirements specified in the Federal and Illinois CCR Rules. These requirements include the following:

- Place the Plan in the facility's operating record and publicly accessible internet site. If the Plan is amended, replace the initial Plan with the amended Plan. Only the most recent amended Plan will be maintained in the facility's operating record and internet site.
- Prepare an annual CCR Fugitive Dust Control Report compliant with 40 CFR 257.80(c) and place it in the facility's operating record and post to the publicly accessible internet site. The annual report will include:
 - A description of the actions taken to control CCR fugitive dust,
 - A record of all citizen complaints, and
 - A summary of any corrective measures taken.
- Prepare an annual CCR Fugitive Dust Control Report compliant with 35 Ill. Adm. Code 845.500(c), place it in the facility's operating record, and submit to the IEPA as part of the annual consolidated report required by 845.550. The annual report will be posted to the publicly accessible website and will include:
 - A description of the actions taken to control CCR fugitive dust,
 - A record of all citizen complaints, and
 - A summary of any corrective measures taken.
- Provide notification to the IEPA and, if applicable, the Tribal authority when the Plan and reports are placed in the facility's operating record and publicly accessible internet site.
- Submit quarterly reports compliant with 35 Ill. Adm. Code 845.500(b)(2)(B) to IEPA within 14 days from the end of the quarter of all complaints received in that quarter. The quarterly reports will include:
 - The date of the complaint,
 - The date of the incident,
 - The name and contact information of the complainant, and
 - All actions taken to assess and resolve the complaint.

7.0 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned Registered Professional Engineer is familiar with the requirements of 40 CFR 257.80 and 35 Ill. Adm. Code 845.500 and has visited and examined the facility or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this CCR Fugitive Dust Control Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of 40 CFR 257.80 and 35 Ill. Adm. Code 845.500, and that this Plan is adequate for the facility. This certification was prepared as required by 40 CFR 257.80(b)(7) and 35 Ill. Adm. Code 845.500(b)(7).

Engineer: Timothy J. Stohner

Signature: Date: 12/3/24

Company: KPRG and Associates, Inc.

Registration State: Illinois

Registration Number: 062.057635

License Expiration Date: November 30, 2025

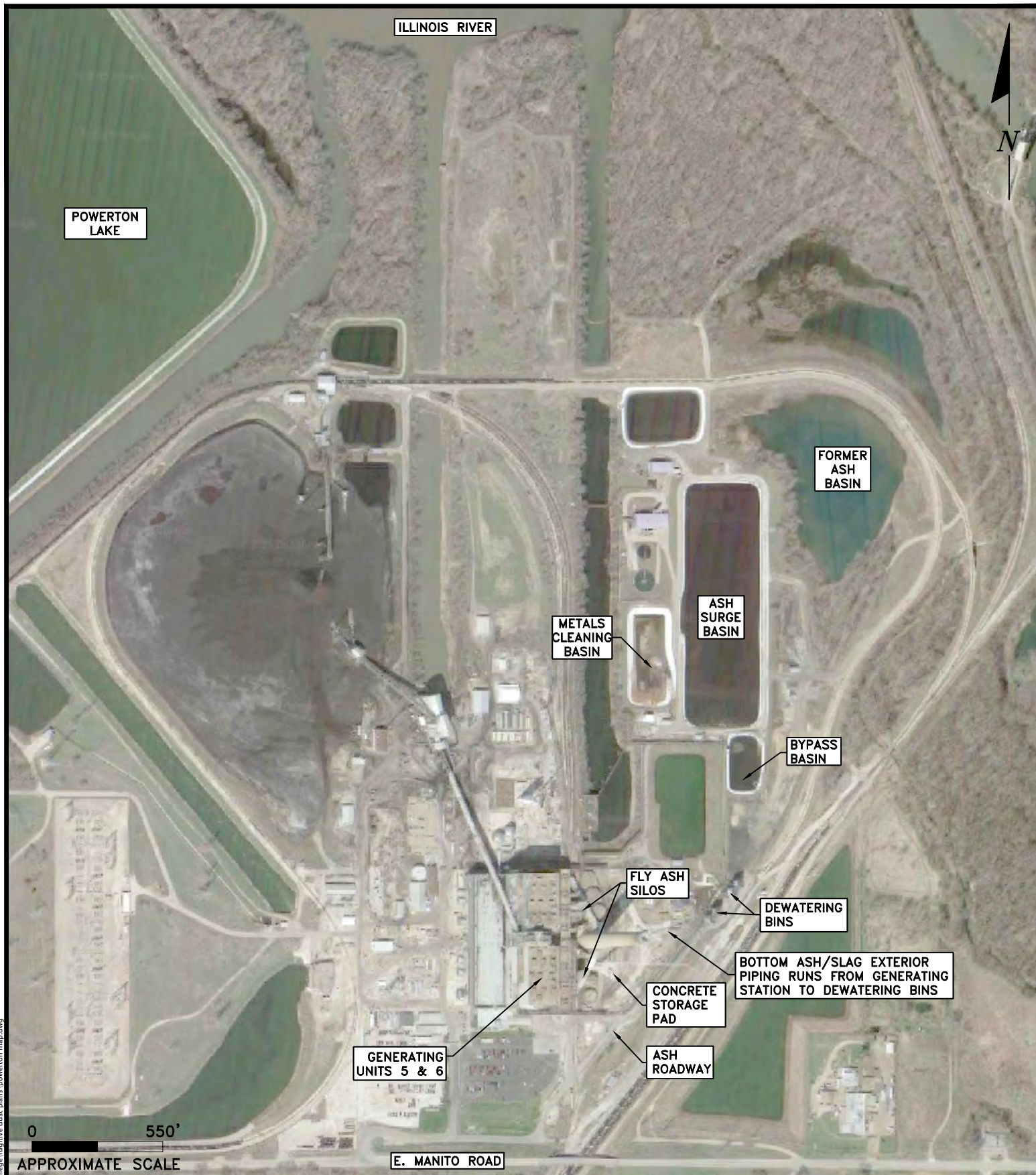
Professional Engineer Stamp:



APPENDIX A

SITE DIAGRAM

POTENTIAL FUGITIVE DUST SOURCES



ENVIRONMENTAL CONSULTATION & REMEDIATION

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 28 Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

SITE DIAGRAM/FUGITIVE DUST SOURCES

POWERTON GENERATING STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 17, 2023

KPRG Project No. 15315

APPENDIX A

APPENDIX B

EXAMPLE ASSESSMENT RECORD

APPENDIX B

POWERTON STATION

EXAMPLE ASSESSMENT RECORD

Date	Inspector	Unit Inspected (See Key Below)	Maintenance/Cleanup Required (yes/no)	Response Action Performed (completion date)	Inspector Signature

Unit Key:

1 - Exterior Bottom Ash/Slag Piping

2 - Dewatering Bins

3 - Concrete Storage Pad

4 - Ash Roadways

5 - Ash Surge Basin

6 - Bypass Basin

APPENDIX C

EXAMPLE PLAN REVIEW AND AMENDMENT RECORD

APPENDIX C

POWERTON STATION

EXAMPLE CCR PLAN REVIEW/AMENDMENT RECORD

[illegible]

APPENDIX D

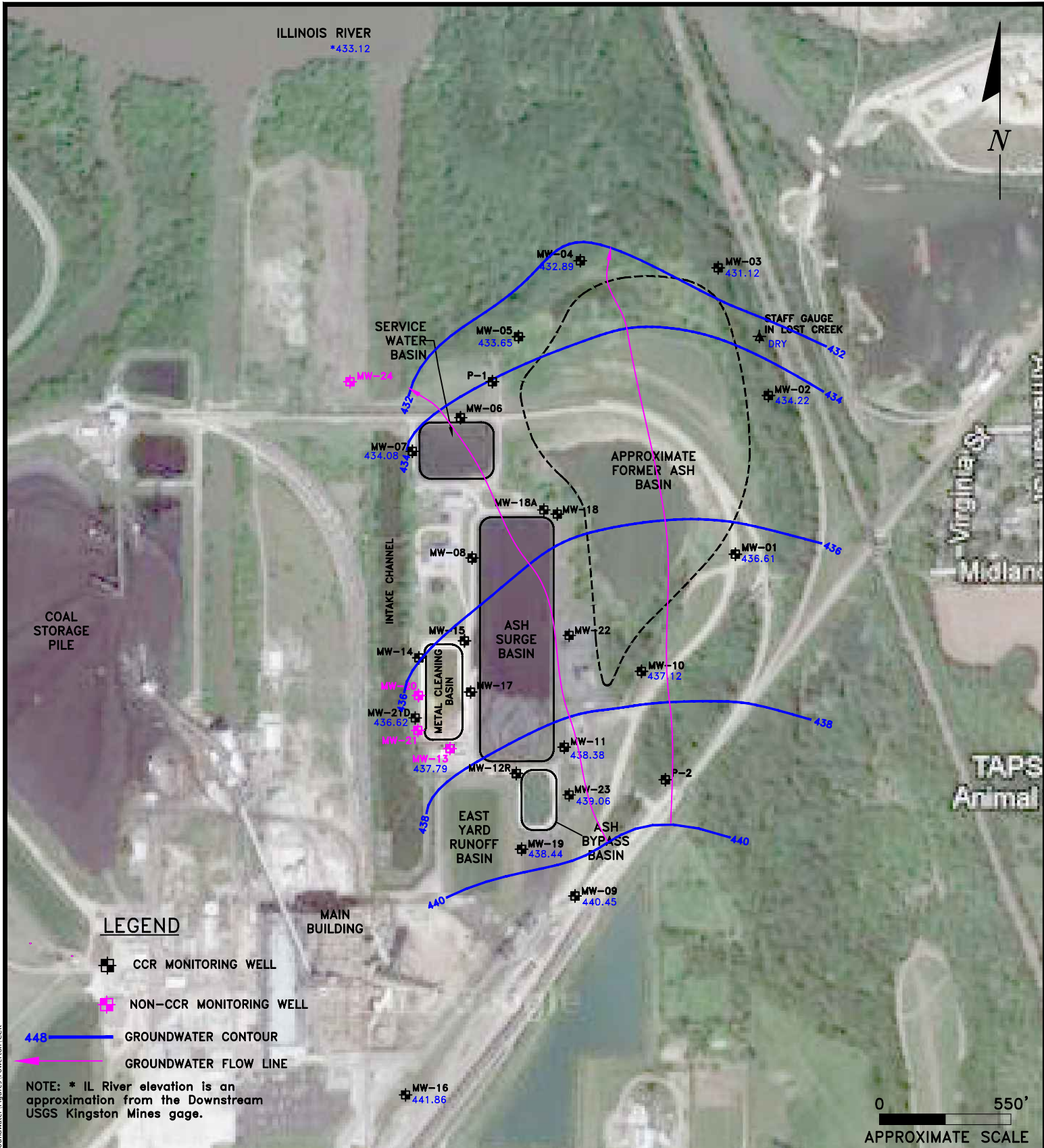
EXAMPLE CITIZEN COMPLAINT LOG

EXAMPLE CITIZEN COMPLAINT LOG

[illegible]

ATTACHMENT 2

Monthly Groundwater Flow Maps (2025)



ENVIRONMENTAL CONSULTATION & REMEDIATION

K P R G

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POTENTIOMETRIC MAP
SAND/GRAVEL UNIT 01/2025

POWERTON STATION
PEKIN, ILLINOIS

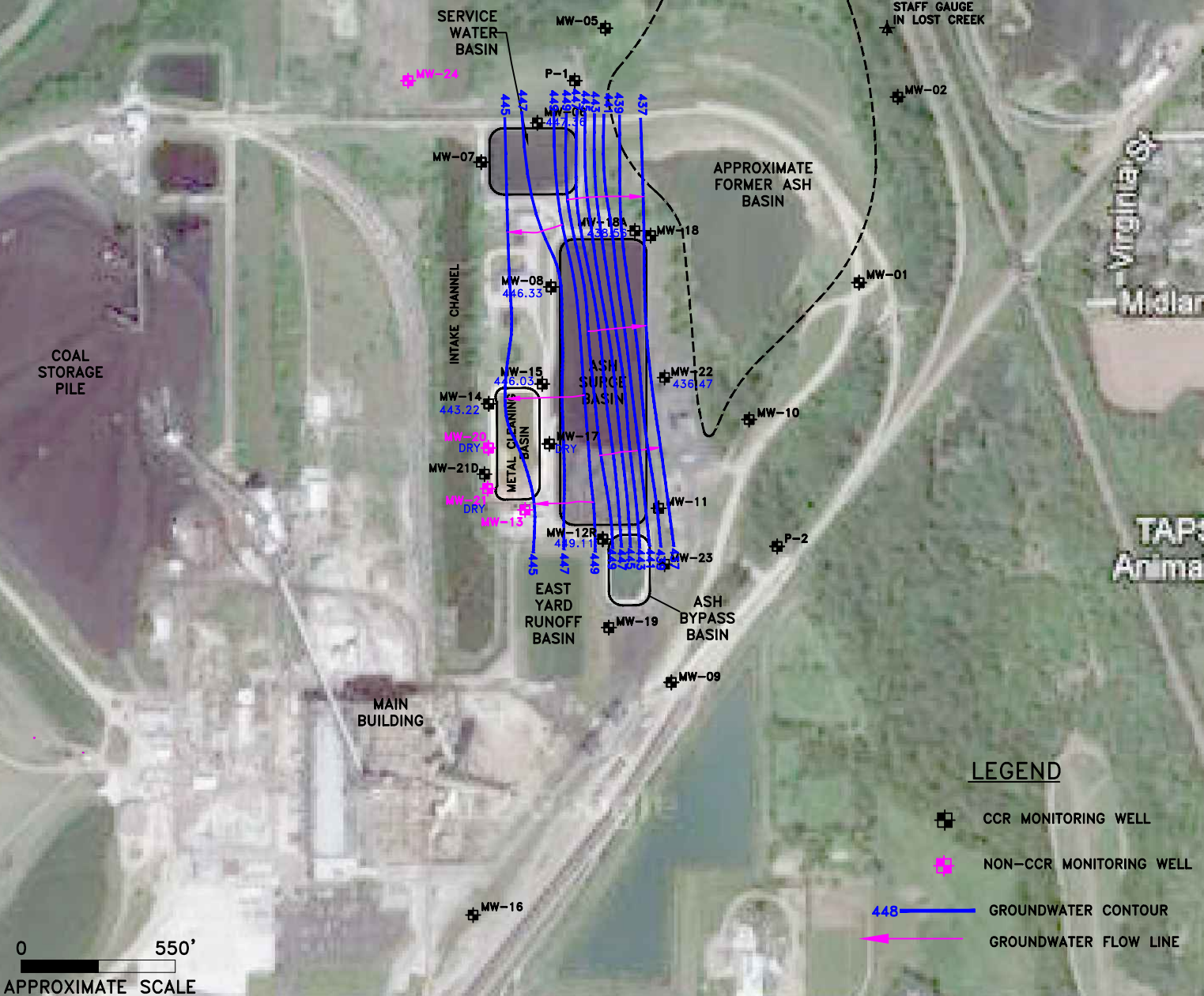
Scale: 1" = 550' Date: December 22, 2025

KPRG Project No. 12313.1

ATTACHMENT 1

ILLINOIS RIVER

N



ENVIRONMENTAL CONSULTATION & REMEDIATION

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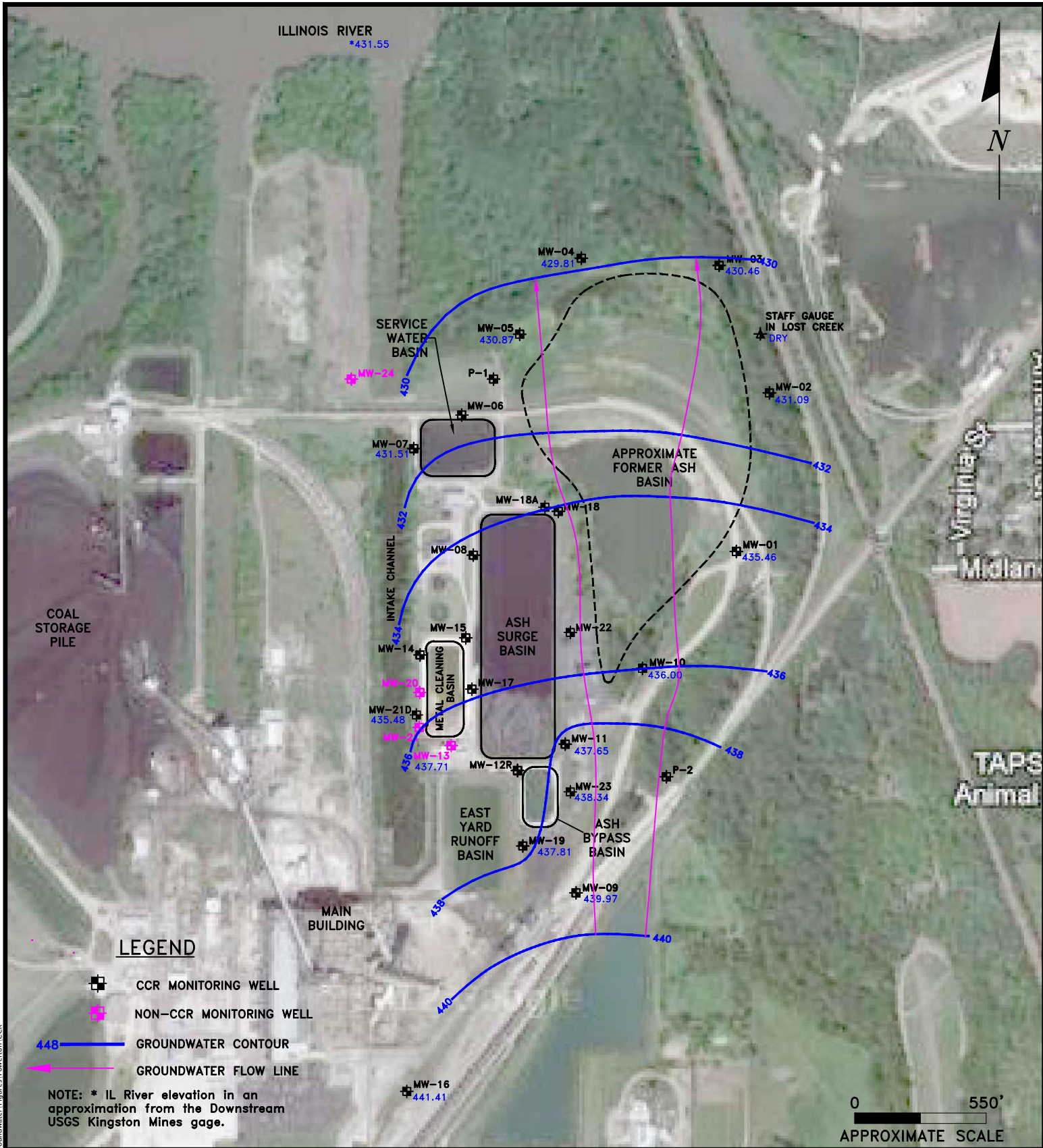
POTENTIOMETRIC MAP SILT/CLAY UNIT 01/2025

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550' Date: December 17, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC SURFACE MAP SAND/GRAVEL UNIT 02/2025

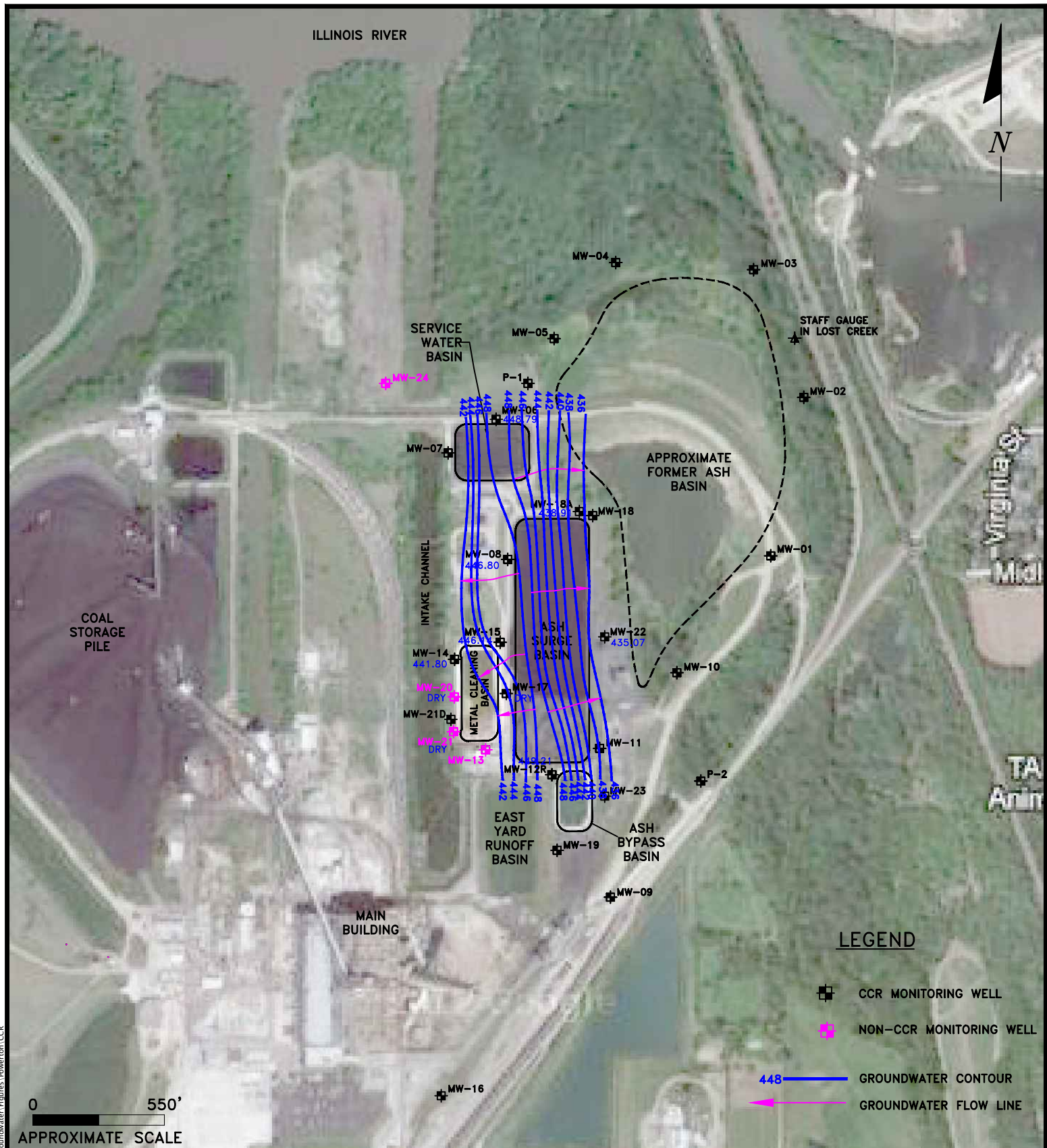
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 31, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SILT/CLAY UNIT 02/2025

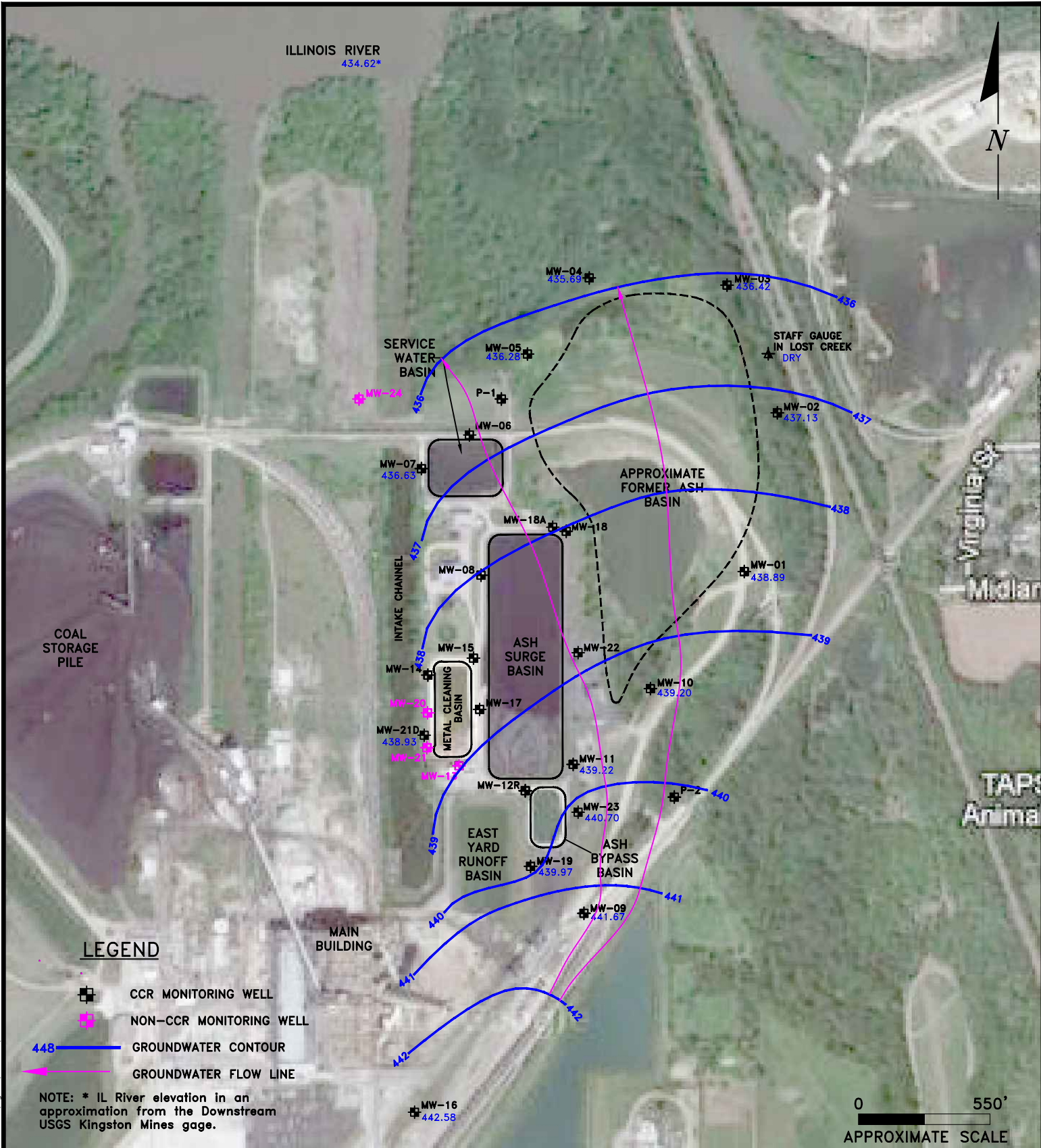
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 17, 2025

KPRG Project No. 12313.1

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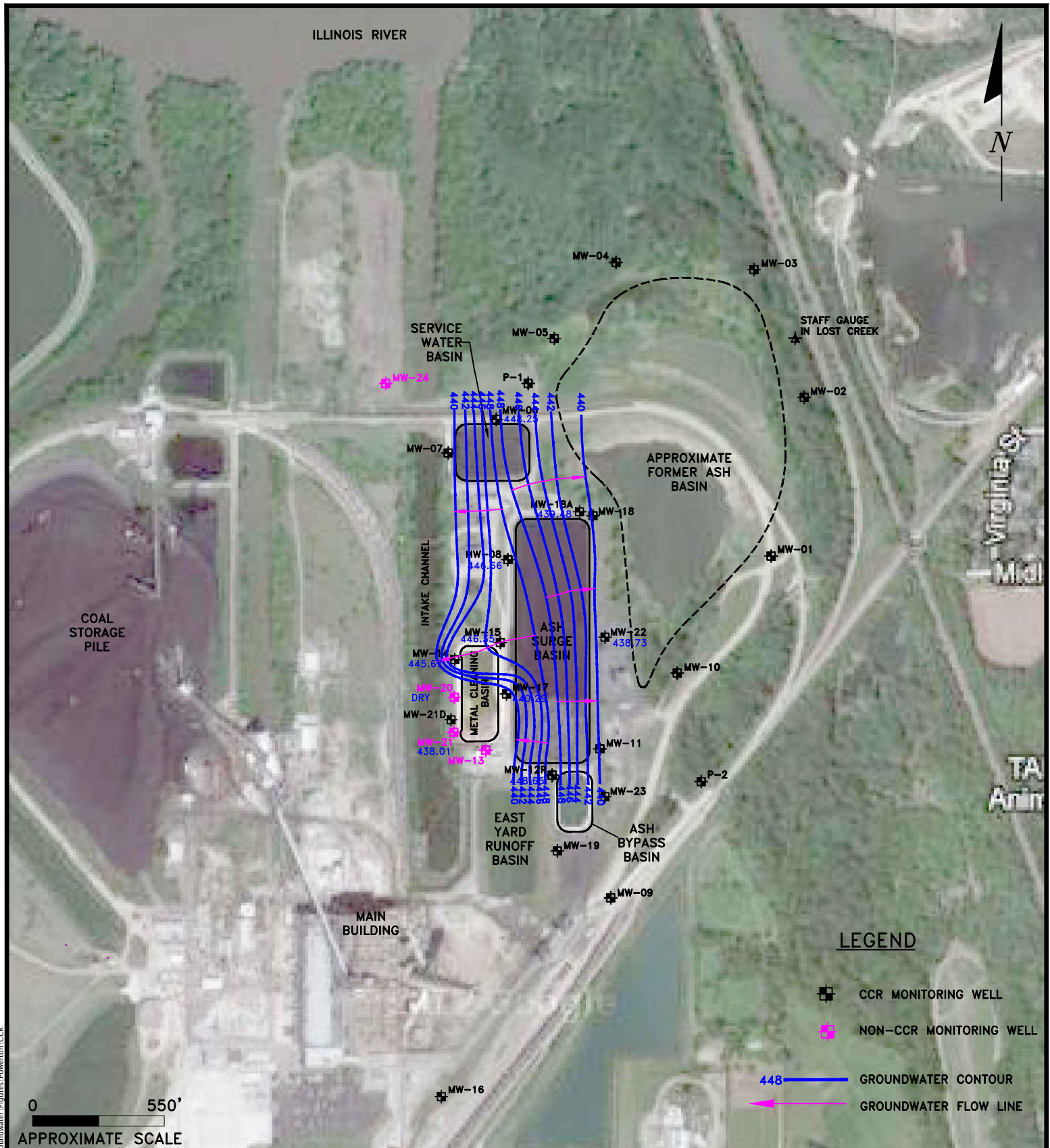
POTENTIOMETRIC MAP SAND/GRAVEL UNIT 03/2025

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550' Date: December 29, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SILT/CLAY UNIT 03/2025

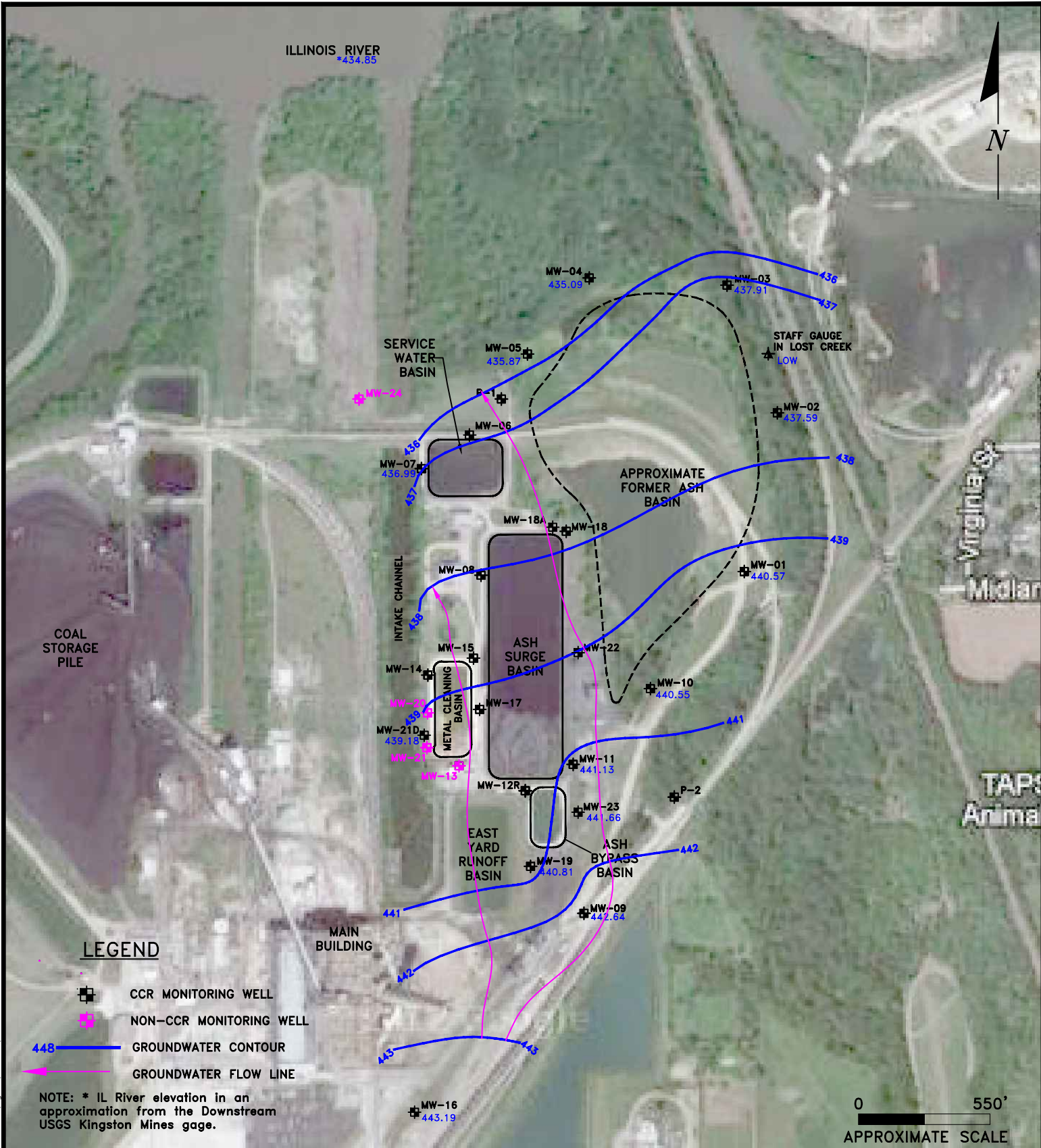
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 17, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 04/2025

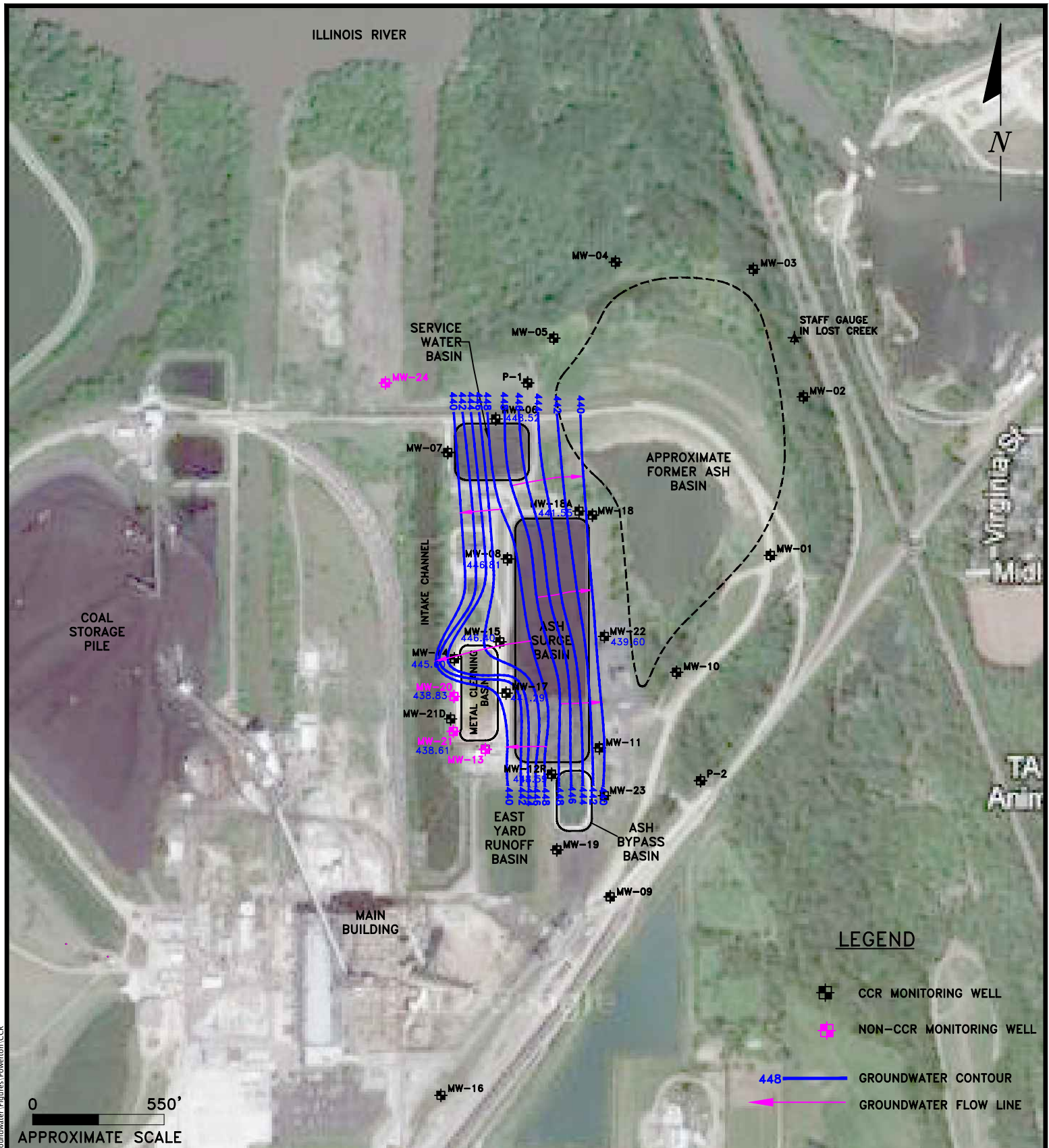
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 29, 2025

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POTENTIOMETRIC MAP SILT/CLAY UNIT 04/2025

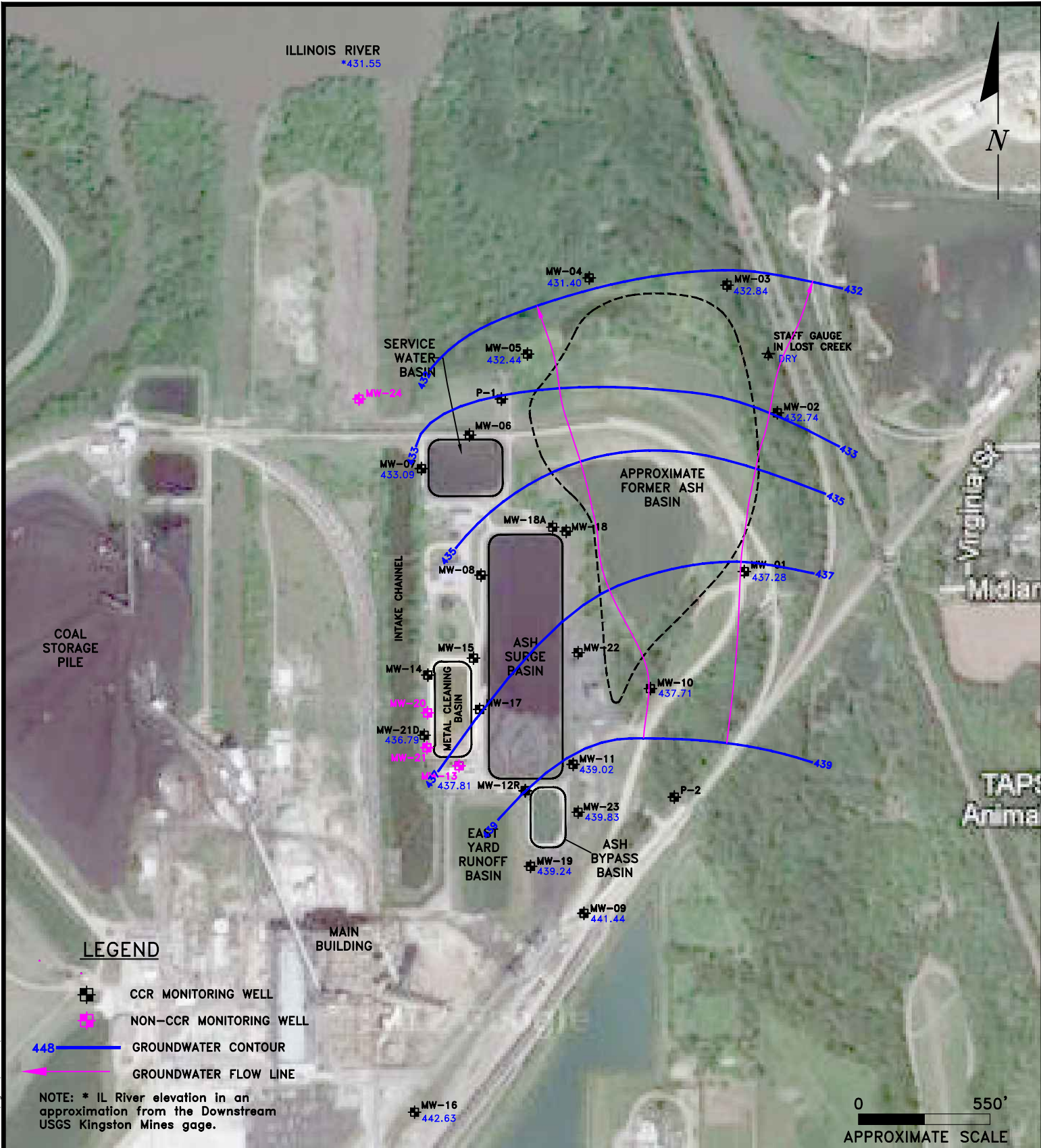
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 17, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 05/2025

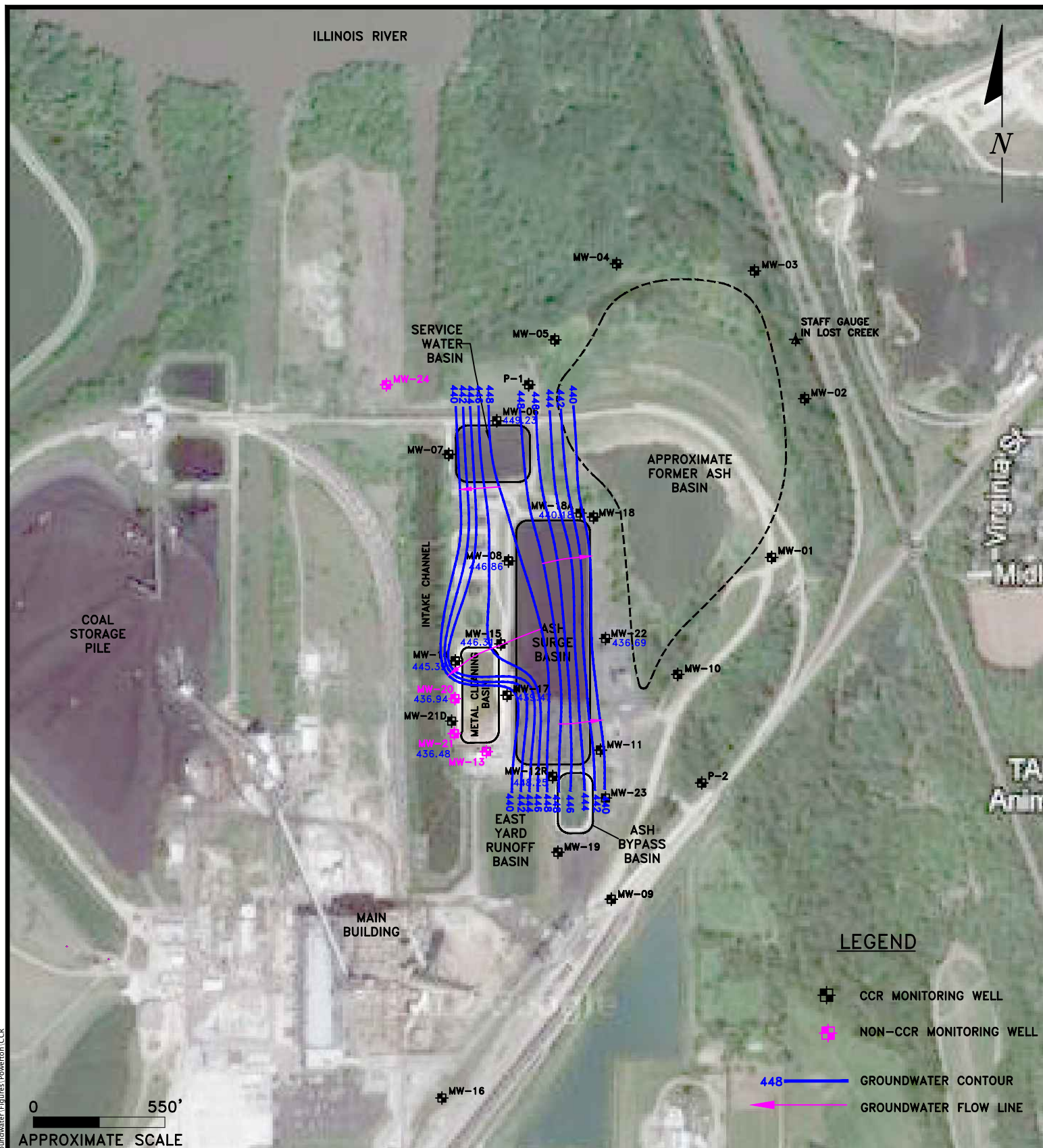
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 31, 2025

KPRG Project No. 12313.1

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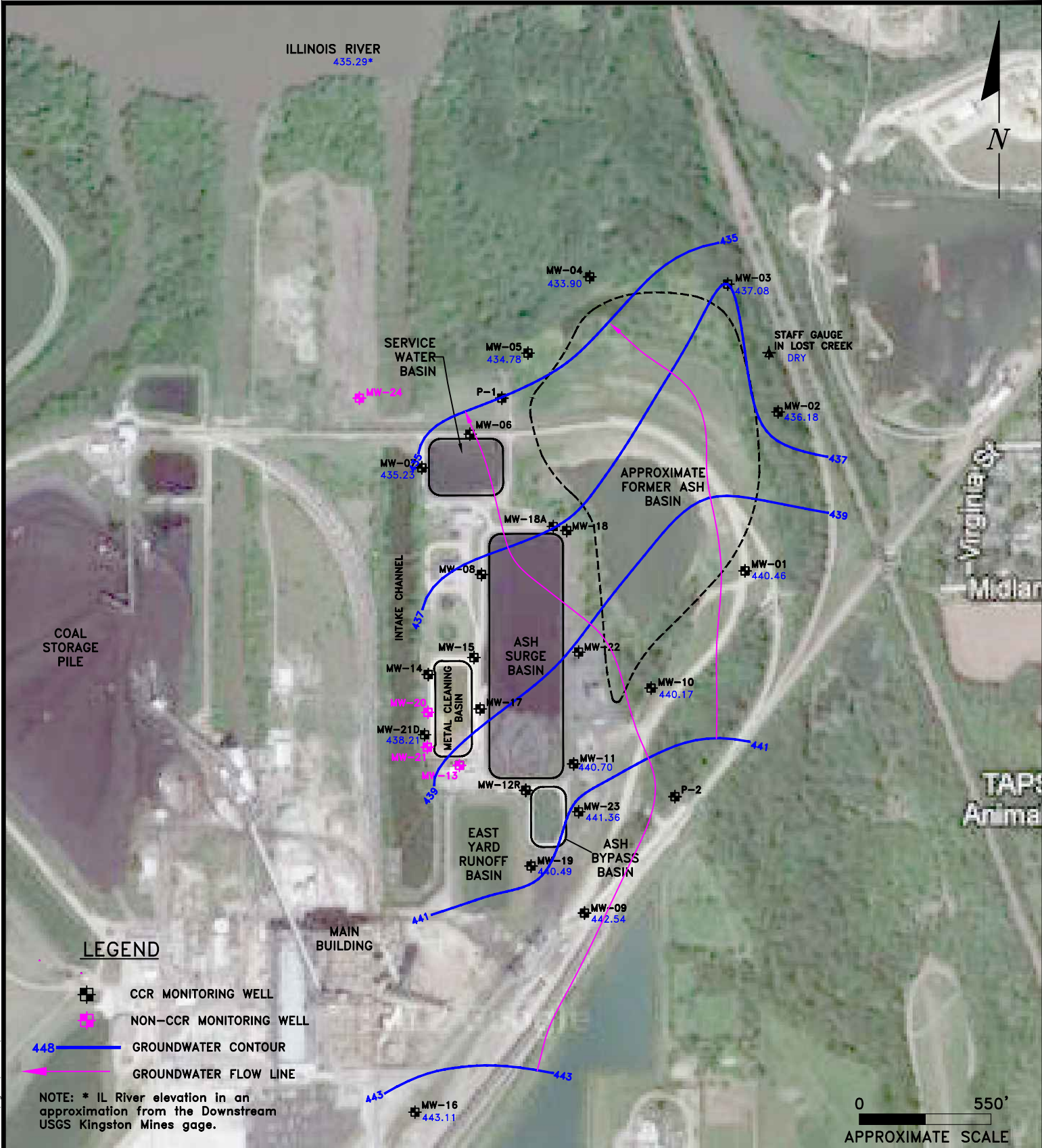
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PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 19, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP
SAND/GRAVEL UNIT 06/2025

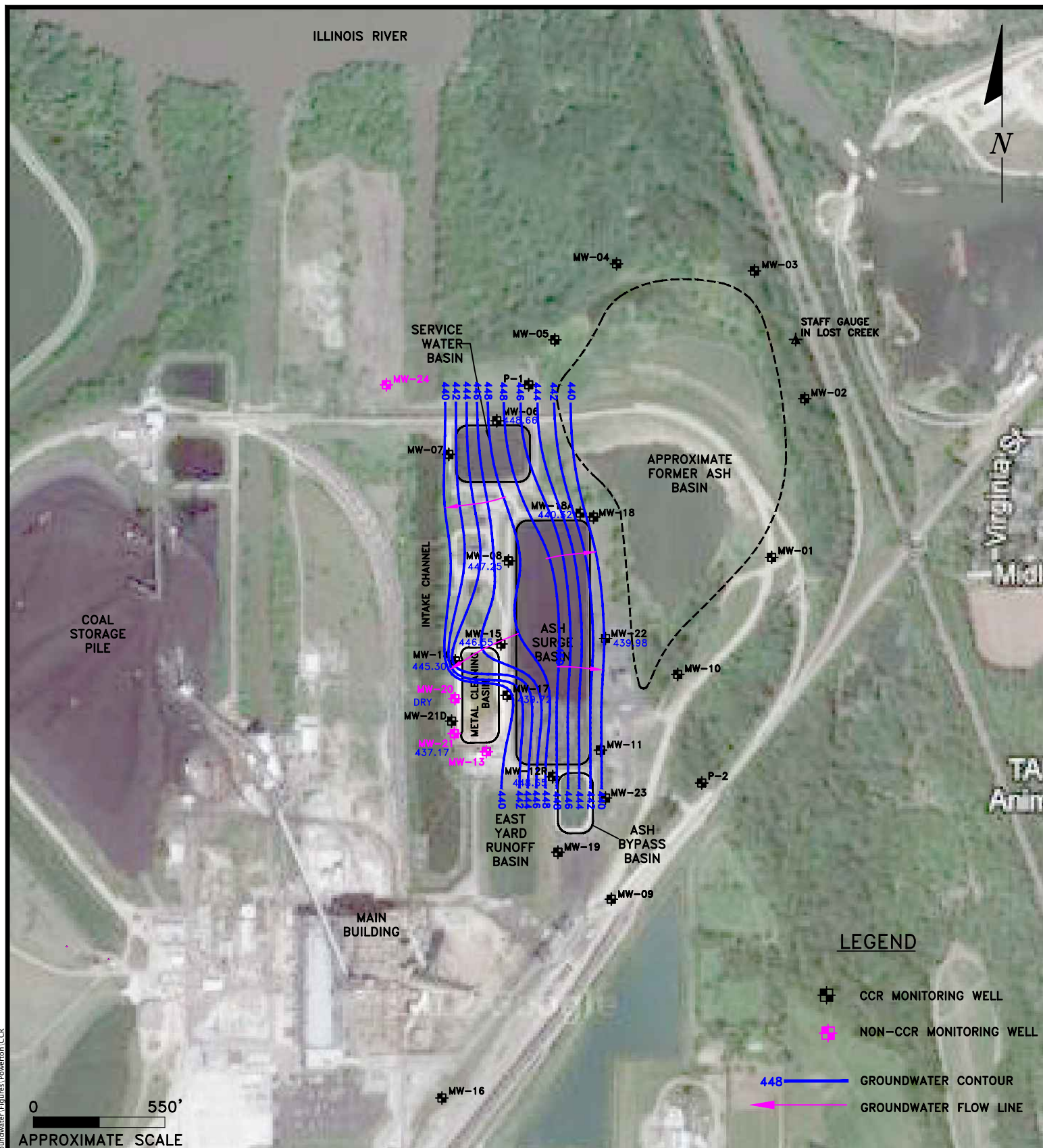
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PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 31, 2025

KPRG Project No. 12313.1

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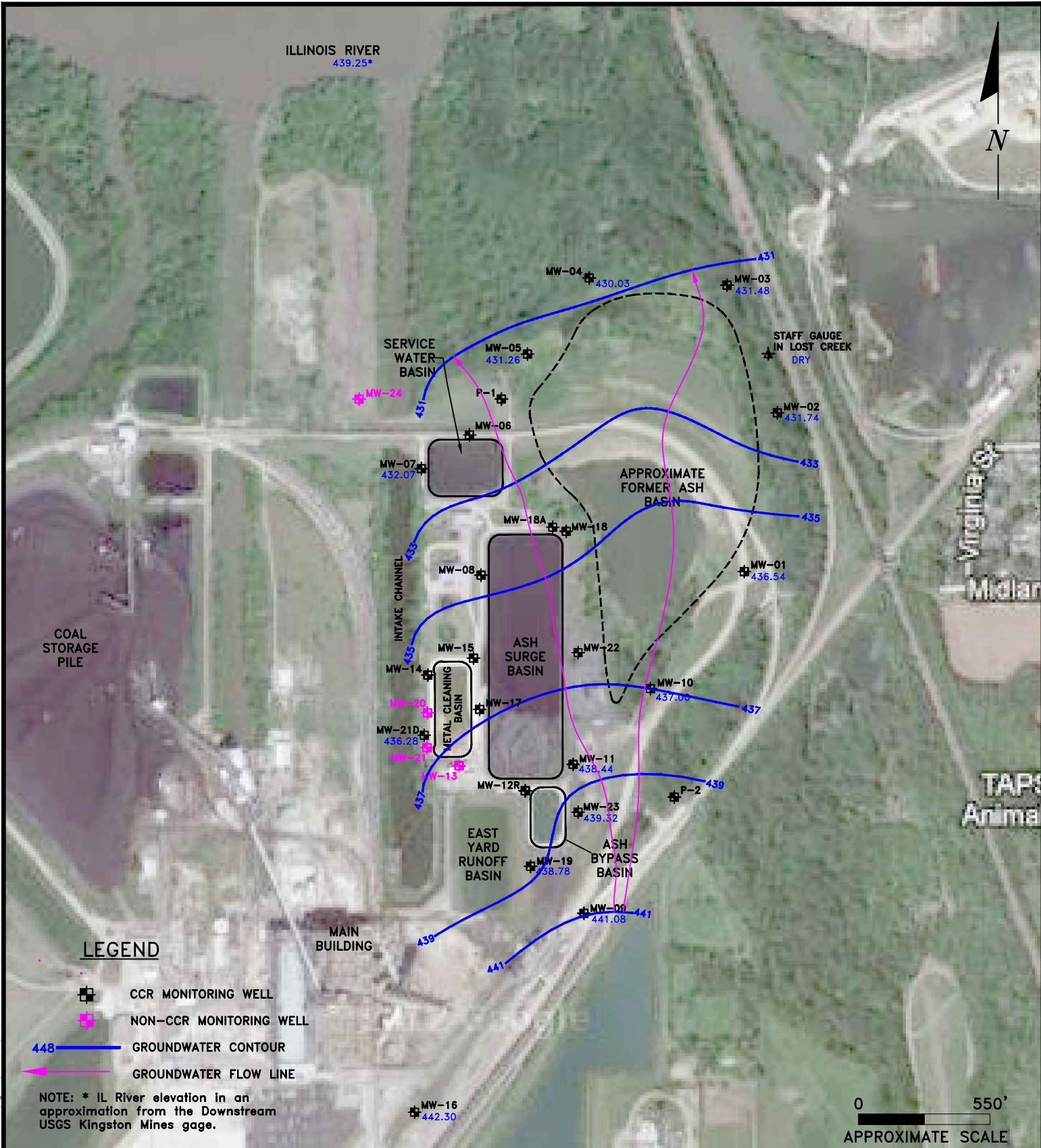
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PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 19, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 07/2025

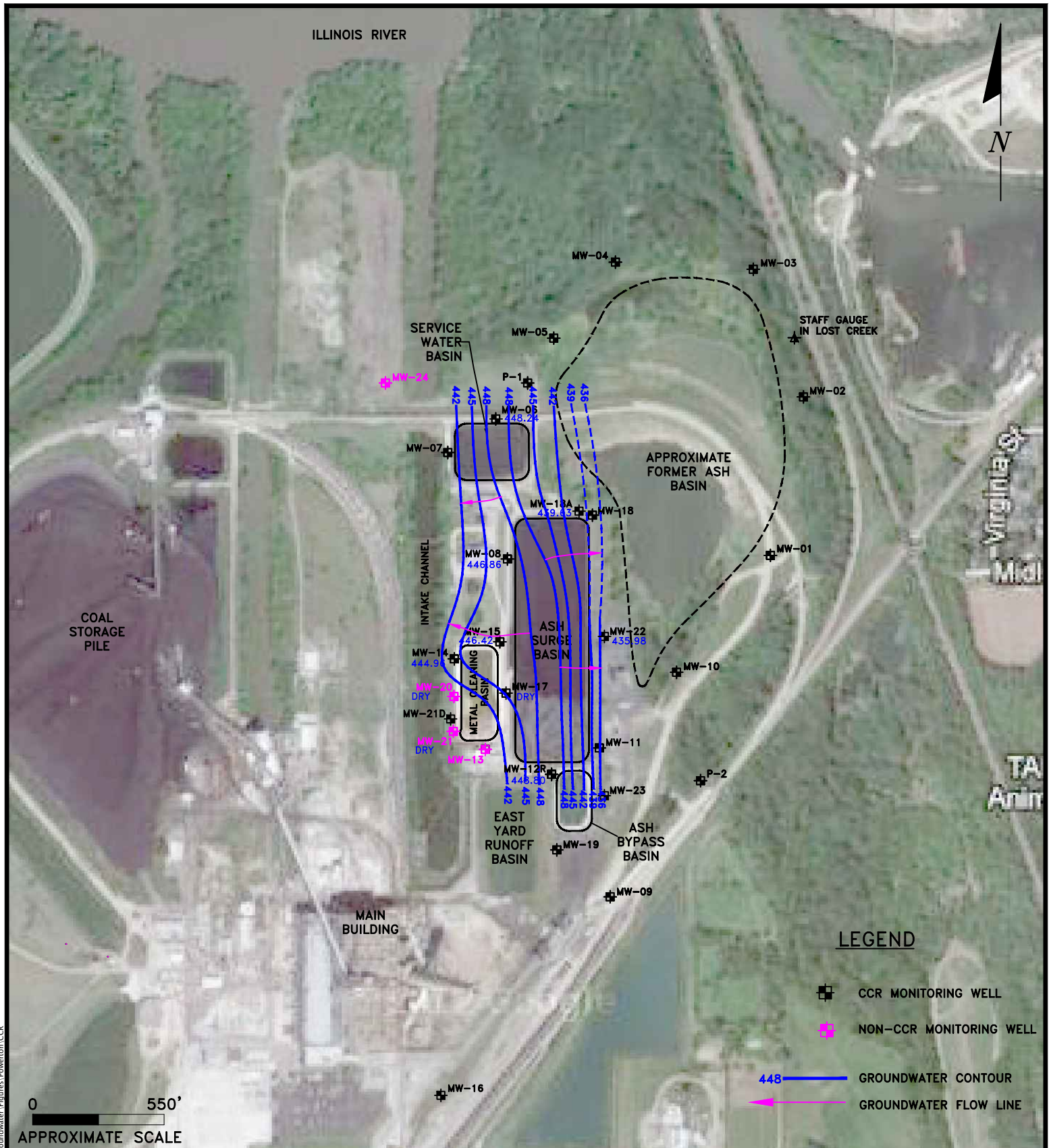
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 31, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SILT/CLAY UNIT 07/2025

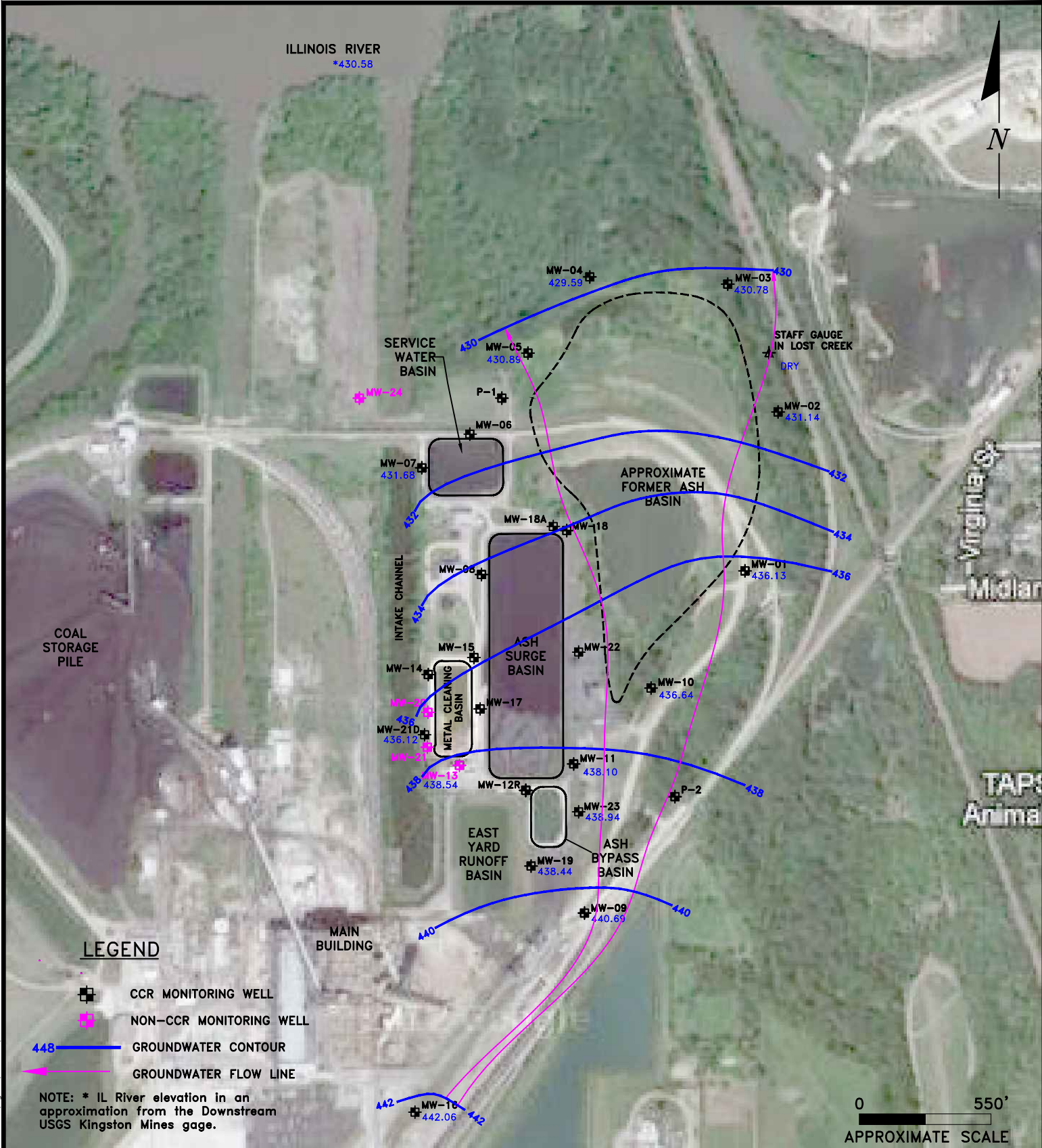
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 19, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP
SAND/GRAVEL UNIT 08/2025

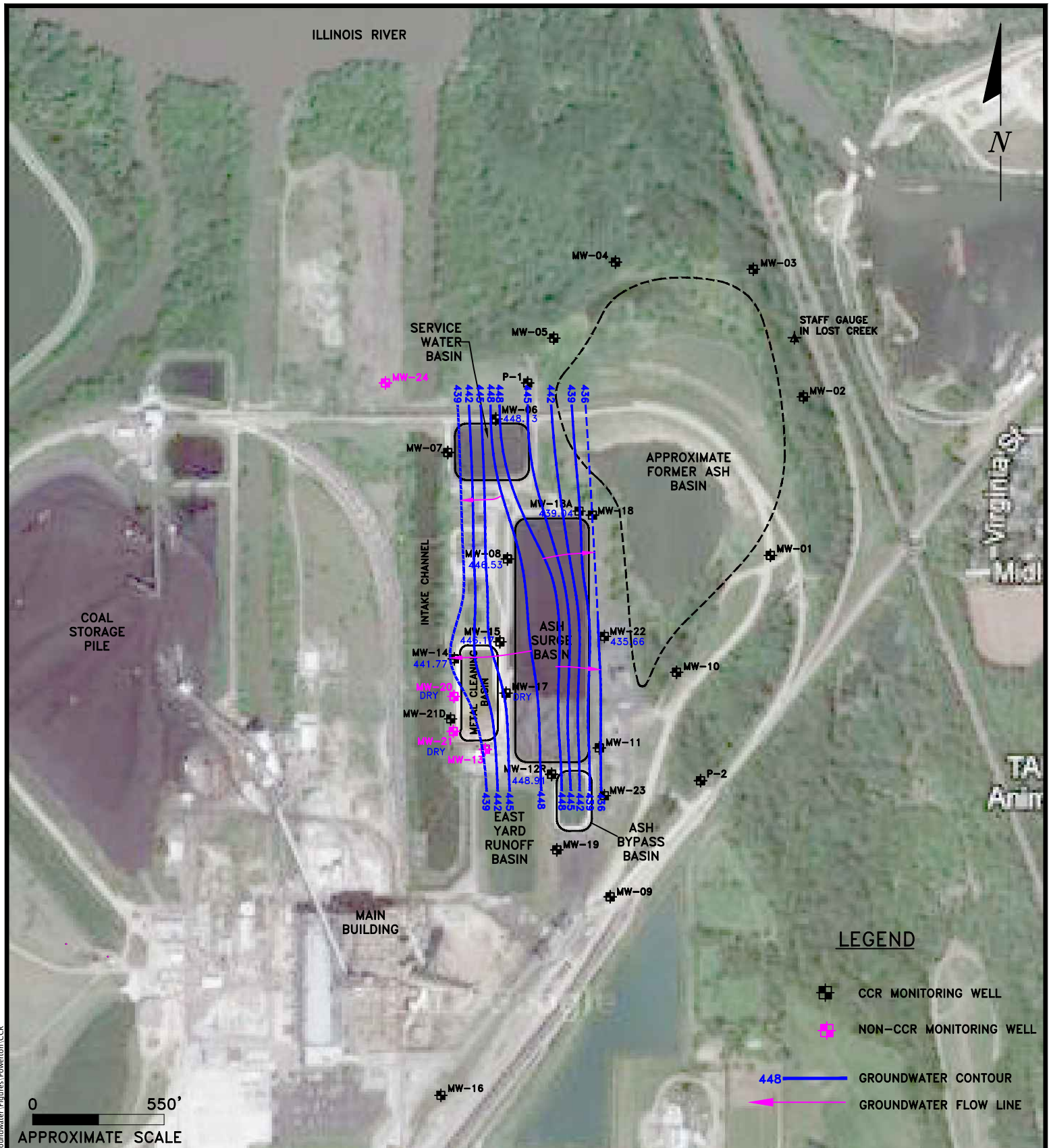
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 31, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SILT/CLAY UNIT 08/2025

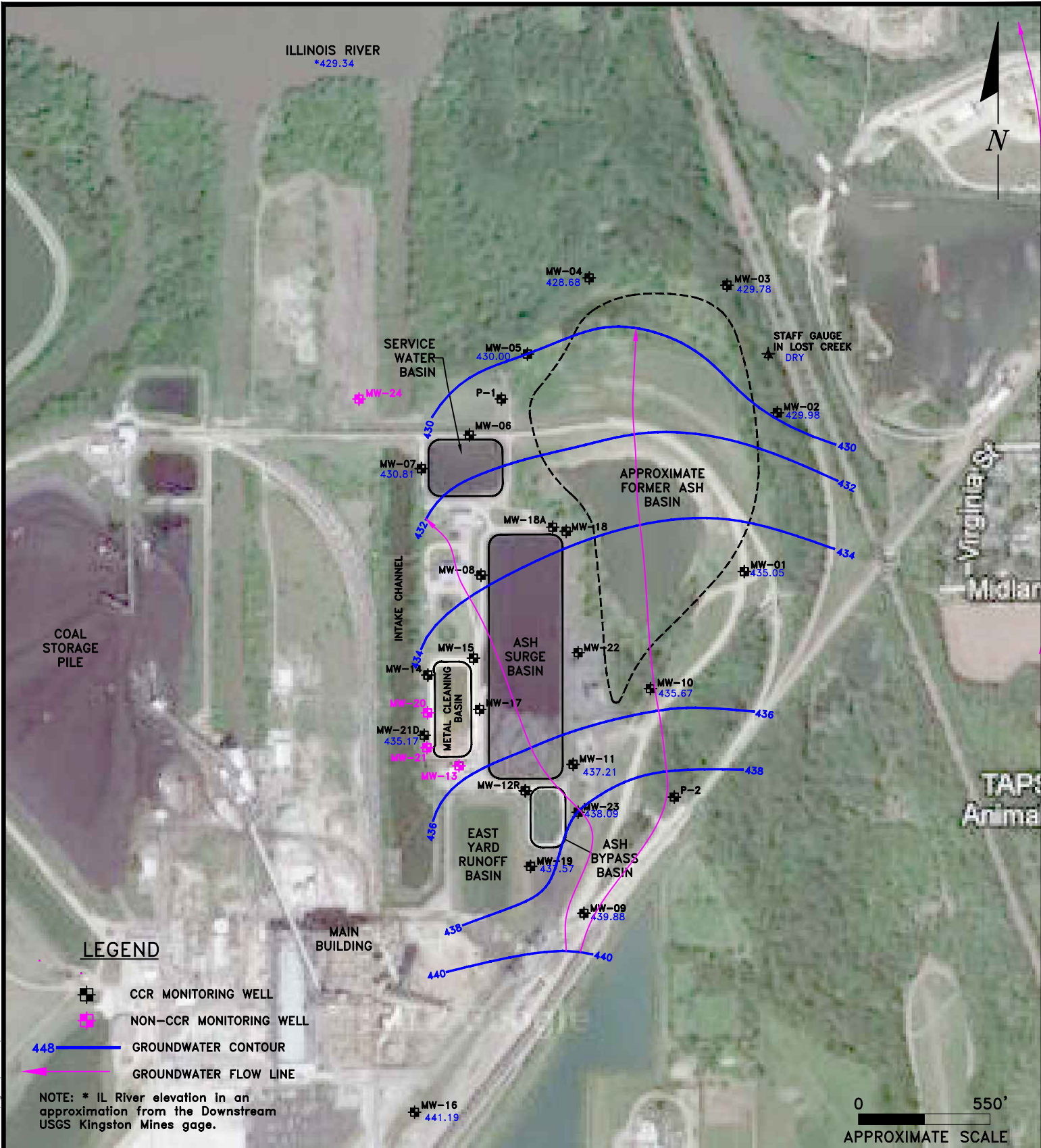
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PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 19, 2025

KPRG Project No. 12313.1

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 09/2025

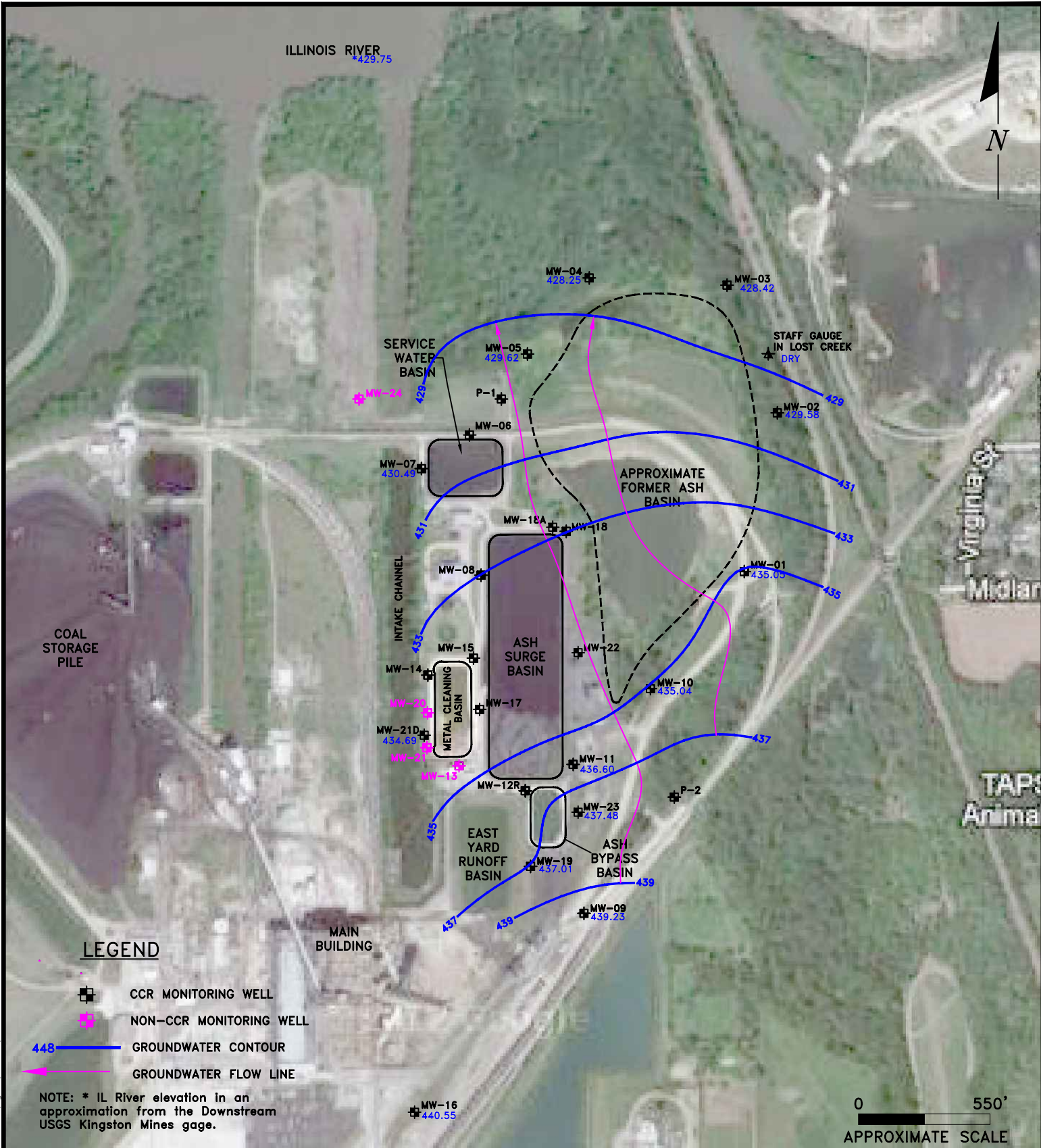
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 30, 2025

KPRG Project No. 12313.1

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ENVIRONMENTAL CONSULTATION & REMEDIATION

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

POTENTIOMETRIC MAP SAND/GRAVEL UNIT 10/2025

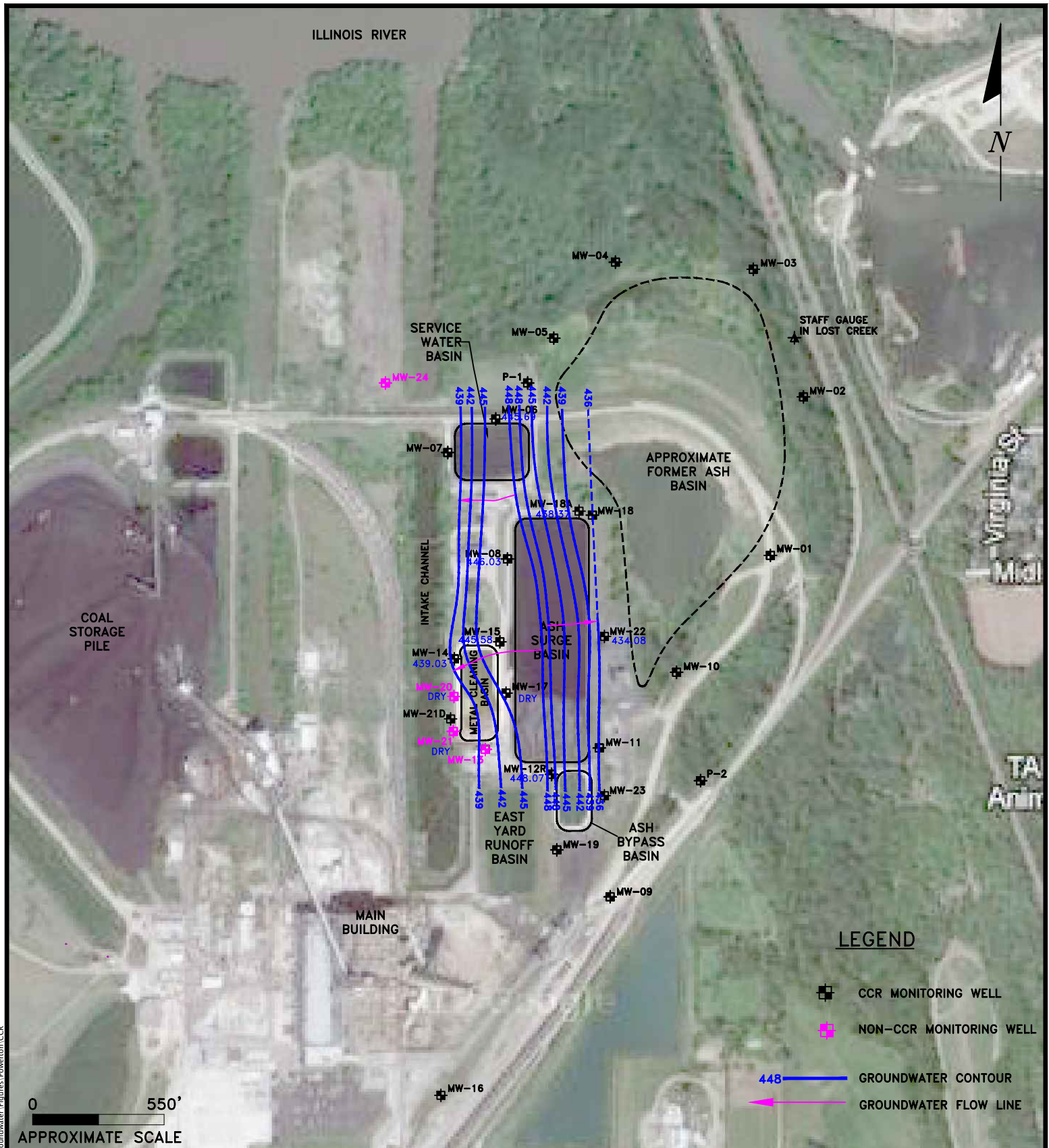
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 30, 2025

KPRG Project No. 12313.1

ATTACHMENT 1



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POTENTIOMETRIC MAP SILT/CLAY UNIT 10/2025

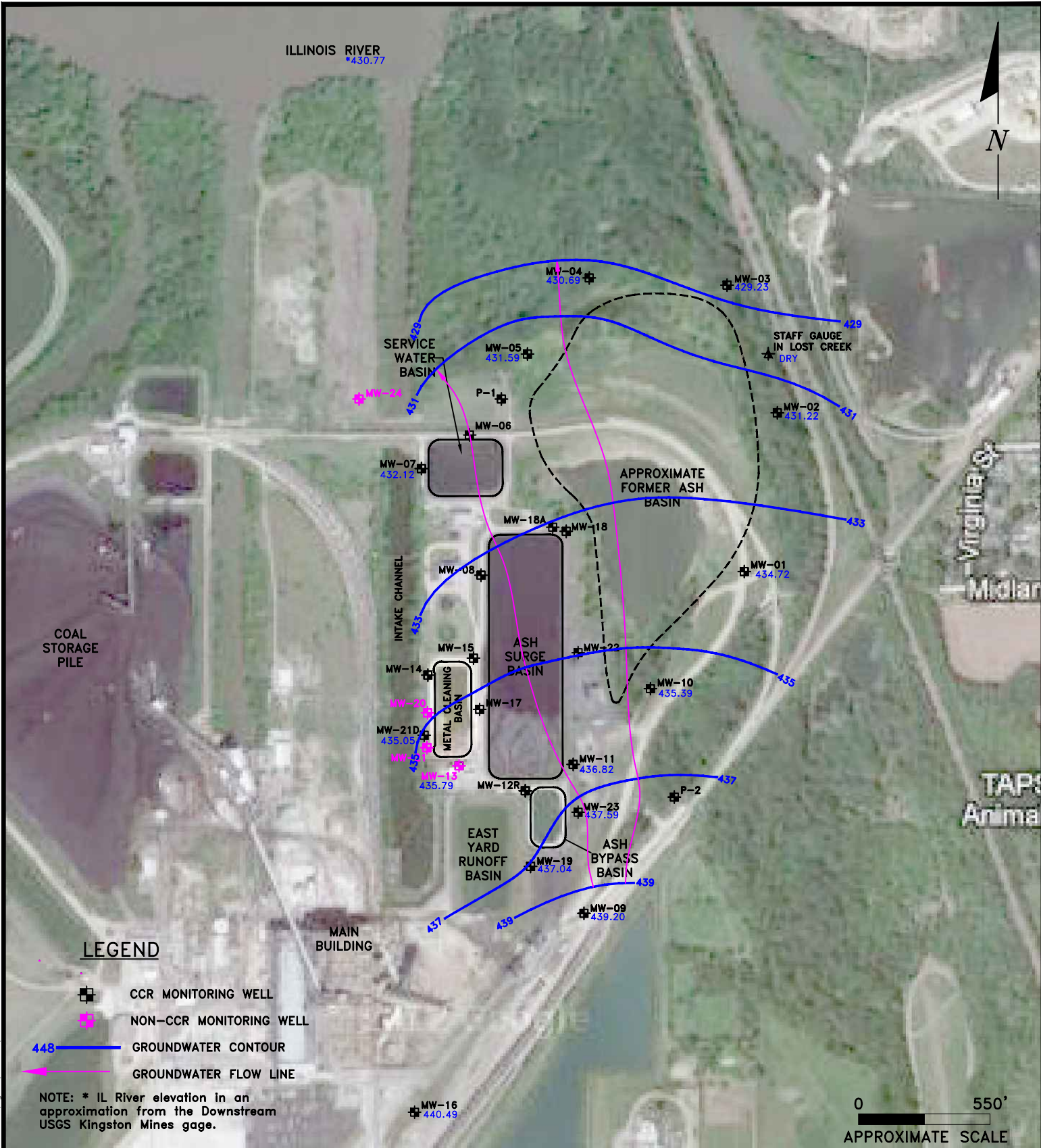
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PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 17, 2025

KPRG Project No. 12313.1

ATTACHMENT 1



ENVIRONMENTAL CONSULTATION & REMEDIATION

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 11/2025

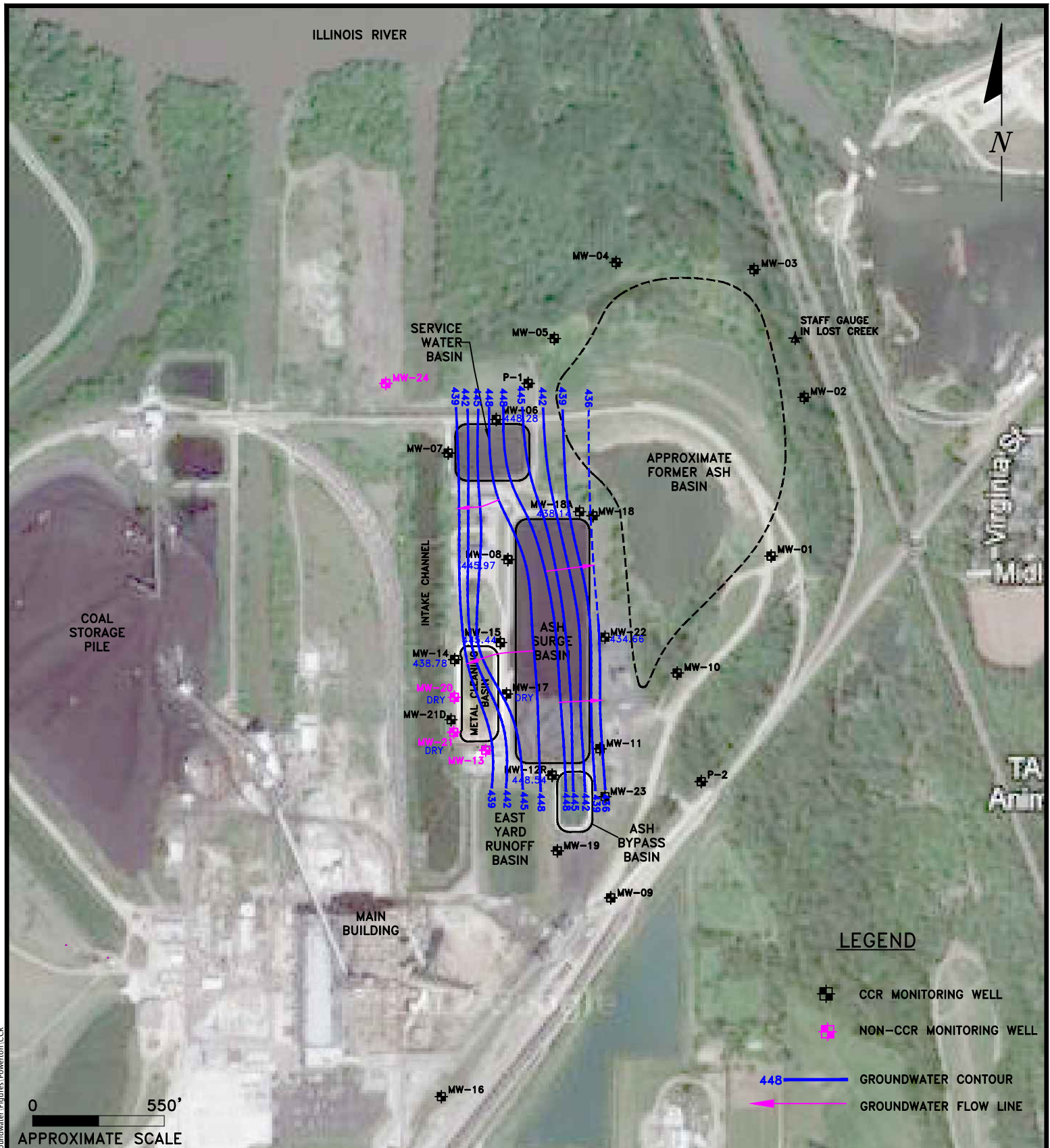
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 30, 2025

KPRG Project No. 12313.1

ATTACHMENT 1



ENVIRONMENTAL CONSULTATION & REMEDIATION

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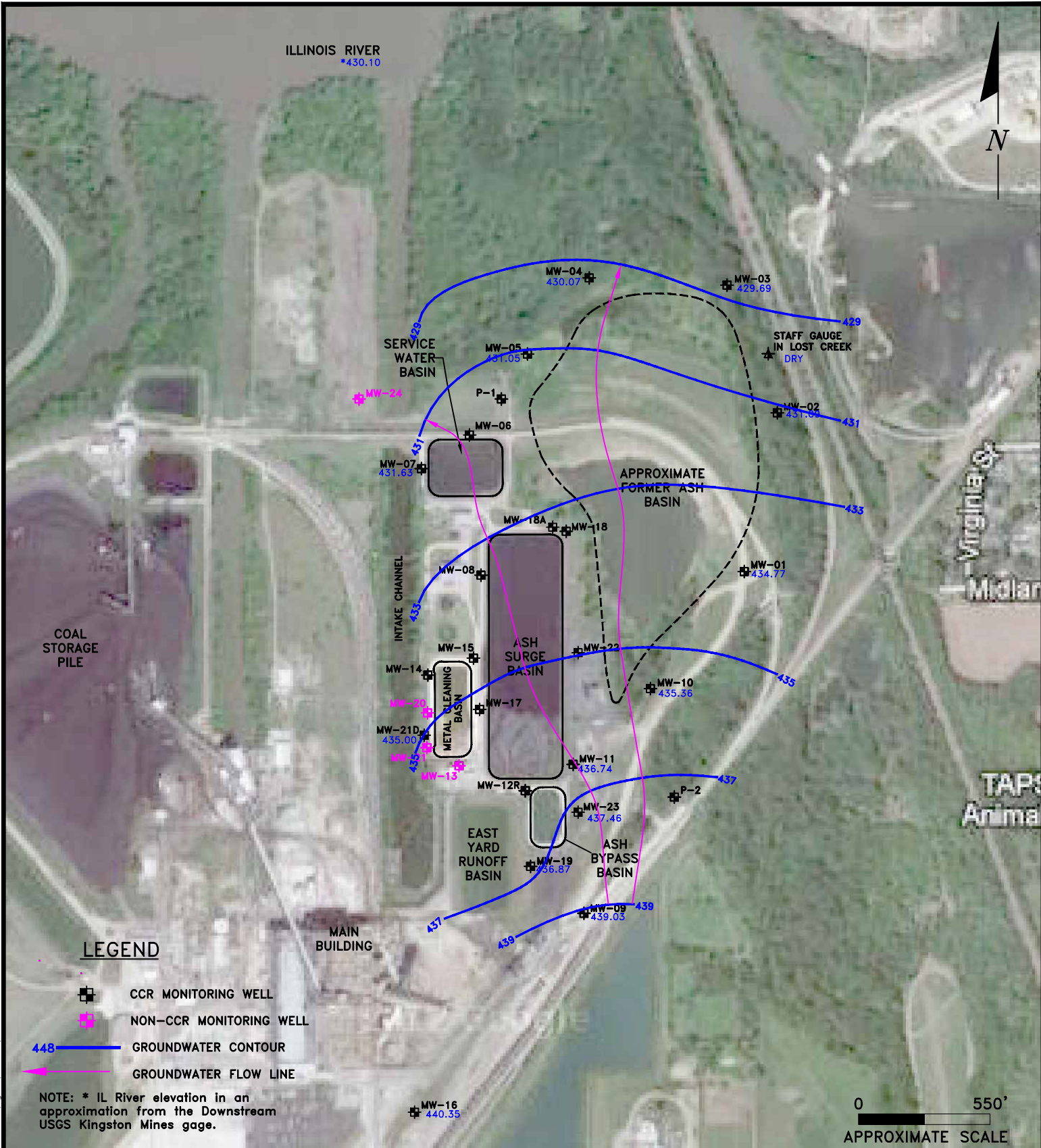
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 17, 2025

KPRG Project No. 12313.1

ATTACHMENT 1



ENVIRONMENTAL CONSULTATION & REMEDIATION

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POTENTIOMETRIC MAP SAND/GRAVEL UNIT 12/2025

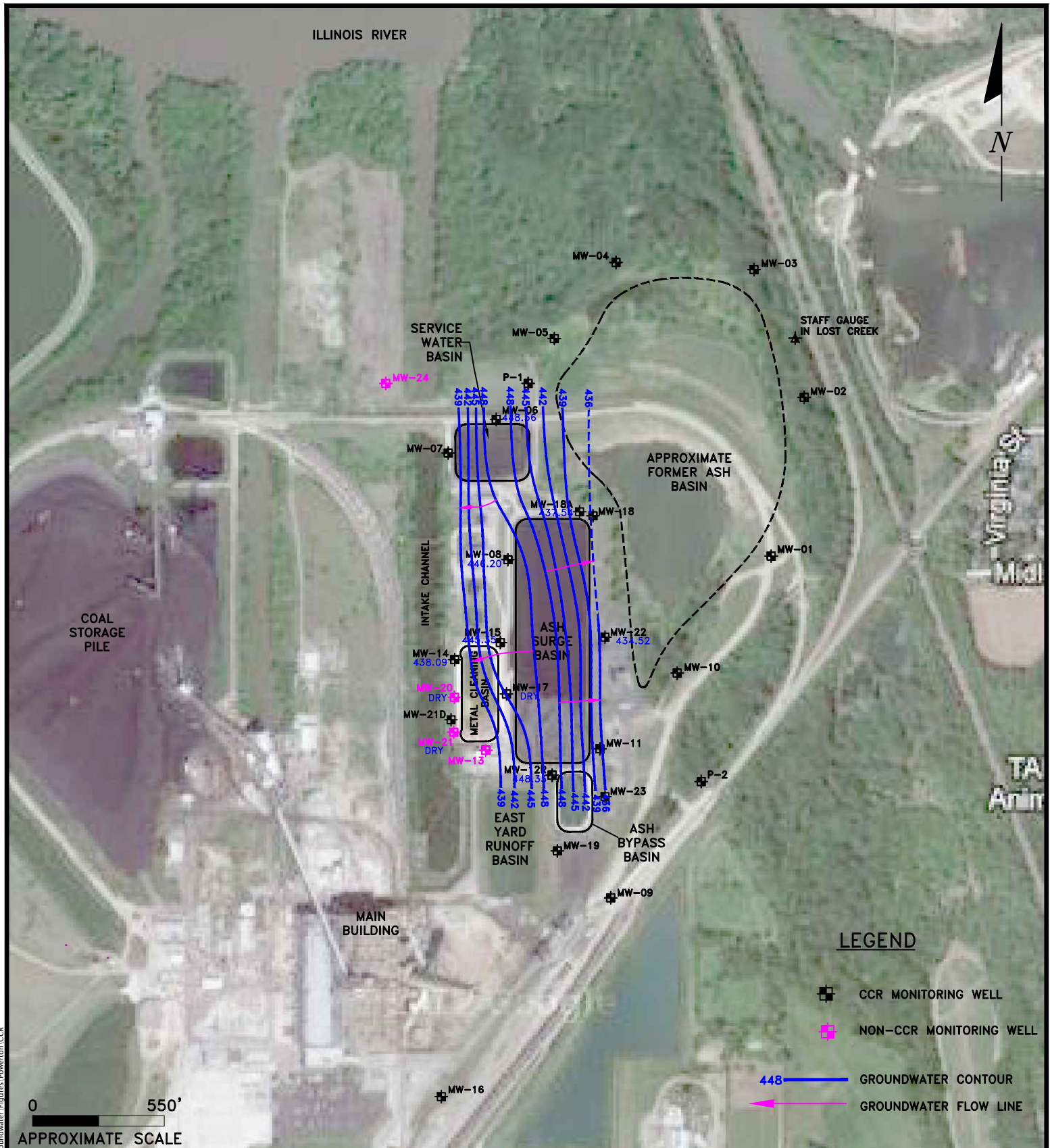
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 30, 2025

KPRG Project No. 12313.1

ATTACHMENT 1



ENVIRONMENTAL CONSULTATION & REMEDIATION

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POTENTIOMETRIC MAP SILT/CLAY UNIT 12/2024

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: December 22, 2025

KPRG Project No. 12313.1

ATTACHMENT 1

ATTACHMENT 3

Boring Logs and Well Construction Summaries

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-1-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET 1 OF 2

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
461.7	0.0		Brown coarse to fine sand, dry	FILL							qu=NT Bentonite seal 3.0'-18.0'. Stickup protective cover installed. qu=NT qu=NT qu=NT qu=NT qu=NT Sand pack 18.0'-30.0' qu=NT
				SS-1 1.0-2.5 14"R	3 4 4						
				SS-2 3.5-5.0 12"R	3 3 5						
				SS-3 6.0-7.5 12"R	2 6 8						
				SS-4 8.5-10.0 10"R	2 5 8						
				SS-5 11.0-12.5 8"R	5 9 10						
				SS-6 13.5-15.0 12"R	3 6 6						
				SS-7 16.0-17.5 16"R	4 6 7						
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						

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					NOTES & TEST RESULTS
						PL	LL				
						10	20	30	40	50	
Unconfined Compressive Strength (TSF) *						1	2	3	4	5	
441.7	20.0										Set screen (slot 0.010") 20.5'-30.5' qu=NT
439.7	22.0			SS-9 21.0-22.5 15"R	4						
					5						
					5						
		SS-10 23.5-25.0 18"R	4								
			4								
			4								
		SS-11 28.0-27.5 18"R	4								
			4								
			6								
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							
		SS-13 31.0-32.5 18"R	4								
			6								
			7								
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					NOTES & TEST RESULTS
						PL	LL				
						10	20	30	40	50	
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
459.2	0.0		Dark brown topsoil, silty clay, dry								
			FILL								
457.7	1.5		Light brown coarse to fine sand, loose, dry	SS-1 1.0-2.5 10"R	4 4 4						qu=NT
			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					NOTES & TEST RESULTS
						PL	Unconfined Strength (TSF)	Compressive	LL		
439.2	20.0		Light brown fine to medium sand, well graded, medium dense, dry FILL								Sand pack 20.0'-33.5' qu=NT
				SS-9 21.0-22.5 18"R	4 10 11						
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' qu=NT qu=NT qu=NT qu=NT
435.2	24.0										
				SS-11 26.0-27.5 18"R	4 6 8						
				SS-12 28.5-30.0 18"R	7 10 10						
				SS-13 31.0-32.5 18"R	7 8 7						
				SS-14 33.5-35.0 18"R	6 9 10						
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					NOTES & TEST RESULTS									
						Unconfined Compressive Strength (TSF) *														
						1	2	3	4	5										
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																	qu=NT
			FILL	SS-1 1.0-2.5 16"R	2 1 2															
				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					NOTES & TEST RESULTS
						PL	10	20	30	40	
439.1	20.0		SW								Sand pack 20.0'-34.0' qu=NT
				SS-9 21.0-22.5 18"R	1 1 1						
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						
				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.

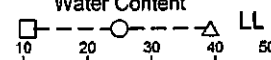
21053.070

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	PL 					NOTES & TEST RESULTS	
						Unconfined Compressive Strength (TSF) *						
						1	2	3	4	5		
457.3	0.0		Brown silty clay, roots, topsoil									
456.5	0.8		FILL									
			Light brown sand, medium to fine brown silty clay, fine gravel, dry	SS-1 1.0-2.5 10"R	6 3 4							
			FILL									
				SS-2 3.5-5.0 8"R	3 4 4							
				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	SS-7 16.0-17.5 18"R	2 2 3							
				SP								
					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.

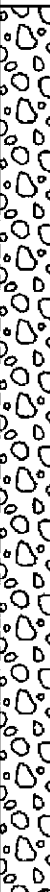
21053.070

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					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF) *						
						10	20	30	40	50			
437.3	20.0		Brown coarse to fine gravel, trace coarse to medium sand, loose to medium dense, poorly graded									Sand pack 20.0'-34.0' qu=NT	
				GP	SS-9 21.0-22.5 12"R	4 6 6							
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
					SS-13 31.0-32.5 10"R	4 4 8							qu=NT
423.3	34.0		Coarse to fine gravel, trace silt										
			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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *			LL		
						10	20	30	40	50		
						1	2	3	4	5		
455.8	0.0		Dark brown silty clay, black coal cinders, topsoil								qu=NT Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT qu=1.25**tsf qu=1.0**tsf qu=0.5**tsf	
			FILL	SS-1 1.0-2.5 12"R	2 2 3							
			Dry									
				SS-2 3.5-5.0 14"R	6 8 10							
			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							
				SS-4 8.5-10.0 18"R	1 2 2							
				SS-5 11.0-12.5 18"R	2 2 3							
			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							
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**

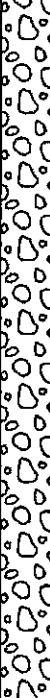
REMARKS
Installed 2" diameter PVC monitoring well.

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 10 20 30 40 50 LL Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
435.8 435.3	20.0 20.5		Coarse to fine gravel, trace coarse to fine sand, poorly graded, medium dense, saturated GP								qu=NT Set screen (slot 0.010") 21.0'-31.0'
				SS-9 21.0-22.5 0"R	4 6 6						
				SS-10 23.5-25.0 10"R	4 6 6						
				SS-11 26.0-27.5 10"R	3 4 4						
				SS-12 28.5-30.0 10"R	4 5 6						
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					NOTES & TEST RESULTS
						PL				LL	
						10	20	30	40	50	
Unconfined Compressive Strength (TSF) *						1	2	3	4	5	
461.2	0.0		Gravel, clay, coal cinders	FILL							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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							qu=0.25**tsf
				SS-5 11.0-12.5 17"R	WOH 1 1						
447.2	14.0		Black coal cinders, loose, wet	FILL							qu=0.25**tsf
				SS-6 13.5-15.0 16"R	WOH 3 3						
444.2	17.0										Sand pack 18.0'-28.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'
				SS-7 16.0-17.5 14"R	2 3 3						
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						

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

▽

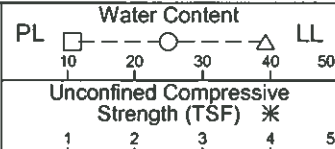
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PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-6-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **2** OF **2**

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
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			SS-12 28.5-30.0 18"R	2 2 3						qu=1.25**tsf
			Dark gray organic clay, trace fine sand, medium stiff, moist	OL							
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.

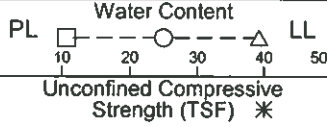
21053.070

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	PL  LL					NOTES & TEST RESULTS
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
459.6	0.0		Sand, gravel, black cinders, dry FILL								Bentonite seal 3.0'-32.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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								qu=0.75**tsf
				SS-8 18.5-20.0 18"R	WOH 2 2						
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.

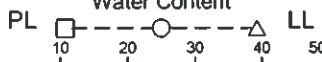
BORING NUMBER
CLIENT
PROJECT & NO.
LOCATION

B-MW-7-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 3

LOGGED BY **MPG**

GROUND ELEVATION **459.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL  LL					NOTES & TEST RESULTS	
						Unconfined Compressive Strength (TSF) *						
						1	2	3	4	5		
439.6	20.0		Dark gray organic clay, mottled black, medium stiff, dry	OH							qu=1.0**tsf	
				SS-9 21.0-22.5 18"R	3 2 4							
				SS-10 23.5-25.0 18"R	2 3 4							
433.6	26.0		Gray organic silt, trace shells, fibers, very soft, moist	OL							qu=0.25**tsf	
				SS-11 26.0-27.5 18"R	2 2 2							
			Dry									
				SS-12 28.5-30.0 18"R	2 3 3							
428.6	31.0		Dark gray organic clay, trace fine gravel, moist	OH							qu=1.25**tsf	
				SS-13 31.0-32.5 18"R	2 4 3							
426.1	33.5		Gray clayey gravel, coarse sand, clay, silt, moist	GC	WOH						qu=NT	
				SS-14 33.5-35.0 18"R	2 2							
				SS-15 36.0-37.5 18"R	2 7 6							
423.6	36.0		Medium dense, saturated								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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
468.7	0.0		Fine gravel, sand, silt, clay, black cinders, dry FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							
458.7	10.0		Black cinders FILL								Sand pack 18.0'-30.0'
				SS-5 11.0-12.5 14"R	15 28 15/3"						
				SS-6 13.5-15.0 18"R	11 15 12						
				SS-7 16.0-17.5 17"R	15 15 14						
				SS-8 18.5-20.0 18"R	7 11 11						
449.2	19.5		Silty clay seam 15.5'-16.5'								

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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **2** OF **2**

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 clnders	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						qu=0.75**tsf qu=1.0**tsf qu=1.25**tsf
				SS-10 23.5-25.0 18"R	1 1 2						
444.2	24.5		Dark gray organic clay, soft, moist	OH							
				SS-11 26.0-27.5 18"R	1 2 2						
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						
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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF)					LL
							1	2	3	4		
466.2	0.0		Black cinders, fine gravel, crushed rock, dry FILL									Bentonite seal 3.0'-20.0'. Stickup protective cover installed.
			SS-1 1.0-2.5									
			SS-2 3.5-5.0									
			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									qu=NT
			SS-5 11.0-12.5 14"R	6 12 15								
			SS-6 13.5-15.0 18"R	5 6 7								
			SS-7 16.0-17.5 18"R	6 9 10								
			SS-8 18.5-20.0 18"R	3 6 11								
449.2	17.0		Moist									qu=NT
			Brown clayey silt, trace fine sand, moist CL									
447.2	19.0		Light brown fine to medium sand, loose, well graded									qu=NT

DRILLING CONTRACTOR **Groff Testing**
 DRILLING METHOD **4.25" I.D. HSA**
 DRILLING EQUIPMENT **CME 550 ATV**
 DRILLING STARTED **9/28/10** ENDED **9/28/10**

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	Water Content					NOTES & TEST RESULTS		
						PL	LL						
						10	20	30	40	50			
						Unconfined Compressive Strength (TSF) *							
						1	2	3	4	5			
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								
442.7	23.5		▽	Saturated	SS-10 23.5-25.0 18"R	1 3 8						Set screen (slot 0.010") 22.0'-32.0'	
				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**
 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-10-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET 1 OF 2

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
454.1	0.0		Black and brown silty clay topsoil	CL							
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
											
				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							Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
				SS-5 11.0-12.5 16"R	1 2 2						
440.6	13.5		Black organic clay, medium plasticity, medium stiff, dry	OL							qu=0.5**tsf
				SS-6 13.5-15.0 18"R	2 3 4						
438.1	16.0		Brown and gray silty clay, trace to little coarse to fine sand, medium stiff, dry	CL							qu=1.5**tsf
				SS-7 16.0-17.5 18"R	4 4 4						
				SS-8 18.5-20.0							

DRILLING CONTRACTOR **Groff Testing**
 DRILLING METHOD **4.25" I.D. HSA**
 DRILLING EQUIPMENT **CME 550 ATV**
 DRILLING STARTED **10/4/10** ENDED **10/4/10**

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					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF) *					LL	
						10	20	30	40	50			
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
CLIENT
PROJECT & NO.
LOCATION

B-MW-11-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

LOGGED BY MPG

GROUND ELEVATION 468.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL Unconfined Compressive Strength (TSF) * LL					NOTES & TEST RESULTS
						1	2	3	4	5	
468.1	0.0		Cinders, gravel, sand, silt FILL								Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							qu=NT
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						
				SS-6 13.5-15.0 17"R	2 2 3						
452.1	16.0		Brown and gray silty clay, trace fine gravel, trace fine sand, stiff, dry CL								qu=1.5**tsf
				SS-7 16.0-17.5 18"R	1 3 4						
449.6	18.5		Gray clayey silt, organics, very soft, moist ML								qu=0.5**tsf
				SS-8 18.5-20.0 18"R	WOH 2 2						

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 488.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						10	20	30	40	50	
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			SS-15 36.0-37.5 18"R	1 0 0						qu=NT
			Light brown fine sand, well graded, very loose, saturated SW	SS-16 38.5-40.0 18"R	2 3 4						qu=NT
428.1	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 **9/28/10** 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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerlon**

SHEET **1** OF **2**

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 10 20 30 40 50 LL Unconfined Compressive Strength (TSF) %					NOTES & TEST RESULTS
						1	2	3	4	5	
470.0	0.0		Black cinders, fine gravel, silty clay, dry FILL	SS-1 1.0-2.5							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-2 3.5-5.0							
				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
				SS-7 16.0-17.5 18"R	6 7 6						qu=NT
				SS-8 18.5-20.0 18"R	1 5 2						Sand pack 18.0'-35.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'
451.5	18.5		Gray silt, little to some coarse to fine sand, trace clay, very soft, saturated								
450.5	19.5										

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
CLIENT
PROJECT & NO.
LOCATION

B-MW-12-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 2

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					NOTES & TEST RESULTS	
						PL	Unconfined Strength (TSF)	Compressive Strength (TSF)	LL			
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	36.0		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.)

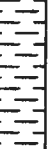
▽ 20.5
 ▽ 19.5
 ▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-13-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Black cinders, sand, rock, dry FILL								Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 2.5-4.0							
				SS-3 6.0-7.5							
			Black cinders, medium sand FILL								qu=NT
457.7	10.0			SS-4 8.5-10.0							
				SS-5 11.0-12.5 14"R	5 9 7						
				SS-6 13.5-15.0 15"R	3 3 2						
			Some organic silt, moist								qu=NT
				SS-7 16.0-17.5 18"R	WOH 1 1						
450.2	17.5		Gray/olive gray organic silt, very soft OL								qu=0.0**tsf
				SS-8 18.5-20.0 18"R	1 0 0						
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.

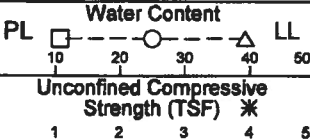
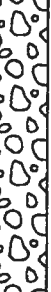
21053.070

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  LL					NOTES & TEST RESULTS
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
447.7	20.0		Dark gray and black organic clay, very soft, moist	OH							qu=0.25**tsf
			SS-9 21.0-22.5 18"R	WOH WOH 2							
445.2	22.5		Dark gray and black organic silt, very soft, moist	OL							qu=0.25**tsf
			SS-10 23.5-25.0 18"R	WOH 1 1							
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								
438.2	29.5				SS-12 28.5-30.0 18"R	0 2 3					Sand pack 28.0'-40.0' qu=1.5**tsf
437.2	30.5										
436.2	31.5		Gray silty clay, some coarse to fine sand, trace fine gravel, wet	CL	SS-13 31.0-32.5 18"R	2 4 5					Set screen (slot 0.010") 30.0'-40.0' 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
CLIENT
PROJECT & NO.
LOCATION

B-MW-14-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Cinders, gravel, sand, silt, dry FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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								Sand pack 18.0'-30.0'
				SS-5 11.0-12.5 18"R	4 4 4						
				SS-6 13.5-15.0 16"R	4 3 4						
				SS-7 16.0-17.5 16"R	2 3 3						
			Black cinders								
				SS-8 18.5-20.0 18"R	3 3 1						
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.

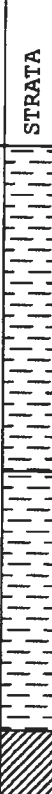
21053.070

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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
						10	20	30	40	50		
						1	2	3	4	5		
447.7 447.2	20.0 20.5		▽ very loose, low plasticity, saturated OL								Set screen (slot 0.010") 20.0'-30.0' qu=NT qu=0.25**tsf qu=0.25**tsf qu=1.25**tsf	
			SS-9 21.0-22.5 18"R	1 0 0								
			SS-10 23.5-25.0 18"R	1 1 2								
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							
				SS-12 28.5-30.0 18"R	2 3 4							
438.7	29.0		Gray and black organic clay, medium stiff, moist OH									
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
CLIENT
PROJECT & NO.
LOCATION

B-MW-15-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

LOGGED BY MPG
GROUND ELEVATION 468.3

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
468.3	0.0		Black cinders, fine gravel, sand, silt, dry								
			FILL	SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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						
				SS-8 18.5-20.0 18"R	2 1 1						
448.8	19.5										
448.3	20.0										

Bentonite seal
3.0'-17.0'. Stickup
protective cover
installed.

Sand pack
17.0'-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
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-15-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **2 OF 2**

LOGGED BY **MPG**
 GROUND ELEVATION **488.3**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL LL Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
448.3	20.0		Gray fine sand, trace medium sand, loose, saturated SM	SS-9 21.0-22.5 18"R	1 1 1						Set screen (slot 0.010") 20.0'-30.0' 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'
 ▼

GEOLOGIC LOG OF MW-16

(Page 1 of 1)

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

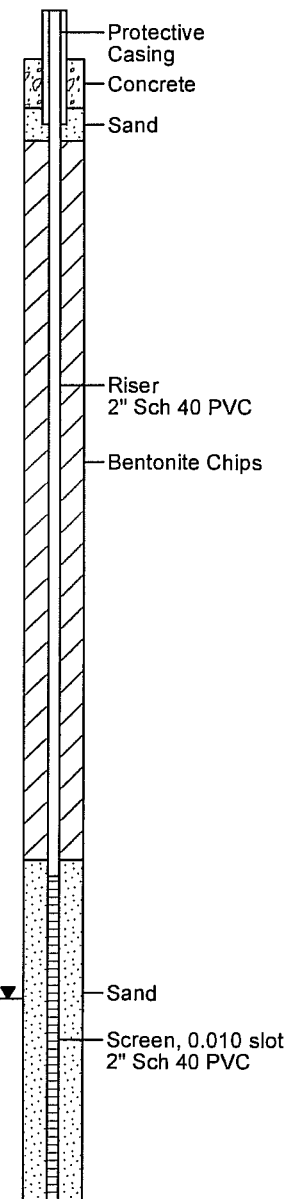
KPRG Project No. 18311.21

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	Well Diagram: MW-16
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	- Gravel layer approximately 2" thick	0		
20	449		0	100	
22	447				
24	445		0		
26	443	- Thin layer of fine grained sand	0	100	
28	441				
30	439		0		
32	437		0	60	
34	435	- Wet	0		
36	433				
38	431				
40					
		End of boring at 35'			

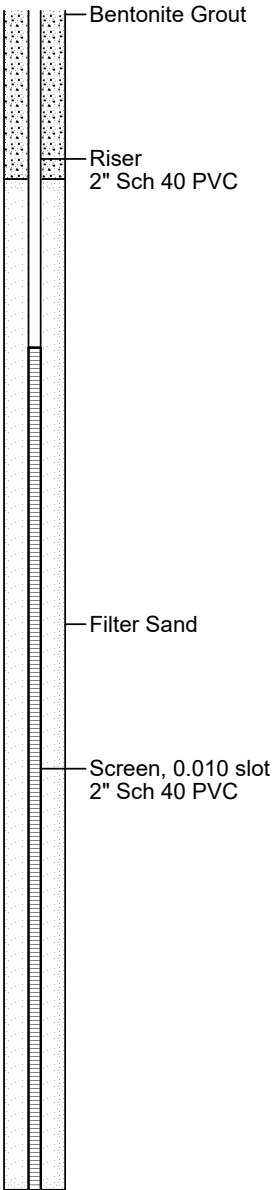
Well Diagram: MW-16



K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-17 (Page 1 of 2)		Total Boring Depth : 30.0 feet Well Bottom Depth : 30.0 feet Surface Elev. : 468.45 feet above MSL TOC Elev. : 467.75 feet above MSL Groundwater Elev. : 440.83 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		
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.				
Depth in Feet	Surf. Elev. 468.45	DESCRIPTION		% RQD	% Recovery	Well Diagram: Concrete with Flushmount Bentonite Grout Riser 2" Sch 40 PVC
0		Asphalt Roadway over sand, silt, gravel mix, brown, dry.				
1		SILTY SAND, fine to coarse, black, slightly moist, occ silty layers.				
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12		- begin black with orange brown				
13						
14						
15						
16		- some gray silt laminates				

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K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.			GEOLOGIC LOG OF MW-17			(Page 2 of 2)			Total Boring Depth : 30.0 feet			Well Bottom Depth : 30.0 feet			Surface Elev. : 468.45 feet above MSL			TOC Elev. : 467.75 feet above MSL			Groundwater Elev. : 440.83 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								
Midwest Generation, LLC			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.																										
Powerton Station																																												
Pekin, Illinois																																												
Project No. 15315.7																																												
Depth in Feet	Surf. Elev. 468.45	DESCRIPTION										% RQD	% Recovery	Well Diagram:																														
16	452																																											
17	451																																											
18	450	SILT, gray, laminated with SILTY SAND, moist																																										
19	449																																											
20	448	- increase to very moist then wet																																										
21	447	SILT, gray, laminated with light brown silt, trace organics, wet.																																										
22	446																																											
23	445																																											
24	444																																											
25	443	SILTY SAND, black and dark gray, fine to meduim, wet.																																										
26	442																																											
27	441	SILT and SAND, gray and black, wet.																																										
28	440																																											
29	439																																											
30	438	End of Boring at 30 feet.																																										
31	437																																											
32																																												



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K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.			GEOLOGIC LOG OF MW-18						Total Boring Depth : 30.0 feet			Well Bottom Depth : 30.0 feet			Surface Elev. : 466.71 feet above MSL			TOC Elev. : 469.28 feet above MSL			Groundwater Elev. : 440.86 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											
Midwest Generation, LLC			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.																													
Powerton Station																																															
Pekin, Illinois																																															
Project No. 15315.7																																															
DESCRIPTION																																															
Depth in Feet			Surf. Elev. 466.71																																												
0						SILTY CLAY, brown, trace gravel, slightly moist.																																									
1			466																																												
2			465																																												
3			464			SILTY SAND, fine to coarse, black, brown and dark gray, dry to slightly moist.																																									
4			463																																												
5			462																																												
6			461																																												
7			460			- clayey from 7-8, followed by occasional clayey layers																																									
8			459																																												
9			458																																												
10			457																																												
11			456																																												
12			455																																												
13			454																																												
14			453																																												
15			452																																												
16			451			- begin all black																																									
17			450																																												
18			449																																												
19			448			- very moist																																									
20			447																																												
21			446																																												
22			445																																												

Well Diagram:

Concrete with Flushmount

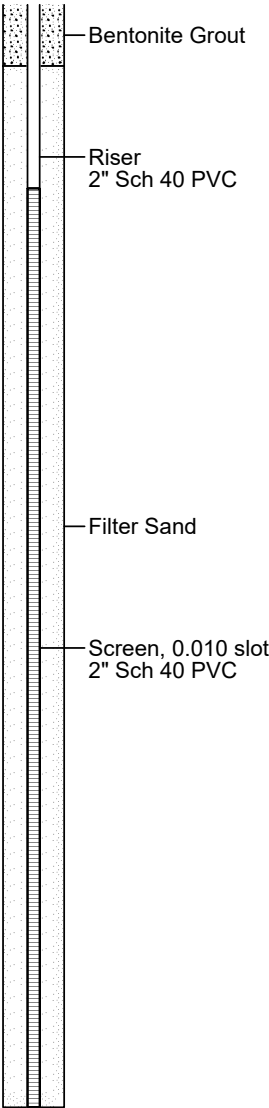
Bentonite Grout

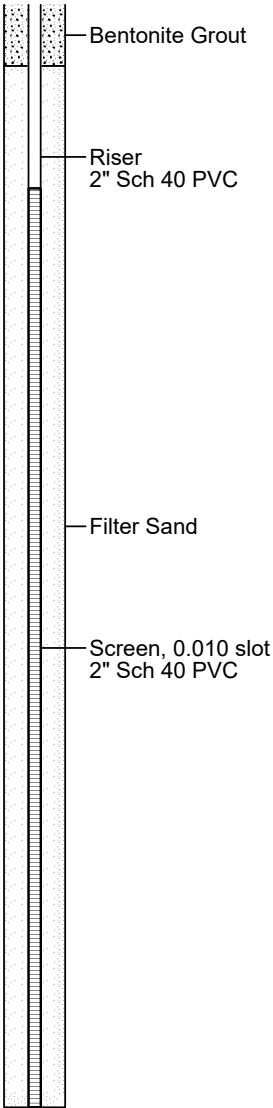
Riser 2" Sch 40 PVC

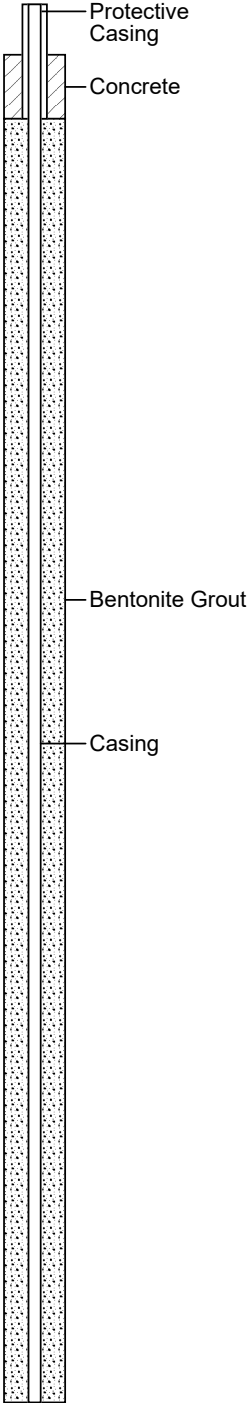
Bentonite Grout

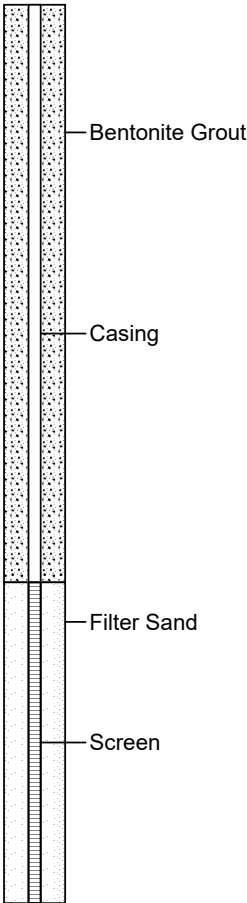
Riser
2" Sch 40 PVC

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K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.			GEOLOGIC LOG OF MW-18			Total Boring Depth : 30.0 feet		
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7			(Page 2 of 2)			Well Bottom Depth : 30.0 feet		
			Date Started : 09/21/15			Surface Elev. : 466.71 feet above MSL		
			Date Well Set : 09/21/15			TOC Elev. : 469.28 feet above MSL		
			Drilling Tools : 8 1/4 HSA			Groundwater Elev. : 440.86 feet above MSL		
			Reaming Tools : None			Riser Material : 2" Sch 40 PVC		
			Drill Rig : Geoprobe			Screen Material : 2" Sch 40 PVC, 0.010 slot		
			Driller Name/Co : Nick / Cabeno Env. Serv.			Coordinate N :		
						Coordinate E :		
						Logged By : P. Allenstein		
Depth in Feet	Surf. Elev. 466.71	DESCRIPTION	% RQD	% Recovery	Well Diagram:			
22								
23	444							
24	443							
25	442							
26	441							
27	440	CLAY, gray, some black, moist.						
28	439							
29	438							
30	437							
31	436							
32	435	CLAY, dark gray, trace organics, moist.						
33	434							
34	433							
35	432							
36	431							
37	430	CLAY, greenish gray, trace organics, moist.						
38	429							
39	428							
40	427							
41	426							
42	425	SILTY SAND, tan, some gravel, very moist.						
43	424							
44	423							
		End of Boring at 40 feet.						



K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-18A (Page 1 of 2)		Boring Depth : 35.0 ft. below surf. Elev. Well Bottom Depth : 35.0 ft. below surf. Elev. Surface Elevation : 466.45 feet above MSL Top of Casing Elev. : 469.54 feet above MSL Groundwater Elev. : 433.94 feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : 1413185.170 Coordinate E : 2432952.550 Logged By : J. Misner	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 17424.1		Date : August 19, 2024 Drilling Tools : Geoprobe Drill Rig : Geoprobe Driller Name/Co : Nick / Cabeno Env. Serv.			
Depth in Feet	Appx. Elev. 466.45	DESCRIPTION	Recovery (ft)	Formation	Well: MW-18A Elev.: 469.54 
0	466	FILL: Brown SAND, trace silt, trace organics, dry			
2	464	- brown clay lense (6")	4 / 5		
4	462	- trace black gravel			
6	460	FILL: Black and Brown GRAVEL, trace sand, dry	4.5 / 5		
8	458	- brown clay lense (6")			
10	456	- increase moisture			
12	454		4.5 / 5		
14	452	FILL: Black GRAVEL, trace silt and clay, slightly moist			
16	450				
18	448	- organics (wood)	5 / 5		
20		FILL: Black GRAVEL, slightly moist			
		- trace clay			

K P R G ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-18A (Page 2 of 2)		Boring Depth : 35.0 ft. below surf. Elev. Well Bottom Depth : 35.0 ft. below surf. Elev. Surface Elevation : 466.45 feet above MSL Top of Casing Elev. : 469.54 feet above MSL Groundwater Elev. : 433.94 feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : 1413185.170 Coordinate E : 2432952.550 Logged By : J. Misner	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 17424.1		Date : August 19, 2024 Drilling Tools : Geoprobe Drill Rig : Geoprobe Driller Name/Co : Nick / Cabeno Env. Serv.			
Depth in Feet	Appx. Elev. 466.45	DESCRIPTION	Recovery (ft)	Formation	Well: MW-18A Elev.: 469.54 
21	445	- wet	2 / 5		
23	443				
25	441				
27	439				
29	437	Gray SILT with CLAY, trace organics, stiff, very moist/wet	3.5 / 5		
31	435	- organics (wood)	3.5 / 5		
33	433				
35	431				
37	429				
39	427	End of Boring at 35 feet.			
41					



(Page 1 of 2)

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.	: 462.19 feet above MSL
TOC Elev.	: 465.01 feet above MSL
Groundwater Elev.	: 442.36 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

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GEOLOGIC LOG OF MW-19

(Page 2 of 2)

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. : 462.19 feet above MSL
TOC Elev. : 465.01 feet above MSL
Groundwater Elev. : 442.36 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.
462.19

DESCRIPTION

% RQD

% Recovery

Well Diagram:

22 - 440
23 - 439
24 - 438
25 - 437
26 - 436
27 - 435
28 - 434
29 - 433
30 - 432
31 - 431
32 - 430
33 - 429
34 - 428
35 - 427
36 - 426
37 - 425
38 - 424
39 - 423
40 - 422
41 - 421
42 - 420
43 - 419
44 -

SAND, fine to medium, gray, trace gravel, moist.

SAND, fine to medium, brown, very moist.

End of Boring at 41 feet.

Bentonite Grout

Riser
2" Sch 40 PVC

Filter Sand

Screen, 0.010 slot
2" Sch 40 PVC

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-20

(Page 1 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

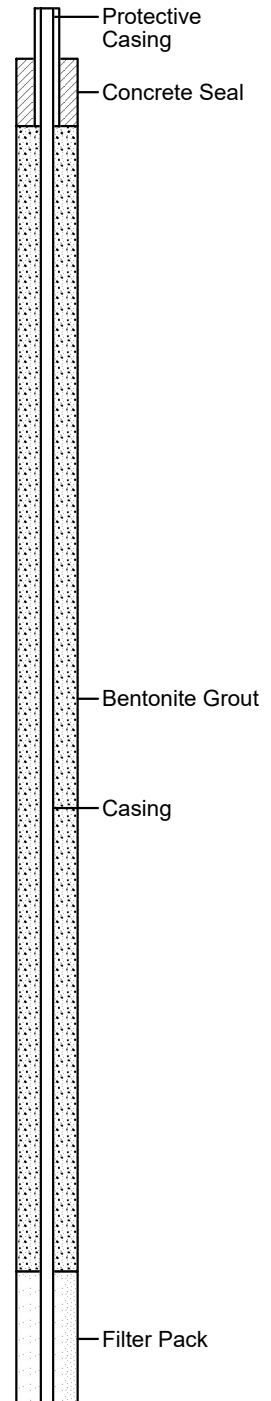
Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 30.0
Well Bottom Depth : 30.0
Surface Elevation : 466.43 ft. above MSL
Top of Casing Elev. : 468.95 ft. above MSL
Groundwater Elev. : 441.60 ft. above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466.5	DESCRIPTION	Recovery (in.)	REMARKS
0	466	CLAY with SAND and GRAVEL, brown, dark brown, top soil, dry.	24	
5	461	SAND and GRAVEL, coarse, brown, tan, dry.	30	
10	456	CLAY, trace SAND and GRAVEL, brown, dark brown, dry.	36	
15	451	CLAY, some SAND and GRAVEL, cinders and slag, dark brown, black, dry.	48	
20		SILTY CLAY with SAND and GRAVEL, black, gray, dry.		

Well: MW-20
Elev.: 468.95



K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-20

(Page 2 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 30.0
Well Bottom Depth : 30.0
Surface Elevation : 466.43 ft. above MSL
Top of Casing Elev. : 468.95 ft. above MSL
Groundwater Elev. : 441.60 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466.5	DESCRIPTION	Recovery (in.)	REMARKS	Well: MW-20 Elev.: 468.95
20	446	CLAYEY SILT, trace SAND and GRAVEL, black, gray, moist.	36		
25	441	SILT, trace SAND, organic with laminations, dark gray, black, wet.	42		
30	436	End of Boring at 30 feet.			
35	431				
40					

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-21

(Page 1 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 35.0
Well Bottom Depth : 30.0
Surface Elevation : 465.71 ft. above MSL
Top of Casing Elev. : 468.17 ft. above MSL
Groundwater Elev. : 440.65 ft. above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466	DESCRIPTION	Recovery (in.)	REMARKS
0	465.5	CLAY, black, dark brown, top soil, dry.	36	
		CLAY, dark brown, black cinders, dry.		
		SAND and GRAVEL, brown, black cinders, dry.		
		SAND and fine grained GRAVEL, brown, dry.		
5	460.5	CLAY with SAND and GRAVEL, black, dark brown, dry.	30	
10	455.5	SAND and GRAVEL, coarse, trace CLAY, brown, dry.	42	
		SILTY SAND, trace GRAVEL, brown, dry.	42	
15	450.5	CLAY, black, stiff, dry		
		SILT, trace SAND, black, gray, organic, moist		
20				

Well: MW-21
Elev.: 468.17

Protective Casing

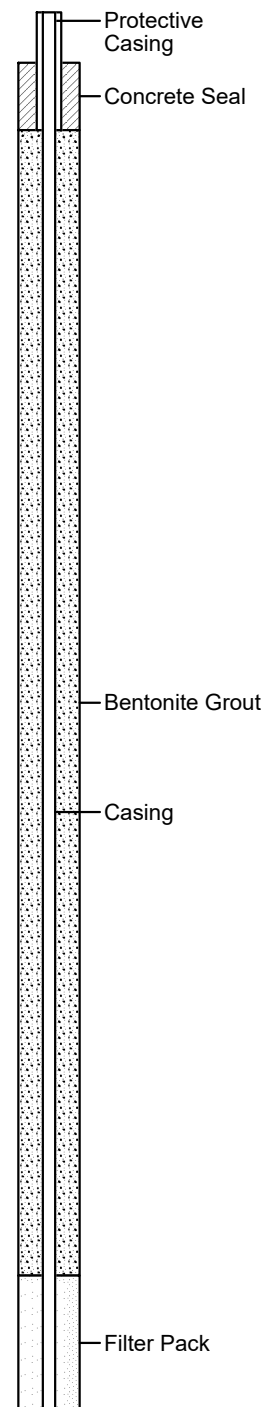
Concrete Seal

Bentonite Grout

Casing

Filter Pack

Well: MW-21
Elev.: 468.17



K P R G

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GEOLOGIC LOG OF MW-21

(Page 2 of 2)

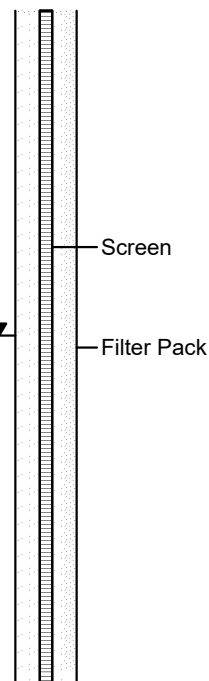
Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 35.0
Well Bottom Depth : 30.0
Surface Elevation : 465.71 ft. above MSL
Top of Casing Elev. : 468.17 ft. above MSL
Groundwater Elev. : 440.65 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466	DESCRIPTION	Recovery (in.)	REMARKS	Well: MW-21 Elev.: 468.17
20	445.5		60		
25	440.5		60		
30	435.5	SILT, trace very fine grained SAND, black, gray, organic, stiff, wet.	48		
35	430.5	CLAYEY SILT, trace very fine grained SAND, black, gray, organic, stiff, wet.			
		End of Boring at 35 feet.			
40					



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GEOLOGIC LOG OF MW-21D

(Page 1 of 1)

Midwest Generation, LLC
Powerton Station
Pekin, IL

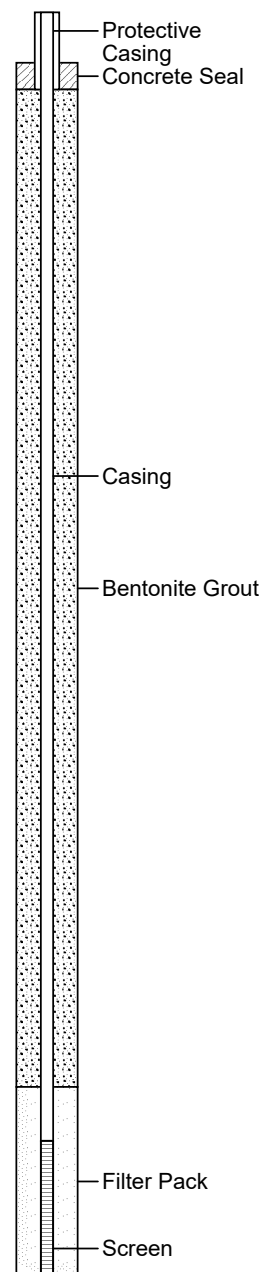
Project # 12313.1

Date Started : 04/12/24
Date Completed : 04/12/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 45.0 ft. below surf. Elev.
Well Bottom Depth : 45.0 ft. below surf. Elev.
Surface Elevation : 466.79 ft. above MSL
Top of Casing Elev. : 469.93 ft. above MSL
Groundwater Elev. : 445.17 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N : 1412219.230
Coordinate E : 2432352.116
Logged By : J. Misner

Depth in Feet	Surf. Elev. 466.79	DESCRIPTION	Recovery (in.)
0	466	Blind drilling to 35 feet. See Boring Log MW-21 for reference.	
5	461		
10	456		
15	451		
20	446		
25	441		
30	436		
35	431	Logged off cuttings from 35-45 feet. Brown SILTY SAND, some gravel.	
40	426		
45	421	End of Boring at 45 feet	
50			

Well: MW-21D
Elev.: 469.93



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GEOLOGIC LOG OF MW-22

(Page 1 of 1)

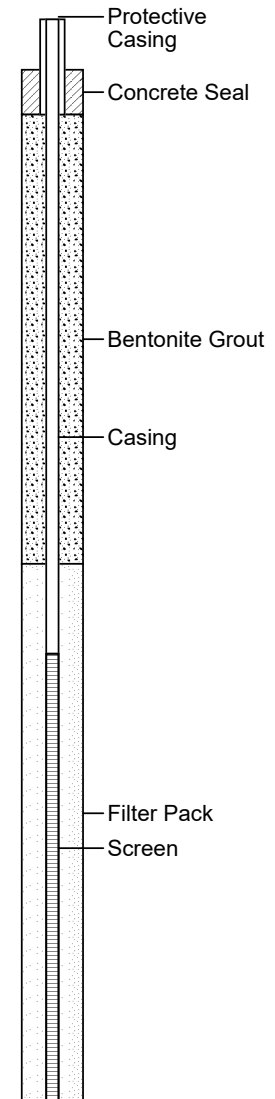
Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 04/10/24
Date Completed : 04/10/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 25.0 ft. below surf. Elev.
Well Bottom Depth : 23.0 ft. below surf. Elev.
Surface Elevation : 454.27 ft. above MSL
Top of Casing Elev. : 457.18 ft. above MSL
Groundwater Elev. : 444.45 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N : 1412616.452
Coordinate E : 2433012.148
Logged By : J. Misner

Depth in Feet	Surf. Elev. 454.27	DESCRIPTION	Recovery (in.)	Formation	Well: MW-22 Elev.: 457.18
0	454	FILL: Dark Brown SILTY SAND, trace clay, moist.			
		FILL: Black SAND and GRAVEL, wet (SLAG).	2 / 5		
5	449				
			2 / 5		
		Brown ORGANIC PEAT with ROOTS, moist.			
10	444	Dark Gray/ Light Gray BANDED SILT, trace clay, moist.			
			2.5 / 5		
15	439	- begin trace sand - sand-silt-clay mixture	3 / 5		
		Brown SAND, medium-fine, very moist.			
20	434	Orange Brown (Rust) SILTY SAND, medium-fine, trace gravel, wet.	4 / 5		
25	429	End of Boring at 25 feet.			
30					



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KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

GEOLOGIC LOG OF MW-23

(Page 1 of 2)

Date Started : 04/10/24
Date Completed : 04/10/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 43.0 ft. below surf. Elev.
Well Bottom Depth : 43.0 ft. below surf. Elev.
Surface Elevation : 462.13 ft. above MSL
Top of Casing Elev. : 465.03 ft. above MSL
Groundwater Elev. : 445.20 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N : 1411947.955
Coordinate E : 2432993.953
Logged By : J. Misner

Depth in Feet	Surf. Elev. 462.13	DESCRIPTION	Recovery (in.)	Formation	Well: MW-23 Elev.: 465.03
0	462	FILL: Brown CLAY and TOP SOIL, moist.	2 / 5		Protective Casing Concrete Seal Bentonite Grout Casing
5	457	- dark gray, claye sand and gravel, approximately 3" seam	2.5 / 5		
10	452	FILL: Dark Gray SILTY SAND, trace clay, very moist.	4 / 5		
15	447	FILL: Black GRAVEL, trace medium-coarse sand, trace silt, very moist. (SLAG)	4 / 5		
20	442		4 / 5		
25		- dark gray silty clay lense			

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ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-23

(Page 2 of 2)

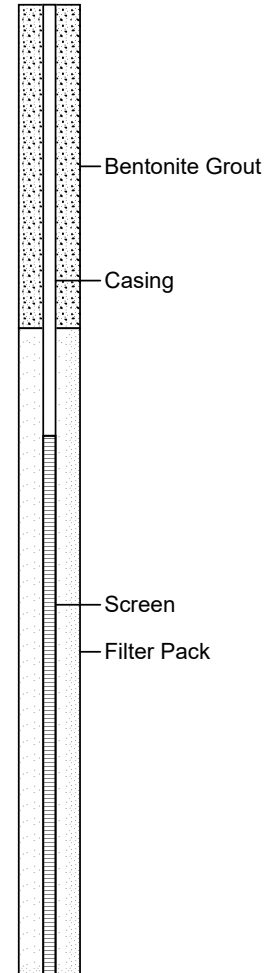
Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

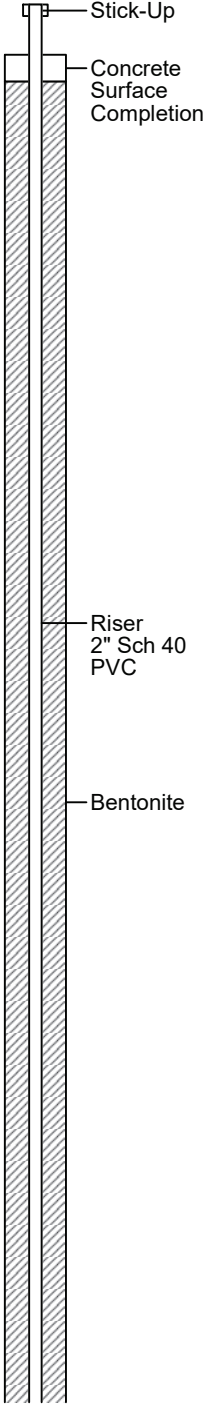
Date Started : 04/10/24
Date Completed : 04/10/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 43.0 ft. below surf. Elev.
Well Bottom Depth : 43.0 ft. below surf. Elev.
Surface Elevation : 462.13 ft. above MSL
Top of Casing Elev. : 465.03 ft. above MSL
Groundwater Elev. : 445.20 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N : 1411947.955
Coordinate E : 2432993.953
Logged By : J. Misner

Depth in Feet	Surf. Elev. 462.13	DESCRIPTION	Recovery (in.)	Formation	Well: MW-23 Elev.: 465.03
25	437		4.5 / 5		
		Gray CLAY, trace silt and coarse sand, wet			
30	432	Brown MEDIUM SAND, trace silt, trace gravel, wet.	4.5 / 5		
35	427	No Recovery	0 / 5		
40	422				
		End of Boring at 43 feet			
45	417				
50					



06-02-2025 N:\Projects\1 - MWG Project Files\10125 - MWG Powerton CMS Hydrogeo Support\Graphics\Powerton MW-24.bor

K P R G		GEOLOGIC LOG OF MW-24 (Page 1 of 2)		Total Boring Depth : 45.0 feet Well Bottom Depth : 45.0 feet Surface Elev. : 457.83 feet above MSL TOC Elev. : 460.80 feet above MSL Groundwater Elev. : 428.50 feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : 1413697.663 Coordinate E : 2432107.317 Logged By : Kaelyn Sperle (KPRG)		
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 17424.1		Date Started : 02/26/2025 Date Well Set : 02/26/2025 Drilling Company : Cabeno Env. Services Driller Name : Cody Wright Drill Rig : Geoprobe Drill Tools : 8 1/4 HSA				
Depth in Feet	Surf. Elev. 457.83	DESCRIPTION	Description	% Recovery	Well Diagram:	
0		SAND (dark brown to black, well-graded, medium to coarse, dry), some GRAVEL and SLAG (fine to coarse) - 1.0" seam GRAVEL and SLAG (black, fine to medium)	Fill	2.5/5.0		
1	457					
2	456					
3	455					
4	454					
5	453					
6	452					
7	451					
8	450					
9	449	LEAN CLAY (dark gray, dry to moist), trace GRAVEL (fine to medium), trace ORGANICS (shells and twigs) - 0.5" seam SAND (brown, well-graded, fine to medium)	Native	5.0/5.0		
10	448					
11	447					
12	446					
13	445					
14	444					
15	443					
16	442					
17	441					
18	440					
19	439					
20	438					
21	437					
22	436					
23	435					
24	434					
25	433					

06-02-2025 N:\Projects\1 - MWG Project Files\10125 - MWG Powerton CMS Hydrogeo Support\Graphics\Powerton MW-24.bor

K P R G		GEOLOGIC LOG OF MW-24 (Page 2 of 2)		Total Boring Depth : 45.0 feet Well Bottom Depth : 45.0 feet Surface Elev. : 457.83 feet above MSL TOC Elev. : 460.80 feet above MSL Groundwater Elev. : 428.50 feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : 1413697.663 Coordinate E : 2432107.317 Logged By : Kaelyn Sperle (KPRG)	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 17424.1		Date Started : 02/26/2025 Date Well Set : 02/26/2025 Drilling Company : Cabeno Env. Services Driller Name : Cody Wright Drill Rig : Geoprobe Drill Tools : 8 1/4 HSA			
Depth in Feet	Surf. Elev. 457.83	DESCRIPTION	Description	% Recovery	Well Diagram:
25					
26	432				
27	431				
28	430			4.5/5.0	
29	429	SILTY SAND (gray, fine to medium, wet, loose)			Riser 2" Sch 40 PVC
30	428				Bentonite
31	427	LEAN CLAY (dark gray, moist), trace GRAVEL			
32	426				
33	425	CLAYEY SAND (gray, moist), trace SILT		5.0/5.0	
34	424	- 1.0" seam LEAN CLAY (gray)			
35	423	- 1.0" seam GRAVEL (greenish-gray, well-graded)	Native		Screen 2" Sch 40 PVC 0.010 slotted
36	422				Filter Pack
37	421				
38	420	SAND (brown, well-graded, fine to medium, wet), some GRAVEL (well-graded, fine)		5.0/5.0	
39	419				
40	418				
41	417				
42	416				
43	415			5.0/5.0	
44	414				
45	413	End of Boring at 45.0 feet			
46	412				
47	411				
48	410				
49	409				
50	408				

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ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF P-1

(Page 1 of 1)

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.1

Date Started : 04/11/24
Date Completed : 04/11/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 20.0 ft. below surf. Elev.
Well Bottom Depth : 20.0
Surface Elevation : 457.13 ft. above MSL
Top of Casing Elev. : 460.08 ft. above MSL
Groundwater Elev. : 446.46 ft. above MSL
Riser Material : 1 " Sch 40 PVC
Screen Material : 1 " Sch 40 PVC, 0.01 slot
Coordinate N : 1413681.386
Coordinate E : 2432692.297
Logged By : J. Misner

Depth in Feet	Surf. Elev. 457.13	DESCRIPTION	Recovery (in.)	Formation	Well: P-1 Elev.: 460.08
0	457	FILL: Brown and Gray COARSE SAND, trace gravel, dry.			
		FILL: Dark Brown MEDIUM SAND, trace silt, dry.	2 / 5		
5	452				
		FILL: Dark Gray and Black SILT, trace banded silts and clay, trace organics with peat, moist.	2.5 / 5		
10	447	FILL: Dark Brown and Black fine-medium GRAVEL trace silt, wet. (SLAG)	2 / 5		
15	442				
		Banded Black and Dark Gray SILTY CLAY, verly moist, high plasticity.	2 / 5		
20	437	End of Boring at 20 feet.			
25					

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ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.1

GEOLOGIC LOG OF P-2

(Page 1 of 1)

Date Started : 04/11/24
Date Completed : 04/11/24
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Nick / Cabeno Env. Serv.

Boring Depth : 20.0
Well Bottom Depth : 20.0
Surface Elevation : 461.50 ft. above MSL
Top of Casing Elev. : 463.65 ft. above MSL
Groundwater Elev. :
Riser Material : 1 " Sch 40 PVC
Screen Material : 1 " Sch 40 PVC, 0.01 slot
Coordinate N : 1412039.533
Coordinate E : 2433180.889
Logged By : J. Misner

Depth in Feet	Surf. Elev.	DESCRIPTION	Recovery (in.)	Formation	
	461.50				Well: P-2 Elev.: 463.65
0	461.5	Brown MEDIUM-FINE SAND ,trace gravel, dry.			
		FILL: Black GRAVEL, trace silt, moist. (SLAG)	2.5 / 5		
		FILL: Brown SAND and SILT, fine grain, dry			
5	456.5		2.5 / 5		
10	451.5	- trace gravel	4.5 / 5		
		FILL: Banded Black and Dark Gray SANDY SILT, dry to slightly moist.			
15	446.5		2 / 5		
20	441.5	End of Boring at 20 feet.			
25					



Ruettiger, Tonelli & Associates, Inc.

Surveyors • Engineers • Planners • Landscape Architects • G.I.S. Consultants

March 16, 2021

KPR&G
14665 West Lisbon Road
Suite 1A
Brookfield, WI 53005
Attn: Rich Gnat
Revised Table to add MW 19, MW 20 and MW 21

Rich,

Below find the tabular list of the monitoring wells at Powerton, IL.

WELL#	LID	T/CASE	T/WELL	CONC/GRND
MW-1	465.64	465.14	465.24	462.01
MW-2	463.12	462.61	462.60	459.53
MW-3	462.90	462.40	462.48	459.31
MW-4	460.91	460.40	460.57	457.30
MW-5	459.10	458.59	458.66	455.92
MW-6	464.84	464.36	464.50	461.27
MW-7	463.68	463.17	463.27	459.73
MW-8	472.14	471.63	471.75	468.75
MW-9	469.83	469.32	469.14	466.44
MW-10	457.74	457.23	457.31	453.97
MW-11	472.01	471.51	471.62	468.04
MW-12	474.08	473.57	473.38	470.34
MW-13	471.48	470.97	470.94	467.79
MW-14	471.24	470.83	470.90	467.73
MW-15	471.85	471.34	471.37	468.29
MW-16	472.25	472.24	471.55	469.32
MW-17	468.45	468.45	467.75	468.45
MW-18	469.64	469.63	469.28	466.71
MW-19	465.22	465.21	465.01	462.19
MW-20	469.18	469.17	468.95	466.43
MW-21	468.41	468.40	468.17	465.71

Sincerely,

David J. Zientek, PLS/PE/LEED AP

N:\Clerical\2021\0231\Old Info\KPRG_R.Gnatt_LT_DJZ_Monitoring Well table Powerton_revised dated 03-16-2021.docx



**MIDWEST GENERATION, LLC
POWERTON STATION - PEKIN, IL
MONITORING WELL, STAFF GAUGE AND PIEZOMETER SURVEY**

WELL#	NORTHING	EASTING	LID	T/CASE	T/WELL	CONC/GRND
MW-12R	1412086.381	2432792.024	473.18	473.17	472.95	470.08
MW-18A	1413185.170	2432952.550	469.55	469.54	469.54	466.45
MW-21D	1412219.230	2432352.116	470.09	470.08	469.93	466.79
MW-22	1412616.452	2433012.148	457.42	457.41	457.18	454.27
MW-23	1411947.955	2432993.953	465.23	465.22	465.03	462.13
PIEZ-1	1413681.386	2432692.297	460.13	460.12	460.08	457.13
PIEZ-2	1412039.533	2433180.889	463.75	463.74	463.65	461.50

ELEVATION AT STAFF GAUGE MARK 0.00' = 440.57

Horizontal: Illinois State Plane Coordinate System West Zone (NAD 83-2011)

Vertical Datum: Plant Datum (subtract 1.04' to obtain NAVD 88)



**MIDWEST GENERATION, LLC
POWERTON STATION-PEKIN, ILLINOIS
MONITORING WELL SURVEY**

	<u>NORTH</u>	<u>EAST</u>	<u>TOP OF</u> <u>LID</u>	<u>TOP OF</u> <u>CASE</u>	<u>TOP OF</u> <u>WELL</u>	<u>GROUND/</u> <u>CONCRETE</u>
MW-24	1413697.663	2432107.317	461.03	461.02	460.80	457.83

42" RCP CULVERT (NORTH SIDE) – INVERT ELEVATION = 431.65

TOP OF REBAR @ SOUTH SIDE NEAR RISER = 438.05 (TWG REFERENCE PT # 2030)

Horizontal: Illinois State Plane Coordinate System West Zone (NAD 83)

Vertical Datum: NAVD 88

ATTACHMENT 4

Illinois Professional Engineer Certification of Monitoring Well Network

CERTIFICATION OF GROUNDWATER MONITORING NETWORK
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 dated October 29, 2021 and the CCR Surface Impoundment Operating Permit 2024-CO-100029 issued by Illinois Environmental Protection Agency dated July 3, 2024, the groundwater monitoring system has been designed and constructed to satisfy the requirements of 35 Ill. Adm. Code 845.630.

Certified by: _____

T. J. Stohner

Date: _____

8/10/26



Timothy Stohner, P.E.

Professional Engineer Registration No: 062.057635

Roux Associates, Inc.

ATTACHMENT 5

**Revised Statistical Approach for Groundwater Data Evaluation and P.E.
Certification**



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

TRANSMITTAL LETTER

September 23, 2024

Illinois Environmental Protection Agency
Compliance Assurance Section
Bureau of Water
1021 North Grand Avenue East
Springfield, IL 62702

Subject: Revised Attachment 9-5 Submittal
Midwest Generation, LLC, Powerton Generating Station
CCR Surface Impoundment Operating Permit No. 2024-CO-100029

Compliance Manager,

KPRG and Associates, Inc. (KPRG), on behalf of our client Midwest Generation, LLC, is submitting this Revised Attachment 9-5 in fulfillment of requirements set forth under CCR Surface Impoundment Operation Permit No. 2024-CO-100029, Special Condition No. 16. As currently required, included is an unbound original and two copies of the submittal. If there are any questions, please contact Ms. Jill Buckley of Midwest Generation at 724-448-9732 or me at 262-781-0475.

Sincerely,
KPRG and Associates, Inc.

Richard R. Gnat, P.G.
Principal

cc: Jill Buckley, Midwest Generation, LLC
Joseph Kotas, Midwest Generation, LLC
Sharene Shealey, Midwest Generation, LLC



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

**ILLINOIS STATE CCR RULE COMPLIANCE
REVISED 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

September 23, 2024

TABLE OF CONTENTS

SECTION/DESCRIPTION	PAGE
1.0 INTRODUCTION.....	1
2.0 STATISTICAL METHOD SELECTION and BACKGROUND DATA EVALUATION	2
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2.2 Spatial Variability	2
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2.4 Trend Testing	3
2.5 Test of Normality	3
2.6 Non-Detects	4
2.7 Prediction Limit Calculation for Normally Distributed Data	4
2.8 Prediction Limit Calculation for Non-Normally Distributed Data	5
3.0 GROUNDWATER MONITORING	6
4.0 CERTIFICATION.....	8

FIGURE

Figure 1 – Monitoring Well Location Map

TABLE

Table 1 – Section 845.600 Parameters

1.0 INTRODUCTION

On July 3, 2024, Illinois Environmental Protection Agency (IEPA) issued the final Coal Combustion Residual Surface Impoundment Operation Permit 2024-CO-100029 (Permit) for the Midwest Generation, LLC Powerton Generating Station in Pekin, Illinois. The Permit covers the operation of the Ash By-pass Basin (ABB), Ash Surge Basin (ASB), Metal Cleaning Basin (MCB) and the Former Ash Basin (FAB). All four basins are covered under one overall monitoring program as defined in Special Conditions 12 and 13. The groundwater monitoring program specified in those conditions is as follows:

- Background Monitoring Well - MW-16; this well is intended for background for both the silty clay/silt unit and the sand and gravel unit (screened in sand and gravel).
- Silty Clay/silt Unit Wells – MW-06, MW-14, MW-22 and MW-18A (see discussion below for MW-18A).
- Sand and Gravel Unit Wells – MW-01, MW-02, MW-03, MW-04, MW-05, MW-07, MW-10 and MW-21D.

It is noted that newly installed well MW-23 did not encounter the silty clay/silty layer and therefore, it is completed as a sand and gravel unit well. It is not included in Special Condition 13 for CCR sampling; however, it is included under Special Condition 14 for water level measurements. As further requested by the Agency, another silty clay/silt unit well was installed adjacent to existing well MW-18, the screen for which currently extends through the silty clay/silt unit into the underlying sand and gravel, and is screened strictly within the silty clay/silt unit. This well is identified as well MW-18A.

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 revised 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) and Special Condition 16 of the Permit. 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]).

Well MW-16 has been specified in the Permit as the background monitoring point. This well has not been previously sampled for CCR parameters for either the Federal CCR program or for the initial several years of sampling performed under the State CCR program prior to issuance of the Permit. Therefore, the initial eight rounds of samples collected from well MW-16 will eventually be used as the basis for the subsequent required background statistical calculations. The established, representative background concentration for the upgradient well location 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. Verified data from a NELAP laboratory is considered representative of the aquifer properties analyzed. Outliers will not be considered for exclusion from any dataset without explicit data validation identifying discrepancies from the laboratory and/or field procedures that would qualify a data point to be considered an outlier. USEPA data validation procedures would be used to determine when or if a data point is to be excluded from a data set. Prior to any such exclusion, agreement will be reached with IEPA regarding the method with which to adjust the dataset.

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. It is noted that at this time, only one background well is being considered, MW-16.

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 additional data is generated after eight rounds of sampling, the background dataset may be considered for expansion. This is usually done only after at least three to five years of additional sampling (per Unified Guidance). 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 as 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 cannot 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:

$$95\% \text{ Prediction Limit} = \bar{x} + t_{1-0.05/m, n-1} s \sqrt{1 + \frac{1}{n}}$$

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. Any prediction limits which will be based on non-parametric evaluations will be highlighted for IEPA review and approval any time a background statistic is recalculated.

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 facility's 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.

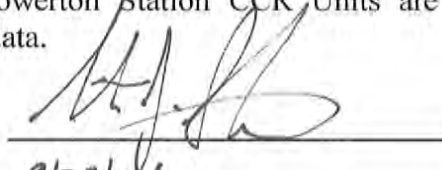
If it is decided not to complete an ASD or if Illinois EPA does not concur with and approve the ASD, a characterization of the nature and extent of the potential release must be completed in

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:

9/23/24

Timothy Stohner, P.E.

Professional Engineer Registration No. 062.057635

KPRG and Associates, Inc.



FIGURE

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 6
Owner Certification

OWNER CERTIFICATION

I, Todd Mundorf, as an authorized representative of Midwest Generation, LLC, certify that the public notification and public meeting requirements were completed in accordance with 35 Ill. Adm. Code 845.240.

Signature: Todd Mundorf

Title: Plant Manager

ATTACHMENT 7
Public Meeting Information

Table. List of Public Meeting Attendees

Name	E-mail	Phone
John Wosik	johnwosik@outlook.com	
Joyce Harat	jahchoices@gmail.com	
Robert Rowe	rowe@bradley.edu	
Tracy Meints Fox	tracy@tracyfox.com	
Chad Chism	chizman76@yahoo.com	
Robin Nolting		309-267-8963
Joyce Blumenshine	joblumen@yahoo.com	
Michael Kramer	mkramer@gannet.com	
Darlene McClary	apcgirl@hotmail.com	
Ralph Deene Milam	deenemilam@gmail.com	
Steve Waterworth	sjwritr@yahoo.com	
Debbie Siegel		
Braum Fenili		
Bob Jorgensen	jestpr@aol.com	

**Midwest Generation, LLC
Powerton Generating Station
Ash Surge Basin and Metal Cleaning Basin Groundwater Corrective Action
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 groundwater corrective action at Powerton Generating Station’s Ash Surge Basin and Metal Cleaning 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 two miles of the facility on June 5, 2026, which totaled 1,126 residential mailing addresses. The notice was also posted in 27 public locations within 10 miles of the facility boundary.

The public meetings for Powerton Generating Station’s Ash Surge Basin and Metal Cleaning Basin were held on July 6, 2026 from 6:00 p.m. to 8:00 p.m. and on July 7, 2026 from 10:00 a.m. to 12:00 p.m. The meetings were held in person. Six members of the public attended the July 6th meeting. Five members of the public, including one who attended the previous meeting, attended the July 7th meeting. 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 meeting. Ten attendees requested a copy of the meeting summary and transmittal of their email address to the Agency to be added to the Agency’s listserv for the facility. All email addresses received will be transmitted to the Agency. After an introduction and approximate 60-minute presentation on the proposed groundwater corrective action 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 a corrective action plan that includes the following remedies: (1) redesigning the geomembrane attachment to the Ash Surge Basin weir wall, (2) retrofit both the Ash Surge Basin and Metal Cleaning Basin by removing the remaining material in the basin, retaining and decontaminating the existing geomembrane liner as an additional protective layer under the new composite liner system, and installing a new composite liner system and leachate collection and removal system, and (3) monitored natural attenuation.

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETINGS

Retrofit Design and Process

Questions were asked about the repair process and longevity of the liners. The HDPE geomembrane liner and geosynthetic clay liner materials proposed to be used in the retrofit plans are designed to meet the standards outlined by the U.S. Environmental Protection Agency and Illinois EPA in their respective CCR Rules. When initially constructed and during any repairs, the seams of the liner are welded together, followed by rigorous testing of the welds prior to use, as required by the construction quality assurance program prescribed in the IL CCR Rule. These liners are used in many environmental applications across the country and ongoing research estimates these geosynthetic materials, which will be covered, can last hundreds of years.

Questions were asked about the leachate collected after the retrofit and how it is treated. Leachate collected after the retrofit of the ponds will be treated in the onsite wastewater treatment system, which consists of chemical and physical treatment, before it is discharged via the Powerton Station's NPDES permit.

A question was asked about ash handling during the retrofit process. Any ash that is removed from the pond during the retrofit construction process will be dewatered and sent off-site to a permitted landfill or a beneficial use site located in Canton, IL.

A question was asked whether there is ash located under the liner of the Metal Cleaning Basin and voiced concern that groundwater may be in contact with bottom of the basin at times. While some slag was beneficially used as structural fill in the berms of the basin, the material under the liner and poz-o-pac layer is native soil material. The base elevation of the Metal Cleaning Basin is 457.5 ft above mean sea level (amsl) and the upper limit groundwater elevation is 450.14 ft amsl, which is greater than the 5-foot minimum separation required by the IL and US EPA CCR Rules.

Groundwater Monitoring and Modeling

A question was asked whether the groundwater modeling took river level fluctuations into account and whether there is a mixing zone extending under the entire facility. The groundwater modeling of the river was set at an average level, based on the monthly level measurements collected as required by the IL CCR Rule. The mixing zone between river water and groundwater does not extend under the entire facility and is limited to the northernmost portion of the monitoring network.

A question was asked how high the river level must be before the groundwater levels rise to reach the bottom of the basins. The base of the Metal Cleaning Basin is approximately 450.14 feet amsl. The base of the proposed retrofit liner for the Ash Surge Basin is approximately 450.50 feet amsl. The estimated last 10-year average for the stage of the Illinois River, based on concurrent

measurements at the U.S. Geological Survey gauge station at Kingston Mines and those from northern-most site monitoring wells (i.e., wells closest to river), is 435.26 feet amsl. The Illinois River stage would need to rise at least 15 feet and maintain that elevation for this scenario to occur. There is no indication or evidence that such a large, sustained increase in river stage would occur.

A question was asked whether the Mohamet aquifer has been analyzed for comingling with the groundwater near the ash basins. MWG has not completed a specific evaluation of the Mohamet aquifer because monitoring shows that any groundwater impacts have been localized within the facility boundaries with discharge into the Illinois River which is a regional hydrogeologic boundary. The impacts will not affect the existing overall water quality of the Mohamet Aquifer.

A question was asked about a potential arsenic source other than the Metal Cleaning and Ash Surge Basins. The boring log for monitoring well MW-24 located on the west side of the former intake channel noted some ash in the boring column. That ash was placed long ago before any environmental regulations existed. US EPA's Legacy CCR Rule was designed to address areas like these.

A question was asked if elevated levels of heavy metals are still being observed and where one could find groundwater trends. All groundwater data is posted on our public website, www.midwestgenerationllc.com, in a tabular format on a quarterly basis. The groundwater data is showing stable to improving conditions at this time.

A question was asked about future groundwater monitoring. Groundwater monitoring will continue throughout the operating life of the basins, as well as throughout the post-closure care period once the basins are closed. The post-closure care period lasts a minimum of three years for closure by removal and a minimum of thirty years for closure in place. Once the required post-closure care monitoring has been completed, the owner or operator of a CCR surface impoundment must request Illinois EPA approval to terminate post-closure care. The Illinois EPA will continue to have oversight for CCR surface impoundments until the Agency agrees that its oversight is no longer necessary.

Groundwater Corrective Action Plan

A question was asked to further explain monitored natural attenuation (MNA). MNA is a remediation method that uses natural processes to decrease the concentration of contaminants in the environment. It uses in-situ physical, chemical, and biological processes that occur naturally in the environment. MNA works best when used in conjunction with an active corrective action, such as the basin retrofits MWG is proposing here.

A question was asked whether we could use electronic leak detection on a periodic basis to determine liner system integrity as opposed to going through the remedies proposed during the meeting. The electronic leak detection works best when the basin is emptied, which occurs every 1-2 years. The IL CCR rule prescribes that quarterly groundwater sampling detects any potential

leak and requires a corrective action process that all CCR impoundment owners/operators must follow when a groundwater protection standard is exceeded. MWG is following that process, which includes the corrective measures alternatives analysis, presentation of proposed remedies to the public, and submittal of a groundwater corrective action plan via a corrective action construction permit application for Illinois EPA review and approval.

A comment was made that the corrective action alternative analysis showed a similar benefit between closure by removal and retrofit of the Metal Cleaning and Ash Surge Basins. Powerton is an operating electric generating facility, and at this time both basins are needed to ensure electric generating operations can continue reliably. Once electric generation ceases at Powerton, closure construction permit applications will be submitted to Illinois EPA for the retrofitted basins.

NPDES Permit

A question was asked about the NPDES permitted outfalls and where they are located. There are two permitted outfalls that discharge to the Illinois River and two permitted outfalls that discharge to Powerton Lake.

A question was asked whether water analysis is performed at Powerton Lake. MWG does not study Powerton Lake. Instead, we monitor our discharges to the Illinois River and Powerton Lake and report those to the Illinois EPA as required by the Station's NPDES permit.

Ash Handling

Questions were asked about the ash handling process at the Station. Ash is sluiced from the boilers to hydrobins, which are dewatering bins that allow the overwhelming majority of ash to settle out while the water is decanted to an ash basin for further settling (polishing) before discharge via the NPDES permit. The bulk ash remaining in the hydrobins is removed and either beneficially reused or sent to a permitted landfill for disposal.

A question was asked about the current status of the CCR basins at the Station. The Ash Bypass Basin has been retrofitted in accordance with the IL CCR Rule and is in service. It is used to settle any ash remaining in the decanted sluice water after the significant majority of ash is removed in the hydrobins. The Ash Surge Basin is out of service. The Metal Cleaning Basin is used occasionally to collect and treat boiler cleaning wash waters during boiler outages, and to temporarily store ash from maintenance activities outside of boiler outages. The Former Ash Basin (FAB) is an inactive basin that has not been used since the 1970's. MWG submitted a closure construction permit application for the FAB which is under review by Illinois EPA.

A question was asked if there is analysis of the ash from the ash basins. Ash from each basin was analyzed in accordance with the IL CCR Rule. The results of that sampling can be found in the Initial Operating Permit applications, available at www.midwestgenerationllc.com.

A question was asked about wildlife interaction with the ash basins. On occasion, wildlife such as birds or turtles are seen in or around the basins. No adverse effects to the animals have been observed.

Future

General concerns were raised about potential future impacts to the ponds due to climate change, such as groundwater level fluctuations and flooding, historic fill, and impacted soils under the basins. During the useful life of the impoundments and throughout the closure and post-closure care periods (if applicable), groundwater monitoring will continue, which includes monitoring and reporting the groundwater levels in the monitoring wells. Additionally, the impoundments will continue to be inspected weekly by qualified staff and annually by a certified Professional Engineer. MWG has no evidence of any sustained long-term rise in water levels around the impoundments at Powerton Station.

A question was asked about MWG's plans to address historical deposits of ash in light of EPA proposing revisions to the rule originally published in 2024. MWG reviews and evaluates all federal and state rules that are or may be applicable to its facilities and will continue to follow the laws and regulations while prioritizing the community, the environment, and the well-being of our employees.

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 corrective action at the Ash Surge Basin and the Metal Cleaning Basin 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.

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

APPENDICES

- A. Application for Retrofit Construction Permit Application - Metal Cleaning Basin July 19, 2023
- B. Application for Retrofit Construction Permit Application - Ash Surge Basin July 26, 2023
- C. Design Specifications and Drawings – Capping of ASB Weir Wall
- D. Corrective Action Plan

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

APPENDIX A

Application for Retrofit Construction Permit Application - Metal
Cleaning Basin July 19, 2023



Thomas J. Dehlin, P.E.

Project Engineer (Licensed in IL, KY, and WY)

(312) 269-6373

tdehlin@sargentlundy.com

July 19, 2023

Illinois Environmental Protection Agency

DWPC – Permits MC #15

Attn: Part 845 Coal Combustion Residual Rule Submittal

1021 North Grand Avenue East

P.O. Box 19276

Springfield, IL 62794-9276

Re: Powerton Metal Cleaning Basin Retrofit Construction Permit Application

To Whom It May Concern:

On behalf of Midwest Generation, LLC (MWG), Sargent & Lundy (S&L) respectfully submits the enclosed construction permit application to retrofit the Metal Cleaning Basin (Illinois EPA ID No. W1798010008-03) at MWG's Powerton Generating Station pursuant to 35 Ill. Adm. Code 845.770. The enclosed permit application has been prepared in accordance with 35 Ill. Adm. Code 845.220(a)–(b). As detailed in the application, MWG is proposing to retrofit the Metal Cleaning Basin with a new composite liner system and a new leachate collection system.

We look forward to working with the Illinois EPA on this project. Please contact me ((312) 269-6373 or tdehlin@sargentlundy.com) or Mr. Joseph Kotas at the Powerton Generating Station ((309) 477-5216 or Joseph.Kotas@nrg.com) with any questions or concerns regarding this permit application.

Best Regards,

A handwritten signature in black ink that reads 'Th. Dehlin'.

Thomas J. Dehlin, P.E.

Enclosures:

1. Form CCR 1 – General Provisions
2. Form CCR 2CN – New Construction
3. Application for Retrofit Construction Permit



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 1 – General Provisions

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:

Facility Name:

SECTION 1: FACILITY, OPERATOR, AND OWNER INFORMATION (35 Ill. Adm. Code 845.210(b))

Facility, Operator, and Owner Information	1.1	Facility Name		
		Powerton Generating Station		
	1.2	Illinois EPA CCR Permit Number (if applicable)		
	1.3	Facility Contact Information		
		Name (first and last)	Title	Phone Number
		Joseph Kotas	Environmental Specialist	309-477-5216
		Email address		
		Joseph.Kotas@nrg.com		
	1.4	Facility Mailing Address		
		Street or P.O. box		
		13082 East Manito Road		
		City or town	State	Zip Code
		Pekin	IL	61554
	1.5	Facility Location		
	Street, route number, or other specific identifier			
	13082 East Manito Road			
	County name	County code (if known)		
	Tazwell			
	City or town	State	Zip Code	
	Pekin	IL	61554	
1.6	Name of Owner/Operator			
	Midwest Generation, LLC			

Facility, Operator, and Owner Info	1.7	Owner/Operator Contact Information		
		Name (first and last) Todd Mundorf	Title Plant Manager	Phone Number 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 Princeton		State NJ	Zip Code 08540	
SECTION 2: LEGAL DESCRIPTION (35 III. Adm. Code 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) N W 1/4 300.7 AC		
SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 III. Adm. Code 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.		
		W1798010008-03	☒	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description

		☐	Attached written description
		☐	Attached written description
		☐	Attached written description
		☐	Attached written description

SECTION 5: CHECKLIST AND CERTIFICATION STATEMENT

Checklist and Certification Statement	5.1	In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing.			
		Column 1		Column 2	
		Section 1: Facility, Operator, and Owner Information	☒	w/attachments	☒
		Section 2: Legal Description	☒	w/attachments	☐
		Section 3: Publicly Accessible Internet Site Requirement	☒	w/attachments	☐
		Section 4: Impoundment Identification	☒	w/attachments	☒
	5.2	Certification Statement			
		I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.			
	Name (print or type first and last name) of Owner/Operator			Official Title	
	Todd Mundorf			Plant Manager	
	Signature 			Date Signed 7/18/23	



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 2CN – New Construction

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:

Facility Name:

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

Design and Construction Plans (Construction History)	1.1	CCR surface impoundment name.
		Metal Cleaning Basin
	1.2	Identification number of the CCR surface impoundment (if one has been assigned by the Agency).
		W1798010008-03
	1.3	Describe the boundaries of the CCR surface impoundment. (35 Ill. Adm. Code 845.210 (c)).
		SEC 8 T24N R5W E 1/2 OF NE 1/4 (EXC RIVER) & E 1/2 OF SE 1/4 (EXC RIVER & EXC TRACT) 111.65 AC
	1.4	State the purpose for which the CCR surface impoundment is being used.
		The Metal Cleaning Basin is primarily used for temporarily storing gas-side boiler cleaning wash water. When no wash water is present, the basin is also used to temporarily store dry bottom ash and dry fly ash collected during routine cleaning activities at the Station.
	1.5	How long has the CCR surface impoundment been in operation?
		45 Years (Since 1978)
	1.6	List the types of CCR that have been placed in the CCR surface impoundment.
		Gas-side boiler cleaning wash water, which may contain boiler slag. When not used for managing wash water, dry bottom ash and dry fly ash are temporarily stored in the impoundment and are removed as quickly as possible.
	1.7	List the name of the watershed within which the CCR surface impoundment is located.
		Pekin Lake-Illinois River Watershed

Design and Construction Plans (Continued)	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?		
		28,834 acres		
	1.9	Check the corresponding boxes to indicate that you have attached the following:		
		☒	A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.	
		☒	A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR surface impoundment.	
		☒	A statement of the method of site preparation and construction of each zone of the CCR surface impoundment.	
		☒	A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.	
		☒	Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).	
		☒	A description of the type, purpose, and location of existing instrumentation.	
		☒	Area Capacity Curves for the CCR Impoundment.	
	1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?		
		☐	Yes	☒ No
	1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.		
Narrative Description	2.1	List the types of CCR expected in the CCR surface impoundments.		
		Gas-side boiler cleaning wash water, which may contain boiler slag. Dry bottom ash. Dry fly ash.		
	2.2	Have you attached a chemical analysis of each type of expected CCR?		
		☒	Yes	

Narrative Description (Cont.)	2.3	Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.		
		The Metal Cleaning Basin's maximum capacity is approximately 12,800 cubic yards.		
	2.4	The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.		
		40,000	GPD	dTn
	2.5	Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.		
	Approximately 4 Years (Until December 31, 2028)			
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	☐	No
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 States 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.		
	☒	A summary of the issues raised by the public during the public notification and public meetings.		
	☒	A summary of any revisions, determinations, or other considerations made in response to those issues raised by the public during the public notification and public meetings.		
	☒	A list of interested persons in attendance who would like to be added to the Agency's listserv for the facility.		
☒	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in erosion control and environmental remediation.			

			Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in the operation of heavy equipment and excavation.
SECTION 5: GROUNDWATER MONITORING PROGRAM			
Groundwater	5.1	Indicate that you have attached the following components of a new groundwater monitoring program or any modifications to an existing groundwater monitoring program by checking the corresponding boxes:	
	☒	A hydrogeologic site investigation meeting the requirements of 35 III. Adm. Code 845.620, if applicable.	
	☒	Design and construction plans of a groundwater monitoring system meeting the requirements of 35 III. Adm. Code 845.630.	
	☒	A proposed groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by 35 III. Adm. Code 845.640 and 35 III. Adm. Code 845.650.	
SECTION 6: PLANS AND SPECIFICATIONS			
Plans and Specifications	6.1	Indicate that you have attached plans and specifications that demonstrate the proposed CCR surface impoundment will meet the location standards in the following sections by checking the corresponding boxes:	
	☒	35 III. Adm. Code 845.300 (Placement Above the Uppermost Aquifer)	
	☒	35 III. Adm. Code 845.310 (Wetlands)	
	☒	35 III. Adm. Code 845.320 (Fault areas)	
	☒	35 III. Adm. Code 845.330 (Seismic impact zones)	
	☒	35 III. Adm. Code 845.340 (Unstable areas and floodplains)	
	6.2	Indicate that you have attached plans and specifications that demonstrate the proposed CCR surface impoundment will meet the following design criteria by checking the corresponding boxes:	
	☒	The CCR surface impoundment will have a liner meeting the liner requirements of 35 III. Adm. Code 845.400(b) or (c).	
	☒	The CCR surface impoundment will have a leachate collection system meeting the requirements of 35 III. Adm. Code 845.420.	
	☒	The CCR surface impoundment, if not incised, will be constructed with slope protection, as required by 35 III. Adm. Code 845.430.	
	6.3	Indicate that you have attached the following plans by checking the corresponding boxes:	
	☒	CCR fugitive dust control plan, as specified in 35 III. Adm. Code 845.500(b).	
	☒	Preliminary written closure plan, as specified in 35 III. Adm. Code 845.720(a).	
☒	Initial written post-closure care plan, as specified in 35 III. Adm. Code 845.780(d), if applicable.		

MWVG

Midwest Generation, LLC

Powerton Generating Station
Metal Cleaning Basin
(IEPA ID No. W1798010008-03)

Application for Retrofit Construction Permit

Revision 0

July 19, 2023

Issue Purpose: Permit

Project No.: 12661-152

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INTRODUCTION

Midwest Generation, LLC (MWG) currently operates the Powerton Generating Station (“Powerton” or the “Station”), a coal-fired steam electric generating station located in Pekin, Illinois. The Station’s address is 13082 East Manito Rd, Pekin, IL 61554. The Station consists of four coal-fired boilers and two electric generating units, Units 5 and 6, with an approximate nameplate capacity of 1,785 megawatts (MW). Each of the four boilers are typically cleaned on an annual basis during scheduled outages. During these cleanings, gas-side boiler cleaning wash water is pumped to the Station’s Metal Cleaning Basin for temporary storage. This wash water is ultimately discharged into the Station’s Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. When the Metal Cleaning Basin is not being used to store gas-side boiler cleaning wash water, the Station has historically used it to temporarily store dry bottom ash and fly ash collected during routine cleaning activities at the Station.

Pursuant to § 845.220 of Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code), MWG is submitting this application to the Illinois Environmental Protection Agency (Illinois EPA) for a construction permit to retrofit Powerton’s Metal Cleaning Basin with a new composite liner system and a new leachate collection and removal system. The purpose of this report and all attachments hereto is to demonstrate that the design, construction, and operation of the retrofitted Metal Cleaning Basin will comply with the Illinois Pollution Control Board’s “Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments,” which are codified in Part 845 to the aforementioned 35 Ill. Adm. Code. Accordingly, this report and all attachments hereto provide the documents and information required for a construction permit application to retrofit an existing CCR surface impoundment as specified by 35 Ill. Adm. Code 845.220(a)–(b).

1.0 HISTORY OF CONSTRUCTION (845.220(A)(1))

The history of construction for the Metal Cleaning Basin as specified by 35 Ill. Adm. Code 845.220(a)(1) is presented in Sections 1.1 through 1.13.

1.1 CCR SURFACE IMPOUNDMENT IDENTIFYING INFORMATION

The Metal Cleaning Basin is operated by Midwest Generation, LLC, whose address is 804 Carnegie Center, Princeton, NJ, 08540. The Metal Cleaning Basin's Illinois EPA identification number is W1798010008-03.

1.2 PURPOSE OF THE CCR SURFACE IMPOUNDMENT

Powerton primarily uses the Metal Cleaning Basin for temporarily storing gas-side boiler cleaning wash water prior to treatment in the Station's Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. The Station also uses the basin (when no wash water is present) to temporarily store dry bottom ash and fly ash collected during routine cleaning activities at the Station. After it has been retrofitted with a new composite liner system and a new leachate collection and removal system, the Metal Cleaning Basin will continue to be used for these purposes.

1.3 CCR SURFACE IMPOUNDMENT SERVICE HISTORY

The Metal Cleaning Basin was originally constructed circa 1978 and has been operating since that time.

1.4 TYPES OF CCR IN THE SURFACE IMPOUNDMENT

The Metal Cleaning Basin accepts gas-side boiler cleaning wash water, which may contain boiler slag, when the Station's boilers are cleaned during scheduled outages. The Station also uses the basin (when no wash water is present) to temporarily store dry fly ash removed from the fly ash silos when they are cleaned, and dry bottom ash collected during routine cleaning activities at the Station. The chemical constituents that make up these CCRs are discussed in detail in Section 2.1.

1.5 NAME & SIZE OF SURROUNDING WATERSHED

The Metal Cleaning Basin is located within the Pekin Lake-Illinois River watershed (U.S. Geological Survey 12-Digit Hydrologic Unit Code 071300030304), which is approximately 28,834 acres (USGS, 2021). This watershed is located within the larger Lower Illinois watershed.

It should be noted that the surface water runoff for the Metal Cleaning Basin is limited to the area within the embankment crests because the basin is constructed with elevated embankments in relation to the surrounding ground surface.

1.6 DESCRIPTION OF CCR SURFACE IMPOUNDMENT FOUNDATION MATERIALS

1.6.1 PHYSICAL PROPERTIES OF FOUNDATION MATERIALS

The following descriptions of the physical properties of the Metal Cleaning Basin's foundation materials are taken from the history of construction in the initial operating permit application prepared by KPRG and Associates, Inc. (KPRG) for the basin in 2022 (KPRG, 2022a).

The physical properties of the foundation materials in which the Metal Cleaning Basin is constructed range from sand and clay. Alluvial sands and gravels with some minor clay underlie the site. This information was obtained from published geologic information and field investigations performed by KPRG in 2005, Patrick Engineering in 2011, and Geosyntec in 2016. Publicly available geologic information shows the site is underlain by approximately 100 to 125 feet of alluvial sands and gravels with minor interspersed clay. Patrick Engineering (2011) and Geosyntec (2016) investigations show that the silt and clay layers identified range from 16 to 20 feet with approximately 34 to 43 feet of medium dense poorly graded sand and gravel below. Finally, no abutments are present.

The physical properties of the embankment fill materials consist of fine to coarse silty sand in the east embankment and clay with intermingled sand and gravel layers in the west embankment. The soils that underly the Metal Cleaning Basin consists of clay with some sand and gravel.

1.6.2 ENGINEERING PROPERTIES OF FOUNDATION MATERIALS

The following descriptions of the engineering properties of the Metal Cleaning Basin's foundation materials are taken from the initial structural stability and safety factor assessments prepared by Civil & Environmental Consultants, Inc. (CEC) for the basin in 2021 (CEC, 2021).

The foundation materials for the Metal Cleaning Basin were determined to be clay or sand as indicated in Section 1.6.1; the engineering properties for these materials are presented in Table 1.6-1. The properties were determined from site investigations, published correlations, and laboratory testing of samples collected during the site investigations referenced in Section 1.6.1.

Table 1.6-1 – Engineering Properties of Foundation Materials

Material	Unit Weight (pcf)	Drained Friction Angle (degrees)	Effective Cohesion (psf)	Undrained Shear Strength (psf)
Clay	128	34	50	600
Sand	125	32	0	--

1.7 DESCRIPTION OF CONSTRUCTION MATERIALS, METHODS, AND DATES

The following descriptions of the historical construction materials, methods, and dates for the Metal Cleaning Basin are based on the construction plans prepared by (1) NUS Corporation in 1978 for the basin's original construction and by (2) Natural Resource Technology (NRT) in 2010 for re-lining the basin. Both sets of construction plans are provided in Attachments 1-1 and Attachment 1-2, respectively. It should be noted that as-built drawings for the original construction of the Metal Cleaning Basin were not available detailing the actual methods and materials used to construct the basin circa 1978.

1.7.1 PHYSICAL & ENGINEERING PROPERTIES OF CONSTRUCTION MATERIALS

Based on the original construction plans for the Metal Cleaning Basin prepared by NUS Corporation in 1978, the basin's embankments were constructed using compacted fill. Engineering properties for the compacted fill were estimated by CEC as shown in Table 1.7-1 for use in the Metal Cleaning Basin's initial safety factor assessment (CEC, 2021). These estimated engineering properties were based on site investigations, published data, and laboratory testing of the Metal Cleaning Basin's embankment materials.

Table 1.7-1 – Engineering Properties of Embankment Materials

Material	Unit Weight (pcf)	Drained Friction Angle (degrees)	Effective Cohesion (psf)
Embankment Fill	125	35	25

The Metal Cleaning Basin shares its east embankment with the Ash Surge Basin's west embankment. This embankment was initially designed to have a gravel-surfaced access road, which was eventually paved with asphalt at some point during the basins' operating histories. The Metal Cleaning Basin's north, west, and south embankments are vegetated, and the north and west embankments' crests have gravel surfacing.

The Metal Cleaning Basin's interior slopes were originally lined with a Hypalon® liner, and the base and the upper few feet of the interior slopes were lined with a Poz-O-Pac liner. In 2010, the Hypalon® and Poz-O-Pac liners along the interior slopes were removed and replaced with a new 60-mil high-density polyethylene (HDPE) geomembrane liner. Except for the area north of the basin's weir wall, the original Poz-O-Pac liner along the basin floor was left in-place and covered with the new HDPE geomembrane liner.

1.7.2 CONSTRUCTION METHODS

The Metal Cleaning Basin was constructed circa 1978 by placing compacted fill to form the basin's four embankments. All four embankments were constructed with 3-horizontal to 1-vertical (3H:1V) exterior and interior side slopes to crest elevations of 468 feet (+/-) above mean seal level (amsl). Based on existing grade at the time of their construction, minor fill quantities were required to construct the south and east embankments relative to the north and west embankments. The south embankment consists of

approximately 3 feet of compacted fill, while the remaining 10 feet of the southern interior slope was excavated below existing grade at the time. Meanwhile, the north embankment consists entirely of compacted fill. The crests of the west and south embankments were originally designed to be 5 feet wide, whereas the crests of the east and north embankments were designed to be 40 and 30 feet wide, respectively, in order to support gravel access roads.

The bottom of the Metal Cleaning Basin and the lower four feet of its embankments were originally lined with a 12-in.-thick Poz-O-Pac liner, which was to be installed in two 6-in.-thick lifts. The remaining portions of the basin's interior slopes were lined with a Hypalon® liner.

In 2010, the Metal Cleaning Basin was re-lined with a new 60-mil HDPE geomembrane. Prior to installing the new HDPE geomembrane liner, the existing Hypalon® and Poz-O-Pac liners along the basin's interior slopes were removed. However, except for the area north of the basin's weir wall, the original Poz-O-Pac liner installed along the floor of Metal Cleaning Basin was left in-place and covered with the new HPDE geomembrane liner. Meanwhile, the original Poz-O-Pac liner on the north side of the outlet weir was removed and replaced with a 60-mil HDPE geomembrane that was then covered with 18 inches of riprap. The remainder of the HDPE geomembrane liner along the Metal Cleaning Basin floor was covered with 18 inches of fine and coarse aggregate material.

1.7.3 CONSTRUCTION DATES

Exact dates for construction of the Metal Cleaning Basin's embankments, original liner system, and appurtenant structures are unknown; however, construction drawings were approved for construction in June 1978. As previously stated, the Metal Cleaning Basin was re-lined with a 60-mil HDPE geomembrane liner in 2010.

1.8 DETAILED DIMENSIONAL DRAWINGS

The original construction plans for the Metal Cleaning Basin prepared by NUS Corporation in 1978 are provided in Attachment 1-1. Meanwhile, the as-built drawings for replacing the Metal Cleaning Basin's liner prepared by NRT in 2011 (documenting the re-lining work completed in late 2010) are provided in Attachment 1-2.

1.9 INSTRUMENTATION

Electronic instrumentation is not present in the Metal Cleaning Basin. However, 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 retrofitted Metal Cleaning Basin is provided in Attachment 1-5.

1.11 SPILLWAY AND DIVERSION DESIGN FEATURE CAPACITIES AND CALCULATIONS

The Metal Cleaning Basin does not have an emergency spillway.

1.12 SURVEILLANCE, MAINTENANCE, & REPAIR CONSTRUCTION SPECIFICATIONS

Technical specifications for the Metal Cleaning Basin liner replacement project performed in 2010 are provided in Attachment 1-3, and the permit issued by the Illinois EPA for the liner replacement project is provided in Attachment 1-4.

1.13 RECORD OF STRUCTURAL INSTABILITY

There is no record or knowledge of structural instability associated with the Metal Cleaning Basin.

2.0 NARRATIVE DESCRIPTION OF THE FACILITY (845.220(A)(2))

2.1 CCR TYPES & CHEMICAL ANALYSES

As previously stated in Section 1.4, the gas-side boiler cleaning wash water sent to the Metal Cleaning Basin when the Station's boilers are cleaned may contain boiler slag. When wash water is not present in the Metal Cleaning Basin, the Station has historically used the basin to temporarily store dry bottom ash and dry fly ash. These CCRs will continue to be managed in the basin after it has been retrofitted with a new composite liner system and a new leachate collection and removal system. Sample of the CCRs present in the Metal Cleaning Basin were sampled and analyzed for the parameters listed in 35 Ill. Adm. Code 845.600(a) except for total dissolved solids. The results of those analyses are presented in Table 2.1-1, and the total laboratory data package is provided in Attachment 2-1.

**Table 2.1-1 – Chemical Constituents of CCR to be
Managed in Powerton Metal Cleaning Basin**

Parameter	CCR Sample (06-23-2021)	Parameter	CCR Sample (06-23-2021)
Antimony	< 1.8	Cobalt	< 22
Arsenic	7.6	Fluoride	22
Barium	1,900	Lead	66
Beryllium	1.5	Lithium	16
Boron	100	Mercury	0.26
Cadmium	4.3	Molybdenum	5.3
Calcium	120,000	Selenium	7.1
Chloride	110	Sulfate	21,000
Chromium	52	Thallium	4.0

Notes:

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

2.2 MAXIMUM CAPACITY

The Metal Cleaning Basin's maximum capacity is approximately 12,800 cubic yards.

2.3 WASTE STREAMS

As shown in the Station's process flow diagram provided in Attachment 2-2, the Station sends gas-side boiler cleaning wash water to the Metal Cleaning Basin. As previously mentioned, the Station also uses the Metal Cleaning Basin when no wash water is present to temporarily store dry fly ash and dry bottom ash collected during routine cleaning activities at the Station. The Station plans to continue sending these waste streams to the Metal Cleaning Basin after it has been retrofitted with a new composite liner system and a new leachate collection and removal system.

The Station cleans each boiler once per year over a 5-day period. During this period, gas-side boiler cleaning wastewater is pumped to the Metal Cleaning Basin at an average rate of 1,200 gallons per minute over 20 hours. Thus, each cleaning event produces approximately 7.2 million gallons of gas-side boiler cleaning wastewater. For the two units, this intermittent flow has an equivalent annual average continuous flow rate of approximately 40,000 gallons per day.

2.4 OPERATING LIFE

The Metal Cleaning Basin is currently anticipated to receive the CCR waste streams listed in Section 2.3 until December 31, 2028.

2.5 ON-SITE TRANSPORTATION PLAN

The Powerton Generating Station is a secure facility. The property boundary is fenced in with two gates. The main gate has a guard house with full time security. This will be the typical route for vehicle access to the Metal Cleaning Basin using the main plant road. Visitors will be required to sign in and out with the guard personnel. The second gate will be used for large vehicles to access the Metal Cleaning Basin. This gate is a slide gate with a key card just east of the main gate.

Upon approval of this construction permit application, the Metal Cleaning Basin will be retrofitted with a new composite liner system and a new leachate collection system. During the retrofit construction activities, access to the facility will still be controlled via the two aforementioned gates. As needed, road intersections are traffic-controlled with stop signs. The speed limit on the property is typically 10 miles per hour.

The Metal Cleaning Basin will be accessed using the existing roads on the property. These roads are shown in Figure 2 in Attachment 2-3. The main road that leads from the main gate ultimately leads to the southeast corner of the Metal Cleaning Basin at the eastern end of the facility's property. Meanwhile, the plant road utilized by large vehicles ultimately leads to the southeast corner of the Bypass Basin which is located southeast of the Metal Cleaning Basin. There is a gravel road along the Bypass Basin's northern and eastern embankments which will allow vehicles to reach the Metal Cleaning Basin's access ramp located in the southeast corner of the basin. These roads will be used by construction personnel to bring materials and

equipment required for the retrofit activities to the Metal Cleaning Basin. Larger construction equipment may utilize the existing road around the Ash Surge Basin to navigate around the Station's CCR surface impoundments back south to the heavy equipment gate. Such equipment will also have either backup alarms or spotters for backing up as needed.

Transportation access to the Metal Cleaning Basin will not be required during normal day-to-day operations after the Metal Cleaning Basin has been retrofitted and placed back into service. Station personnel will use the access roads shown in Figure 2 (Attachment 2-3) during weekly inspections of the basin to ensure no issue arise. On a quarterly basis, groundwater sampling will be performed at the monitoring wells surrounding the Metal Cleaning Basin, during which time these roads will be used to access the wells.

3.0 SITE LOCATION MAP (845.220(A)(3))

A site location map on the most recent U.S. Geological Survey (USGS) quadrangle of the area from the 7 ½ minute topographic series is provided in Attachment 3. This map includes details regarding the facility and adjacent properties boundaries extending 1000 meters, surface waters, the prevailing wind direction, and the limits of all 100-year floodplains. Alongside this, 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 also shown on this map.

4.0 SITE PLAN MAP (845.220(A)(4))

Site plan maps providing the information required by 845.220(a)(4) are included in various attachments. Figures 4-1 and 4-2 in Attachment 4 show the entire Powerton Generating Station property (Figure 4-1) and a plan view showing Units 5 and 6, the locations of all existing CCR surface impoundments, and facility roads (Figure 4-2). Transportation routes from the Station's main gates to the CCR surface impoundments are shown on the aforementioned transportation plan in Figure 2. The boundaries of the Station's CCR surface impoundments and the locations of their existing groundwater monitoring well locations are shown on Figure 9-1 in Attachment 9-0. Finally, cross sections near / through the Station's CCR surface impoundments are shown on Figures 9-2 through 9-4 in Attachment 9-0.

5.0 DESCRIPTION OF PROPOSED RETROFIT (845.220(A)(5))

The proposed construction plans and specifications for retrofitting the Metal Cleaning Basin are provided in Attachment 5-1. MWG intends for the retrofit work to be performed by a General Work (GW) Contractor and its subcontractors, while an independent, third-party Construction Quality Assurance (CQA) Contractor will be responsible for assuring the Metal Cleaning Basin is retrofitted in accordance with the proposed construction plans and specifications. The technical specifications for the retrofit construction and CQA work are provided in Attachment 5-2.

In accordance with the proposed construction plans and specifications, MWG plans to retrofit the Metal Cleaning Basin with a new composite liner system and a new leachate collection and removal system by executing the following sequential steps:

1. Removing any remaining boiler wash water sediments from the basin and transporting the material to a permitted disposal facility in accordance with current and historic Station maintenance procedures for the Metal Cleaning Basin;
2. Obtaining a construction permit from the Illinois EPA for retrofitting the Metal Cleaning Basin;
3. Removing the gravel warning, sand cushion, and riprap layers over the existing geomembrane liner from the basin and transporting these materials to a permitted disposal facility;
4. Decontaminating the basin's existing geomembrane liner for re-use as a supplemental liner in the retrofitted basin, including submittal of visual inspection documentation and analytical testing results to demonstrate the existing liner is competent and is not contaminated with CCR constituents in accordance with 35 Ill. Adm. Code 845.770(a)(4);
5. Decontaminating the basin's appurtenant structures (e.g., inlet aprons, weir walls, piping);
6. Placing structural fill within the basin floor to establish the slopes for the new leachate collection and removal system and to support the new composite liner system;
7. Installing a composite liner system consisting of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL); and
8. Installing a leachate collection and removal system consisting of a drainage geocomposite, leachate collection pipe, and submersible sump pump;
9. Installing a filter layer over the leachate collection and removal system; and
10. Installing a protective warning layer over the sand filter layer.

5.1 CCR REMOVAL & DECONTAMINATION

After temporarily ceasing all flows into the Metal Cleaning Basin, MWG will remove any remaining boiler wash water sediments stored above the granular protective layers covering the Metal Cleaning Basin's existing geomembrane liner in accordance with the Station's usual cleaning and maintenance practices.

Upon approval of the retrofit construction permit application, the retrofit activities will begin with removal of the granular protective layers covering the Metal Cleaning Basin's existing geomembrane liner: a 6-in.-thick gravel warning layer and a 12-in.-thick sand cushion layer. MWG will also remove an 18-inch-thick layer of riprap above the basin's existing geomembrane liner between the basin's concrete weir wall and discharge pipe. These materials will be carefully excavated, loaded onto trucks, and transported off-site for disposal at a permitted disposal facility. Because these soil materials are likely to contain boiler wash water sediments, they will be handled and hauled off-site in accordance with 35 Ill. Adm. Code 845.740(c), which includes specifications for proper manifests for each transported truckload, a transportation plan, on-site fugitive dust controls, signage and public notices, and managing stormwater to prevent contamination of surface water and groundwater.

After the existing granular protective layers and riprap in the Metal Cleaning Basin have been removed, the basin's existing HDPE geomembrane liner will be decontaminated so that it can be re-used as a supplemental liner under the new composite liner system being installed. The basin's inlet aprons, weir walls, associated piping, etc. will also be decontaminated. At a minimum, decontamination procedures will include pressure washing of the geomembrane liner and pond appurtenances in a systematic manner to remove all boiler wash water sediments. Following decontamination, the existing geomembrane liner will be visually inspected, and an electrical leak location survey will be conducted to ensure the liner is competent. Analytical tests will also be conducted in accordance Note 4.C.III on Drawing POW-MCB-CSK-004 (see Attachment 5-1) to demonstrate that the liner is not contaminated with CCR constituents.

5.2 STRUCTURAL FILL

After the existing granular protective layers and riprap have been removed and the Metal Cleaning Basin's existing HDPE geomembrane liner and appurtenances have been decontaminated, structural fill will be placed, compacted, and graded along the relatively flat basin floor to establish a minimum slope of three percent towards the location of the new leachate collection pipe being installed near the center of the basin. All earthwork activities associated with placing, compacting, and grading structural fill along the basin floor will be done in a manner to prevent tearing, ripping, or otherwise damaging the Metal Cleaning Basin's existing HDPE geomembrane liner.

5.3 COMPOSITE LINER SYSTEM

After the structural fill has been placed over the basin's existing HDPE geomembrane liner, the Metal Cleaning Basin's new composite liner system will be installed. The proposed new composite liner system for the Metal Cleaning Basin consists of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL). The liquid flow rate through the GCL component will be less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec in accordance with 35 Ill. Adm. Code 845.400(c)(2).

The GCL panels will be delivered to the project site by the GCL manufacturer in rolls. The GCL panels will be deployed directly over the recently installed structural fill material parallel to the slope towards the leachate collection trench (i.e., perpendicular to the elevation contours shown on the construction plans). Adjacent panels will be overlapped by a minimum of six inches along longitudinal seams and by a minimum of 24 inches along end seams. Seaming will be performed by pouring dry granular bentonite along the overlap zone in accordance with the GCL manufacturer's recommendations. Temporary anchoring, such as sand bags, will be placed along the edges of the exposed GCL panels to prevent uplift of the panels by wind during installation of the GCL.

As panels of GCL are deployed, placed, and seamed, panels of the upper HDPE geomembrane liner will be placed over the installed GCL panels. Similar to the GCL panels, the HDPE geomembrane liner panels will be delivered to the project site by the geomembrane manufacturer in rolls. The panels will be deployed directly over and in the same orientation as the installed GCL panels (i.e., parallel to the slope towards the leachate collection trench). Adjacent panels will be overlapped by a minimum of three to four inches prior to being seamed via double wedge fusion welding or extrusion fillet welding, depending on the geomembrane manufacturer's recommendations.

Both the GCL and HDPE geomembrane liner will be secured along the crests of the Metal Cleaning Basin's embankments by either (1) placing fill material over horizontal run-outs of the composite liner components or (2) placing both components in an anchor trench. The horizontal run-outs will be at least 15 feet long and covered with 18 inches of fill material, while the anchor trenches will be approximately two feet deep and will be backfilled to anchor the geosynthetic components of the Metal Cleaning Basin's new composite liner system and leachate collection and removal system in place (i.e., GCL, HDPE geomembrane liner, and drainage geocomposite). The backfill soil placed over horizontal run-outs and in anchor trenches will be properly compacted to prevent the geosynthetic components from pulling out of the anchor trenches or under the backfill placed over the horizontal run-outs.

As the composite liner system is being installed, field CQA inspections and tests will be performed in accordance with the retrofit construction plans and specifications provided in Attachments 5-1 and 5-2.

5.4 LEACHATE COLLECTION & REMOVAL SYSTEM

As areas of the Metal Cleaning Basin are lined with the new composite liner system, the new leachate collection and removal system (LCRS) components will be installed. The two primary components of the proposed LCRS are (1) a drainage geocomposite and (2) a perforated leachate collection pipe. The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core. The transmissivity of the drainage geocomposite will be at least $6 \times 10^{-4} \text{ m}^2/\text{sec}$ pursuant to 35 Ill. Adm. Code 845.420(a)(B). Meanwhile, the perforated leachate collection pipe will be installed in the leachate collection trench along the middle of the basin and will ultimately convey collected

leachate to the existing discharge pipe at the northern end of the retrofitted Metal Cleaning Basin. A wye branch in the leachate collection pipe will also be installed and lead to a non-perforated riser pipe in the northeastern quadrant of the basin, where a wheeled, submersible pump will be installed. The Station will use this pump to dewater the Metal Cleaning Basin during periodic cleanings, at the time of closure, and as needed during the post-closure care period.

Similar to the GCL and HDPE geomembrane liner, the drainage geocomposite panels will be delivered to the project site by the corresponding manufacturer in rolls. The panels will be deployed directly over the new composite liner system. Adjacent panels will be overlapped by a minimum of four inches and will be joined using self-locking straps on 1-foot centers along end seams, 5-foot centers along longitudinal seams on the basin slopes, and 10-foot centers along longitudinal seams on the basin floor. The drainage geocomposite will also be secured with the GCL and HDPE geomembrane liner along the crests of the Metal Cleaning Basin's embankments, either under backfill placed over horizontal run-outs or in anchor trenches.

As previously stated, the 6-inch diameter perforated leachate collection pipe will be installed in a leachate collection trench along the center of the basin floor above the new composite liner system. To preclude the pipe's perforations from clogging, the pipe will be installed in and supported by a bedding layer of free-draining, coarse aggregate material.

As the leachate collection and removal system is being installed, field CQA inspections and tests will be performed in accordance with the retrofit construction plans and specifications provided in Attachment 5-1 and 5-2.

5.5 SAND FILTER & PROTECTIVE WARNING LAYERS

After the new LCRS components are installed in the Metal Cleaning Basin, a sand filter layer will be installed above the new LCRS to prevent boiler wash water sediments from clogging the LCRS. This filter layer will consist of sand imported from an offsite borrow source conforming to Gradations FA 1 or FA 2 pursuant to the Illinois Department of Transportation's (IDOT) "Standard Specifications for Road and Bridge Construction." The material will be carefully placed and graded within the basin area to preclude damage to the new LCRS and composite liner system components. Finally, the sand filter layer will have a hydraulic conductivity of at least 1×10^{-5} cm/sec pursuant to 35 Ill. Adm. Code 845.420(a)(2).

In addition, pursuant 35 Ill. Adm. Code 845.420(a)(8), a protective warning layer will be installed over the sand filter layer to provide a means of deflecting the force of boiler wash water sediments pumped into the retrofitted Metal Cleaning Basin. Along the floor of the retrofitted Metal Cleaning Basin, this uppermost layer will be comprised of coarse aggregate materials conforming to IDOT Gradation CA 6 to provide a working surface for operators removing boiler wash water sediments from the basin; it will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's

side slopes, the protective warning layer will consist of riprap on a gravel bedding layer to protect the sand filter layer from erosion. Like the sand filter layer, all protective warning layer materials will be carefully placed and graded within the Metal Cleaning Basin to preclude damage to the basin's new LCRS and composite liner system.

6.0 FACILITY COMPONENT PLANS & SPECIFICATIONS (845.220(A)(6))

The Powerton Generating Station is a coal-fired steam electric generating station that burns coal to generate electricity. The facility's boundaries are shown on Figure 4-1 in Attachment 4. The Station consists of four coal-fired boilers and two electric generating units (Units 5 and 6) as shown on Figure 4-2 in Attachment 4. Fly ash and bottom ash are both generated in the boilers as byproducts of burning coal. The fly ash is captured by electrostatic precipitators, is then pneumatically conveyed to on-site storage silos, and is finally deposited into trucks and hauled off-site. Meanwhile, bottom ash from the bottom of the boilers falls directly into slag tanks where it is quenched with water and subsequently sluiced to a set of two dewatering bins (one dedicated pair per electric generating unit). The dewatering bins mechanically promote sedimentation of the suspended bottom ash particles in the sluice water.

The Station's bottom ash-handling components are shown on Figure 4-2. Per the figure, bottom ash sluice piping from Unit 5 emanates from the north end of the boiler building and heads east above ground for approximately 900 feet where the piping terminates at the two dewatering bins for Unit 5. Meanwhile, bottom ash sluice piping from Unit 6 emanates from the south end of the boiler building and heads east above ground for approximately 1,100 feet, where the piping terminates at the two dewatering bins for Unit 6. Each dewatering bin has a decant pipe where treated overflow water drains into a concrete trench that heads northward towards the Bypass Basin and Ash Surge Basin. The dewatering bin overflow, which still contains some suspended CCR particles, then flows into the basin that is in service at the time for additional sedimentation. Flow into each basin is controlled by a dedicated controlled gate per basin.

Each of the Station's four boilers is typically cleaned on an annual basis during scheduled outages. During these cleanings, the gas-side boiler wash water, which may contain boiler slag, is pumped to the Metal Cleaning Basin for temporary storage via elevated piping supported on a pipe rack. As shown on Figure 4-2, this pipe rack emanates from the north end of the boiler building and follows the eastern edge of the Old Intake Channel to the Metal Cleaning Basin. The wash water flows into the Metal Cleaning Basin over three concrete aprons at the southern edge of the basin. Upon entering the basin, the boiler wash water sediments suspended in the transport water settle to the basin floor as the wash water migrates towards the northern end of the basin. Wash water is ultimately conveyed to the Station's Metal Cleaning Treatment System through a reinforced concrete pipe at the northern end of the Metal Cleaning Basin.

After the Station's Metal Cleaning Treatment System removes dissolved metals and suspended solids from the gas-side boiler wash water, the treated water is discharged to the Ash Surge Basin. Water in the Ash Surge Basin ultimately drains through a reinforced concrete pipe into a sump underneath the pump station

located north of the Ash Surge Basin. Water is then pumped to the Service Water Basin¹ located northwest of the Ash Surge Basin and is then either recycled to the Station's cooling pond or discharged to the Illinois River through NPDES-permitted Outfall 001. This process is illustrated on drawing POW-CSK-PFD-001 in Attachment 2-2 which is a process flow diagram (PFD) that shows how Powerton currently manages the wastestreams produced by its coal-fired steam electric generating process.

Finally, when wash water is not present in the Metal Cleaning Basin, the Station will use the basin to temporarily store dry fly ash and dry bottom ash collected during routine cleaning activities. The Station places this material in the basin via end dumping.

¹ The Service Water Basin is a non-CCR surface impoundment.

7.0 RETROFIT CONSTRUCTION STANDARDS (845.220(B)(1)–(3))

This section demonstrates the retrofitted Metal Cleaning Basin will meet the location, liner, leachate collection and removal system, slope protection, and CCR fugitive dust control standards promulgated by 35 Ill. Adm. Code Part 845.

7.1 LOCATION STANDARDS

7.1.1 PLACEMENT ABOVE THE UPPERMOST AQUIFER

Per the demonstration submitted with MWG's initial operating permit application for the Metal Cleaning Basin in March 2022 (KPRG, 2022a), which is included in Attachment 7-1, the upper limit of the uppermost aquifer under the Metal Cleaning Basin is at El. 450.14 feet above mean seal level (amsl) (KPRG, 2022b). Per Drawing POW-MCB-CSK-006 in Attachment 5-1, the base of the Metal Cleaning Basin's new composite liner system will be at El. 455.67 feet amsl. Therefore, the base of the retrofitted Metal Cleaning Basin will be separated by more than five feet from the upper limit of the uppermost aquifer. Thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.300(a).

7.1.2 WETLANDS

As demonstrated in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), the Metal Cleaning Basin is not located in mapped wetlands. This conclusion is based on the corresponding demonstration KPRG performed for the Metal Cleaning Basin in March 2022 (KPRG, 2022c), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Metal Cleaning Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Metal Cleaning Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.310(a).

7.1.3 FAULT AREAS

As demonstrated in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), the Metal Cleaning Basin is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time. This conclusion is based on the corresponding demonstration KPRG performed for the Metal Cleaning Basin in March 2022 (KPRG, 2022d), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Metal Cleaning Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Metal Cleaning Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.320(a).

7.1.4 SEISMIC IMPACT ZONES

As demonstrated in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), the Metal Cleaning Basin is not located within a seismic impact zone as defined by 35 Ill. Adm. Code 845.120. This conclusion is based on the corresponding demonstration KPRG performed for the Metal Cleaning Basin in March 2022 (KPRG, 2022e), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Metal Cleaning Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Metal Cleaning Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.330(a).

7.1.5 UNSTABLE AREAS

As demonstrated in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), the Metal Cleaning Basin is not located in an unstable area. This conclusion is based on the corresponding demonstration KPRG performed for the Metal Cleaning Basin in March 2022 (KPRG, 2022f), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Metal Cleaning Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Metal Cleaning Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.340(a).

7.1.6 FLOODPLAINS

As demonstrated in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), the Metal Cleaning Basin is not located in a floodplain according to the National Flood Hazard Layer FIRMette Map No. 17179C0175E prepared by the Federal Emergency Management Agency (FEMA, 2017). This map is included in Attachment 7-2.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Metal Cleaning Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Metal Cleaning Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Metal Cleaning Basin complies with 35 Ill. Adm. Code 845.340(c).

7.2 LINER DESIGN CRITERIA

As discussed in Section 5.3, the Metal Cleaning Basin will be retrofitted with a composite liner system consisting of a 60-mil HDPE geomembrane liner over a geosynthetic clay liner. As demonstrated in the Alternative Composite Liner Design Certification provided in Attachment 7-3, the design of this new composite liner system meets the requirements for an alternative composite liner system pursuant to 35 Ill. Adm. Code 845.400(c).

7.3 LEACHATE COLLECTION SYSTEM DESIGN CRITERIA

As discussed in Section 5.4, the Metal Cleaning Basin will be retrofitted with a new leachate collection and removal system (LCRS) consisting of a drainage geocomposite and a leachate collection pipe that will be used to convey and/or pump collected leachate out of the basin. As demonstrated in the Leachate Collection System Design Certification provided in Attachment 7-4, the design of this new LCRS complies with 35 Ill. Adm. Code 845.420.

7.4 SLOPE PROTECTION DESIGN CRITERIA

7.4.1 INTERIOR SLOPES

Per Detail 008-02, "Typical Slope Transition Detail," on Drawing POW-MCB-CSK-008 in Attachment 5-1, a 6-inch-thick layer of riprap (IDOT Gradation No. RR 2) will be placed along the interior slopes of the Metal Cleaning Basin's embankments. This riprap layer will be supported by an underlying, 6-inch-thick bedding layer of coarse aggregate material (IDOT Gradation No. CA 16). This form of slope protection represents an engineered cover; will extend along the entire slope; and will provide protection against surface erosion, wave action, and adverse effects of rapid drawdown. Therefore, the retrofit construction of the Metal Cleaning Basin's interior slopes complies with 35 Ill. Adm. Code 845.430.

7.4.2 EXTERIOR SLOPES

As documented in MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a), slope protection for the basin's exterior slopes consists of vegetative cover. The northern, western, and southern exterior slopes have grassy vegetation. Meanwhile, the eastern exterior slope is an interior slope for the Ash Surge Basin, which is lined with an HDPE

geomembrane liner. The form of protection provided for each slope extends along the entire face of the given slope and provides protection against surface erosion, wave action, and adverse effects of rapid drawdown. Therefore, the existing construction of the Metal Cleaning Basin's exterior slopes comply with 35 Ill. Adm. Code 845.430.

Per the design drawings provided in Attachment 5-1, no lateral expansions are planned for the basin's existing embankments. Therefore, the downstream slopes of the Metal Cleaning Basin will remain unchanged, including the existing slope protection measures. Thus, the protection measures for the retrofitted Metal Cleaning Basin's exterior slopes will comply with 35 Ill. Adm. Code 845.430.

7.5 CCR FUGITIVE DUST CONTROL

The Station will continue to control CCR fugitive dust at the retrofitted Metal Cleaning Basin in accordance with its "CCR Compliance Fugitive Dust Control Plan" (KPRG, 2021), which also covers the Station's Ash Surge Basin, Former Ash Basin, and Bypass Basin. This plan is included in Attachment 7-5.

8.0 RETROFIT, CLOSURE, & POST-CLOSURE CARE PLANS (845.770(C)(2) & 845.220(B)(4)–(5))

8.1 WRITTEN RETROFIT PLAN

MWG's written retrofit plan describing the steps necessary to retrofit the Metal Cleaning Basin has been prepared in accordance with 35 Ill. Adm. Code 845.770(c) and is included in Attachment 8-1.

8.2 PRELIMINARY WRITTEN CLOSURE PLAN

MWG currently intends to close the retrofitted Metal Cleaning Basin by removing CCR and CCR-mixed materials remaining in the basin at the time of closure and decontaminating affected areas in accordance with 35 Ill. Adm. Code 845.740(a). The preliminary written closure plan describing the steps necessary to close the retrofitted Metal Cleaning Basin in this manner has been prepared in accordance with 35 Ill. Adm. Code 845.720(a) and is included in Attachment 8-2.

8.3 POST-CLOSURE CARE PLAN

Because MWG intends to close the retrofitted Metal Cleaning Basin by removal of CCR in accordance with 35 Ill. Adm. Code 845.740(a), the post-closure care requirements promulgated by 35 Ill. Adm. Code 845.780 are not applicable to the retrofitted Metal Cleaning Basin. However, pursuant to 35 Ill. Adm. Code 845.740(b), MWG will continue groundwater monitoring under 35 Ill. Adm. Code Part 845 Subpart F for a minimum of three years after the basin has been closed.

9.0 GROUNDWATER MONITORING PROGRAM (845.220(A)(7))

To monitor the groundwater at the retrofitted Metal Cleaning Basin site, MWG plans to continue using the existing groundwater monitoring well network that was established for the Metal Cleaning Basin. The details of this groundwater monitoring program are provided in Section 9.0 of MWG's initial operating permit application for the Metal Cleaning Basin that was submitted to the Illinois EPA in March 2022 (KPRG, 2022a). In accordance with 35 Ill. Adm. Code 845.220(a)(7), the details of this groundwater monitoring program are reproduced in this section. Where used in this section, "subject CCR surface impoundments" refers to the Station's Metal Cleaning Basin, Bypass Basin, Ash Surge Basin, and Former Ash Basin.

9.1 HYDROGEOLOGIC SITE CHARACTERIZATION

The following subsections provide information on the geology and hydrogeology of the site as required under 35 Ill. Adm. Code 845.620(b). Referenced tables and figures are provided in Attachment 9-0.

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 Plains 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 (USDA, 1996).

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 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 CCR 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 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 below ground surface (bgs), depending on the location of the specific well. The boring logs indicate limestone was encountered from approximately 99 to 103 bgs 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 (USDA, 1996), 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 (from KPRG, 2022a). The nearest natural surface water body is the Lost Creek which bends around the eastern edge of the Former Ash Basin 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 surface impoundments. 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 groundwater monitoring well network around the Metal Cleaning Basin consists of five wells. Monitoring wells MW-15 and MW-17 are upgradient monitoring wells situated between the Ash Surge Basin to the east and the Metal Cleaning Basin to the west. Monitoring wells MW-14, MW-20 and MW-21 are situated immediately downgradient of the Metal Cleaning Basin, along its western side. Well MW-13, located at the east portion of the south side of the Metal Cleaning Basin, has also been being sampled concurrently with the above noted wells. This well was initially installed in 2010 by Patrick Engineering as an upgradient well location for the Metal Cleaning Basin as part of the relining construction permit requirements (Permit No. 2009-EB-2748). It is noted, however, that this well is actually located side-gradient relative to groundwater flow within the clay/silty clay unit and its screen extends down into the underlying, more extensive sand and gravel unit (see Figures 9-2 and 9-3). Therefore, it has been determined that the water quality data from this well, although

useful in evaluating overall site conditions, is not representative of groundwater data for the purposes of leak detection monitoring for the Metal Cleaning Basin.

Groundwater elevation data from the monitoring wells around the MCB are provided in Table 9-2 (from KPRG, 2022a). A hydrograph of water levels for the MCB leak detection monitoring wells are provide as Figure 9-5. A review of the hydrographs shows some temporal fluctuations with the highest water levels occurring within the first or second quarters of the year. It is noted that the water levels in the two new monitoring wells are consistently several feet lower than the other wells, however, based on the boring log data, the wells are all screened within the clay/silty clay unit.

Monthly groundwater flow maps April 2021 through December 2021 are provided in Attachment 9-3. The water elevation data within the clay/silt unit indicates localized groundwater flow beneath the Metal Cleaning Basin in a westerly direction.

Table 9-3 (from KPRG, 2022a) provides a summary of the flow direction, gradients and an estimated rate of groundwater flow based on the monthly flow maps provided in Attachment 9-3. The flow rate was calculated using the following equation:

$$V_s = \frac{Kdh}{n_e dl}$$

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)

The average hydraulic conductivity of 3.28×10^{-7} ft/sec (silt/clay unit) in Table 9-3 (from KPRG, 2022a) is consistent with estimates from current ongoing groundwater modeling evaluations in support of construction permit evaluations and literature values (Freeze and Cherry, 1979). The estimated effective porosity of the silt/clay materials (0.40) was 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 subject CCR surface impoundments is considered as Class I Potable Resource Groundwater in accordance with 35 Ill. Adm. Code 620.210. It is noted, however, that a Groundwater Management Zone (GMZ) and an Environmental Land Use Control ("ELUC") have been established where the subject CCR surface impoundments are located, including the Metal Cleaning Basin, as part of a Compliance Commitment Agreement (CCA) between MWG and the 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 9-6. The GMZ and ELUC occupy the same extent of the Powerton property.

A survey of all potable water sources within a 2,500-foot radius of the 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 preparing the initial operating permit application for the Metal Cleaning Basin pursuant to 35 Ill. Adm. Code 845.230(d), 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 9-7. 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 CCR surface impoundments. There were eight wells identified on the Station's 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 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 subject CCR surface impoundments and are separated from those units by the Station's Intake Channel and Discharge Channel. They are regularly sampled and analyzed for potable water constituents. The sampling results consistently have been in compliance 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 CCR 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 of the Metal Cleaning Basin to the Old Intake Canal, which is a hydrogeologic flow boundary, minimal to no downward vertical flow mixing is 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 Metal Cleaning Basin and anticipated flow discharge boundaries. Also, 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 monitoring wells MW-13 and MW-15 dating back to December 2010. However, the parameter list was slightly different from that specified in 35 Ill. Adm. Code 845.600 and included analysis of dissolved inorganic parameters rather than total inorganic parameters. That historical water quality data is provided in Attachment 9-4.

The Metal Cleaning Basin is not subject to the federal regulation for CCR groundwater monitoring networks under 40 CFR 257 Subpart D, "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," also referred to herein as the Federal CCR Rule. However, monitoring wells MW-15 and MW-17 are also part of the CCR monitoring well network for the Bypass Basin and Ash Surge Basin which are subject to the Federal CCR Rule. Therefore, as required under the Federal CCR Rule, eight rounds of background sampling were completed for the monitoring wells within the monitoring network for the Bypass Basin and Ash Surge Basin. This included the full list of Appendix III (detection monitoring) and IV (assessment monitoring) parameters. Since the effective date of 35 Ill. Adm. Code Part 845, quarterly groundwater monitoring for the full list of parameters specified in 35 Ill. Adm. Code 845.600, which includes all parameters in the Federal CCR Rule Appendix III/IV, has continued. This data is provided in Table 9-5 (from KPRG, 2022a).

9.2 GROUNDWATER MONITORING SYSTEM DESIGN & CONSTRUCTION PLANS

A monitoring well network that includes other basins in the vicinity of the Metal Cleaning Basin was established in 2010 and expanded pursuant to the CCA. In addition, wells MW-20 and MW-21 were installed in March 2021 on the west side of the Metal Cleaning Basin to meet 35 Ill. Adm. Code Part 845 requirements. The well depths were determined based on depth to groundwater and the base elevations of the basin being monitored. The following groundwater monitoring network is established for the Metal Cleaning Basin:

- Upgradient / Background Wells: MW-15 and MW-17
- Downgradient Monitoring Wells: MW-14, MW-20, and MW-21

Groundwater data from the upgradient wells will be evaluated to provide a statistically representative upgradient water quality for the Metal Cleaning Basin prior to that water passing beneath the regulated unit. The proposed monitoring well network 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 unit.

As previously discussed, well MW-13, located at the east portion of the south side of the Metal Cleaning Basin, has also been being sampled concurrently with the above noted detection wells. This well was initially installed in 2010 by Patrick Engineering as an upgradient well location for the Metal Cleaning Basin as part of the relining construction permit requirements (Permit No. 2009-EB-2748). It is noted, however, that this well is actually located side-gradient relative to groundwater flow within the clay/silty clay unit and its screen extends down into the underlying, more extensive sand and gravel unit (see Figures 9-2 and 9-3). Therefore, it has been determined that the water quality data from this well, although useful in evaluating overall site conditions, is not representative of groundwater data for the purposes of leak detection monitoring for the Metal Cleaning Basin.

Monitoring wells MW-14 and MW-15 were installed in 2010 by Patrick Engineering, Inc. Wells MW-17, MW-20, and MW-21 were installed by KPRG at varying times since the initial 2010 well installations (well MW-17 in September 2015 and wells MW-20 and 21 in March 2021). 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 35 Ill. Adm. Code 845.630(g), Attachment 9-5 includes an Illinois licensed Professional Engineer certification of the above-defined monitoring system.

9.3 GROUNDWATER SAMPLING & ANALYSIS PROGRAM

9.3.1 SAMPLE FREQUENCY

As noted in Section 9.1, wells MW-15 and MW-17 are also part of the CCR groundwater monitoring well network for the Bypass Basin and Ash Surge Basin, which are regulated under the Federal CCR Rule. As such, these two wells 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 35 Ill. Adm. Code 845.600(a) plus calcium. Monitoring wells MW-14, MW-20, and MW-21 had eight rounds of CCR sampling done to meet 35 Ill. Adm. Code Part

845 requirements starting in April 2021 through December 2021. 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 35 Ill. Adm. Code 845.600(b). All available data will be used in statistical evaluations and in developing an appropriate and representative background for 35 Ill. Adm. Code Part 845 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 35 Ill. Adm. Code Part 845. 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 35 Ill. Adm. Code 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 along with Metal Cleaning Basin water level elevations.

Quarterly groundwater monitoring will continue during the remaining active life of the Metal Cleaning Basin and the post-closure care period or, if closure is by removal, then in accordance with monitoring frequency requirements under 35 Ill. Adm Code 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 35 Ill. Adm. Code 845.650(b)(4), the owner can petition Illinois EPA to shift the monitoring frequency to semi-annual.

9.3.2 SAMPLING PREPARATION & 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, and 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 foot 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 downhole) 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, & SHIPMENT

Since measurement of total recoverable metals is required by 35 Ill. Adm. Code Part 845, 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 (from KPRG, 2022a) includes a summary of sample bottle requirements, preservatives and holding times.

All groundwater samples collected shall be transferred to the laboratory under proper chain-of-custody (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 Table 9-6 (from KPRG, 2022a). 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 35 Ill. Adm. Code 845.600(a)(1) for that compound which are also provided in Table 9-6 (from KPRG, 2022a).

9.3.7 QUALITY ASSURANCE & QUALITY CONTROL

9.3.7.1 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.

9.3.7.2 FIELD

The QA/QC program for fieldwork will include the collection of blind duplicate samples. 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. If there are any questions regarding the duplicate 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 35 Ill. Adm. Code 845.640(f) is provided in Attachment 9-6 along with a certification of the plan by an Illinois licensed Professional Engineer.

10.0 PROFESSIONAL ENGINEER CERTIFICATION (845.220(A)(8))

I hereby certify that:

- This retrofit construction permit application meets the requirements of 35 Ill. Adm. Code 845.220(a) and 845.220(b),
- This retrofit construction permit application was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 19, 2023

Seal:



Th. Dehlin
7/19/2023
EXP. 11/30/2023

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 35 Ill. Adm. Code 845.240 is included in Attachment 11-1. Meanwhile, the following information is included in Attachment 11-2:

- A summary of the issues and questions raised by the public during the meetings;
- A summary of revisions, determinations, and other considerations made in response to those issues and questions; and
- A list of interested persons who attended the public meetings and would like to be added to the Illinois EPA's listserv for the facility.

12.0 REFERENCES

CEC. (2021.) "Structural Stability and Factor of Safety Assessment, Metal Cleaning Basin, Powerton Station." June.

FEMA. (2017.) "Flood Insurance Rate Map, Tazewell County, Illinois and Incorporated Areas." Map No. 17179C0175E. Panel No. 175. Accessed June 7, 2023.

Geosyntec. (2016.) "History of Construction, Ash Surge Basin and Bypass Basin, Powerton Station." October.

KPRG. (2021.) "CCR Compliance Fugitive Dust Control Plan; Midwest Generation, LLC; Powerton Generating Station; 13082 East Manito Road; Pekin, Illinois." October 19.

KPRG. (2022a.) "Powerton Generating Station, Application for Initial Operating Permit – Metal Cleaning Basin." March.

KPRG. (2022b.) "Placement Above the Uppermost Aquifer Location Restriction, Metal Cleaning Basin, Powerton Generating Station." March.

KPRG. (2022c.) "Wetlands Location Restriction, Metal Cleaning Basin, Powerton Generating Station." March.

KPRG. (2022d.) "Fault Areas Location Restriction, Metal Cleaning Basin, Powerton Generating Station." March.

KPRG. (2022e.) "Seismic Impact Zones Location Restriction, Metal Cleaning Basin, Powerton Generating Station." March.

KPRG. (2022f.) "Unstable Areas and Floodplains Location Restriction, Metal Cleaning Basin, Powerton Generating Station." March.

Patrick Engineering. (2011.) "Hydrogeologic Assessment Report, Powerton Generating Station, Pekin, Illinois." Patrick Project No. 21053.070. February.

Sargent & Lundy. (2020.) "Powerton Generating Station, Demonstration for a Site-Specific Alternative Deadline to Initiate Closure." Report SL-015574. November.

USDA. (1996.) "Soil Survey of Tazewell County, Illinois." August.

USGS. (2021.) "Science in Your Watershed: Locate your Stream Site by 12-digit HUC."
https://water.usgs.gov/wsc/a_api/wbd/subwatershed07/071300030304.html. Accessed June 23, 2022.

ATTACHMENT 1-1
1978 ORIGINAL CONSTRUCTION DRAWINGS

5080.C5008

LAYOUT CONTROL FOR ROADS

NO.	N-S	E-W	RADIUS	TAN
6	N4°07'	E3°07'	150'	0.83
7	N5°45'	E4°07'		
8	N5°36'	E4°36'		
9	N11°00'	E4°36'	100'	1.5
10	N11°37'	E4°07'	100'	1.5
11	N12°53'	E4°27'	88'	0.8
12	N16°33'	E2°33'	68'	0.8
13	N12°18'	E2°33'	68'	0.8
14	N12°27'	E2°33'	68'	0.8
15	N7°35'	E10°10'	68'	10.5
16	N7°35'	E10°10'		
17	N9°55'	E10°15'	100'	1.5
18	N10°20'	E9°05'	100'	1.5
19	N11°35'	E9°05'	45'	3.7

REV.	DESCRIPTION
1	APPROVED FOR CONSTRUCTION
2	ADD P.O. RAC
3	ADD P.O. RAC
4	ADD P.O. RAC
5	ADD P.O. RAC
6	ADD P.O. RAC
7	ADD P.O. RAC
8	ADD P.O. RAC
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18	ADD P.O. RAC
19	ADD P.O. RAC

- NOTES:
1. FOR GENERAL NOTES SEE DWG. C5001.
 2. FOR LEGEND SEE DWG. C5000-1.
 3. FOR TYPICAL RAMP AND R.C. DETAIL SEE DWG. C5015-1.

APPROVED FOR CONSTRUCTION

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITY
POWERTON

DETAIL PLAN METAL CLEANING
LIMESTONE RUNOFF BASINS

CECO CONTRACT: 802067

DATE: 12/19/78

SCALE: 1"=20'

5080.C5008

ROCKVILLE, MD.

DATE: 12/19/78

BY: [Signature]

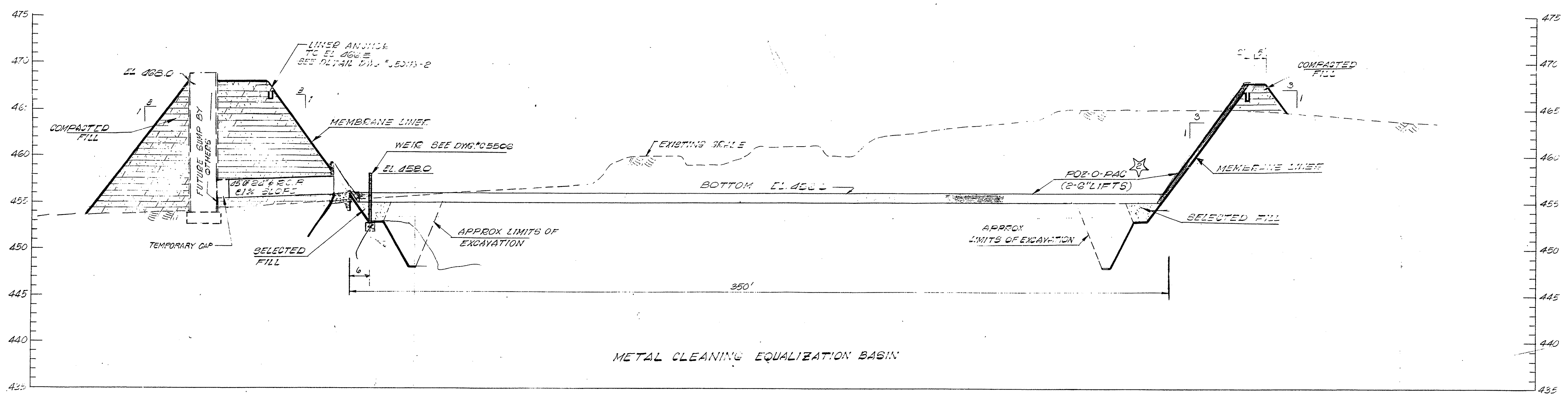
FOR: [Signature]

DATE: 12/19/78

BY: [Signature]

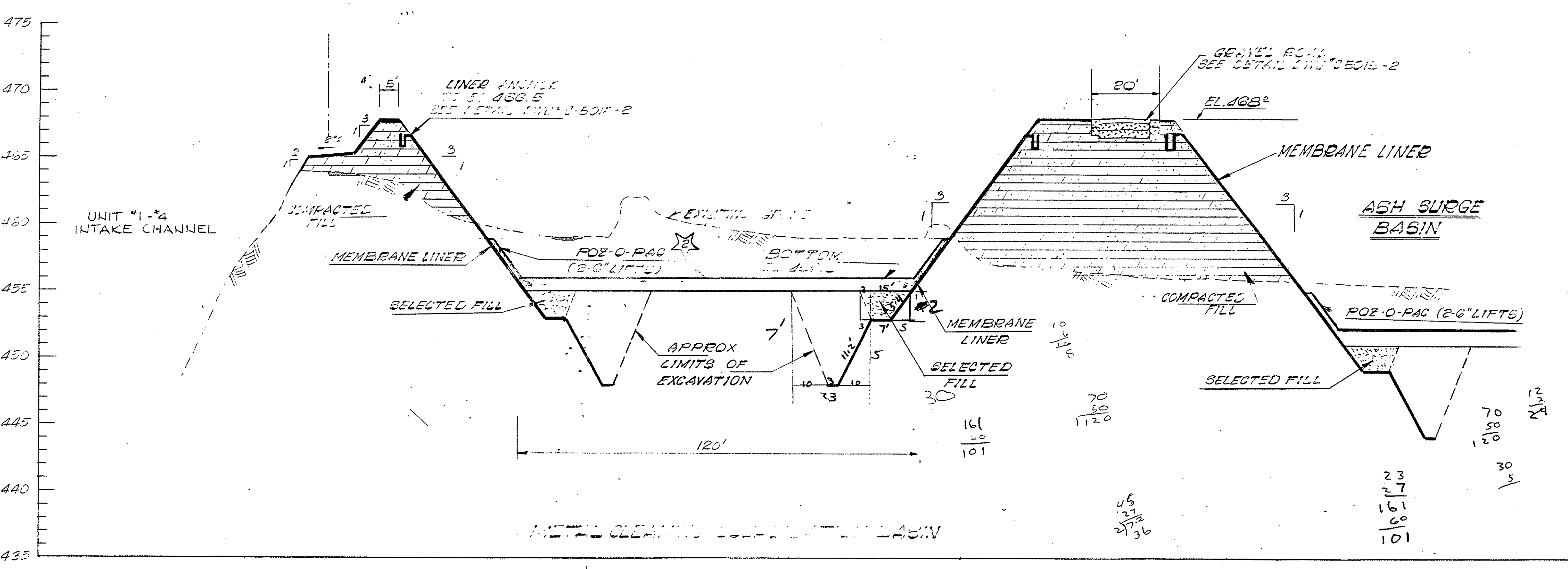
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REVISIONS	
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98	ADD 1/2" R&R
99	ADD 1/2" R&R
100	ADD 1/2" R&R



SECTION D

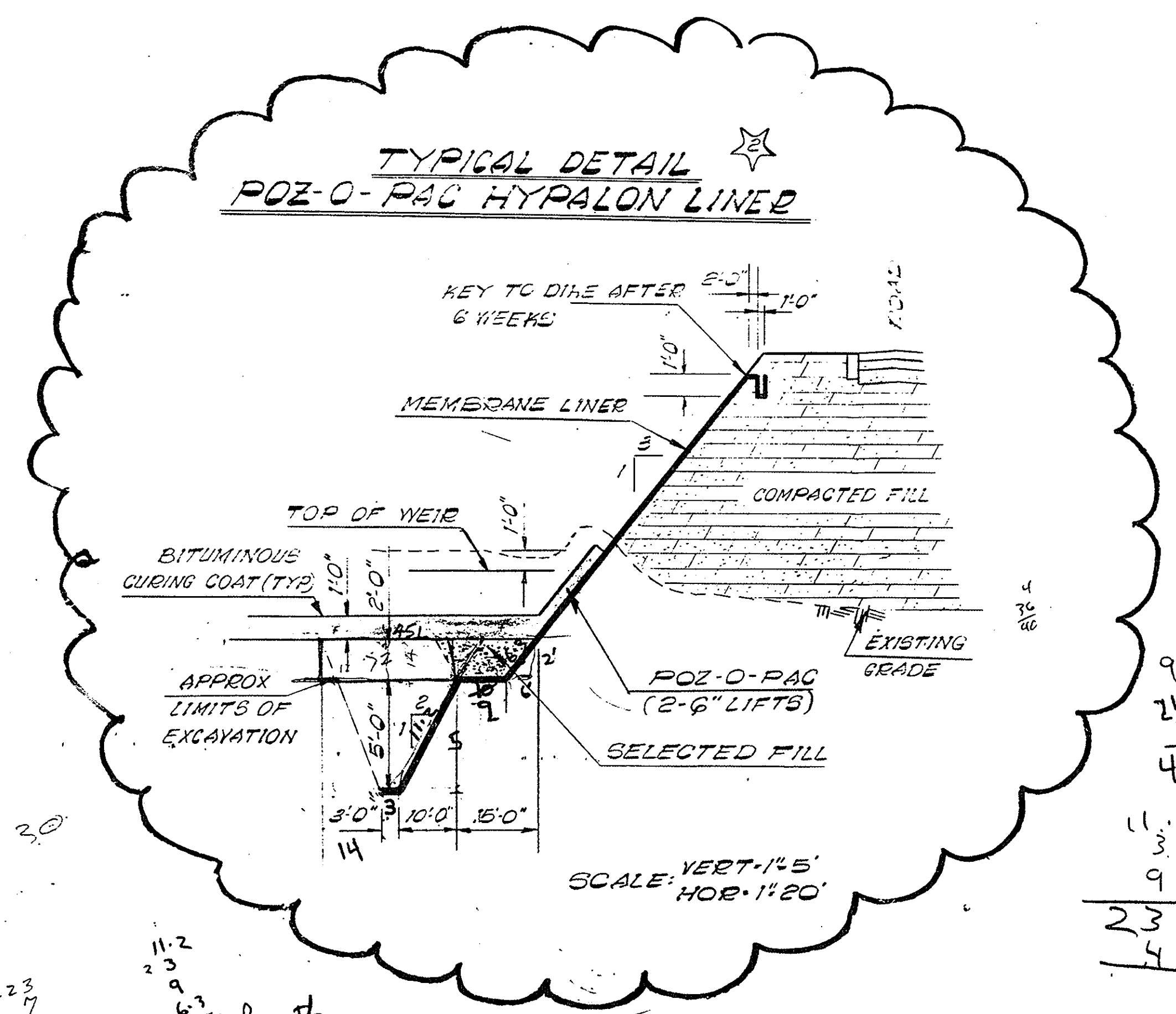
FOR TYPICAL DETAIL
POZ-O-PAC HYPALON
LINER SEE THIS SHEET



SECTION E

21,730 sq ft

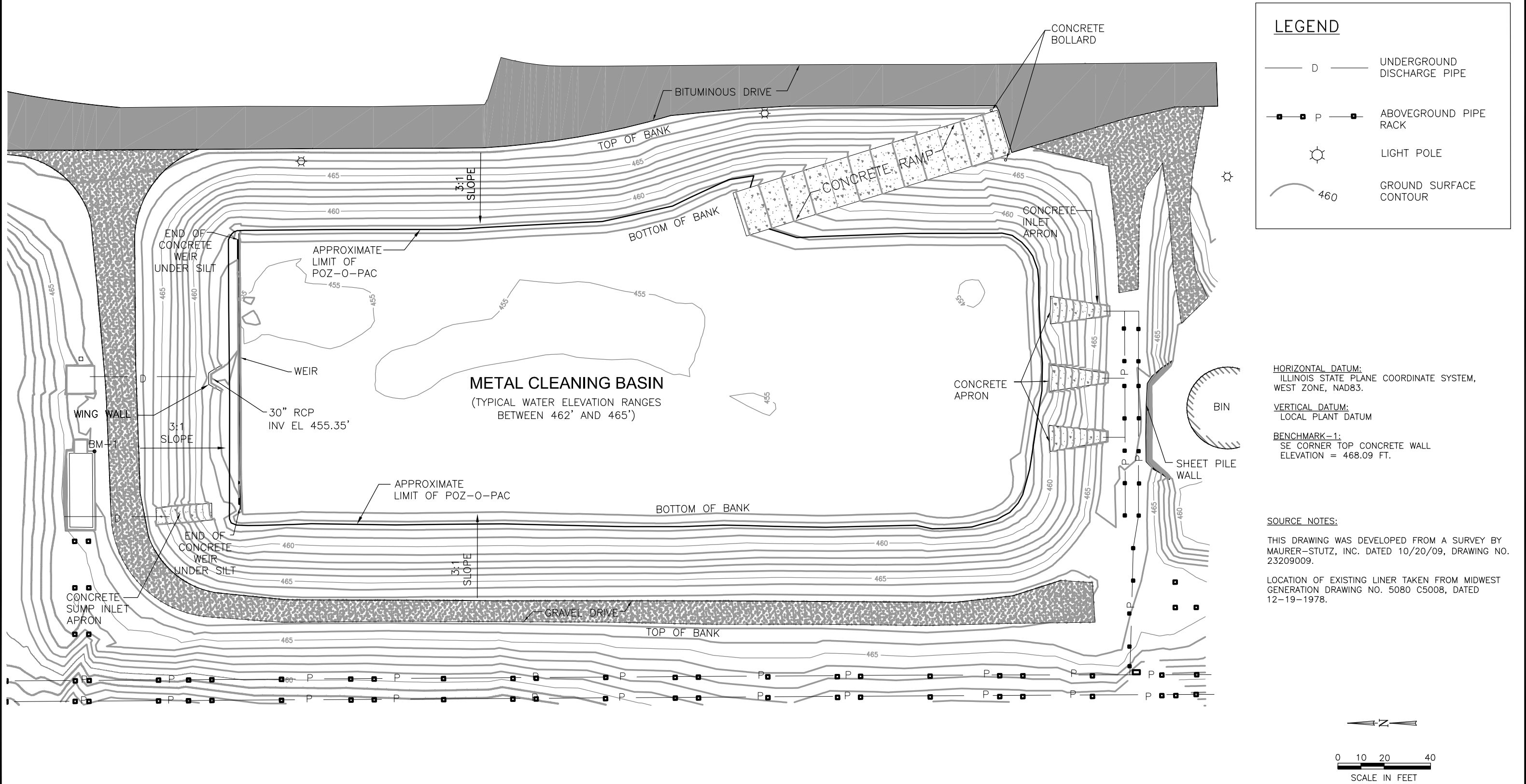
- NOTES:
- FOR GENERAL NOTES SEE DWG. C-5001
 - FOR LEGEND SEE DWG. C-5000
 - CONTRACTOR TO DRYWALL CONSTRUCTION AREA TO EL 450.0 BY APPROVED METHOD(S) PRIOR TO BASIN CONSTRUCTION.



SCALE: HOB 1\"/>

DRAWING STATUS	
APPROVED FOR CONSTRUCTION	
COMMONWEALTH EDISON COMPANY WASTE WATER TREATMENT FACILITIES POWERTON	
METAL CLEANING BASIN SECTIONS	
CEDC CONTRACT 802667	CEDC DWG. NO.
DRAWING NO. 5080 C5013	
SHEET 1 OF 1	

ATTACHMENT 1-2
2010 LINER REPLACEMENT DRAWINGS



LEGEND

— D — UNDERGROUND DISCHARGE PIPE

— P — ABOVEGROUND PIPE RACK

☼ LIGHT POLE

460 GROUND SURFACE CONTOUR

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO. 23209009.

LOCATION OF EXISTING LINER TAKEN FROM MIDWEST GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978.

6.			
5.			
4.	RECORD DOCUMENTATION	06/16/11	HMS
3.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
2.	ADDENDUM 1	10/22/09	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:



PROJECT NO.	1965/4.0
DRAWN BY:	RLH/KNW 07/17/09
CHECKED BY:	RJG 07/17/09
APPROVED BY:	HMS 07/27/09

PRE-CONSTRUCTION CONDITIONS

METAL CLEANING BASIN LINER REPLACEMENT

MIDWEST GENERATION

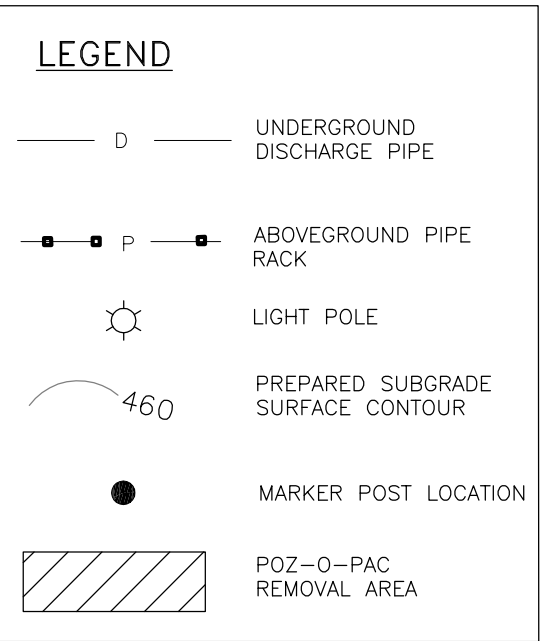
POWERTON POWER STATION

PEKIN, ILLINOIS

DRAWING NO: D1965C010-04

REFERENCE: .

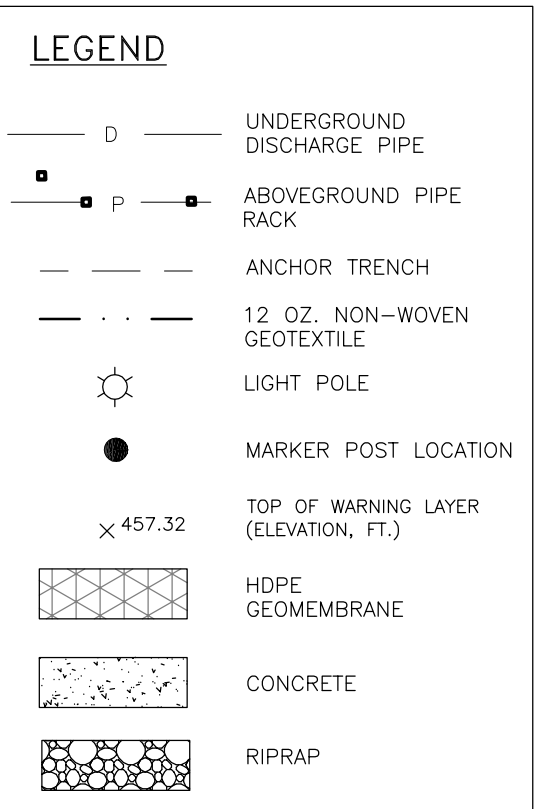
SHEET NO. C010



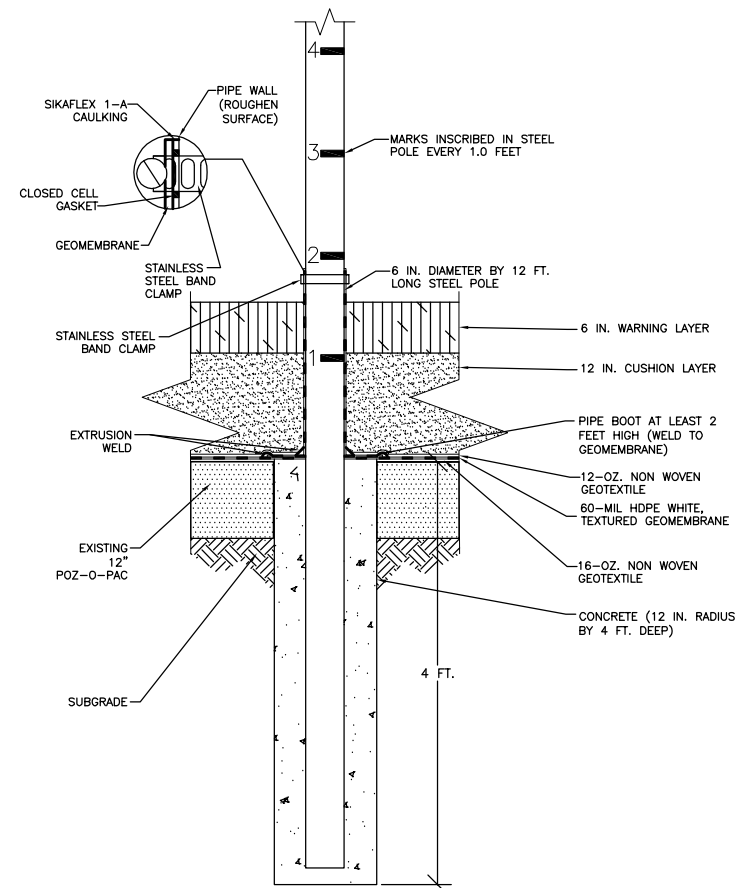
CONTRACTOR NOTES:

1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE STRUCTURES AND ABOVE GROUND PIPING.
3. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
4. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES TO REMAIN IN PLACE THROUGHOUT PROJECT DURATION.
7. REMOVE EXISTING 12-INCH POZ--O-PAC LAYER ALONG SIDE SLOPES. POZ--O-PAC LAYER AT BASE OF BASIN TO REMAIN IN PLACE, EXCEPT NORTH OF WEIR. CONTRACTOR SHALL REMOVE AN ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL ALONG THE NORTH BOTTOM OF BANK, AS SHOWN ON SECTION B, SHEET C031.
8. CONTRACTOR SHALL REMOVE INLET APRONS AND HAUL MATERIAL TO RECYCLING FACILITY.
9. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
10. CONTRACTOR SHALL REMOVE "SOFT" SUBGRADE MATERIAL BENEATH EXISTING HYPALON LINER, AS DIRECTED BY OWNER AND/OR ENGINEER. BACKFILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. CUT HYPALON LINER AS NEEDED TO REPAIR THE "SOFT" SUBGRADE AREAS.
11. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE TOE OF SLOPE AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND DETAIL 1.0 ON SHEET C031.
12. SUBGRADE MUST BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
13. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE OVER THE SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
14. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE LAYER FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE LAYER SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
15. CONTRACTOR SHALL EXTEND CONCRETE WEIR UP BY 18" IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND SECTION A ON SHEET C031.

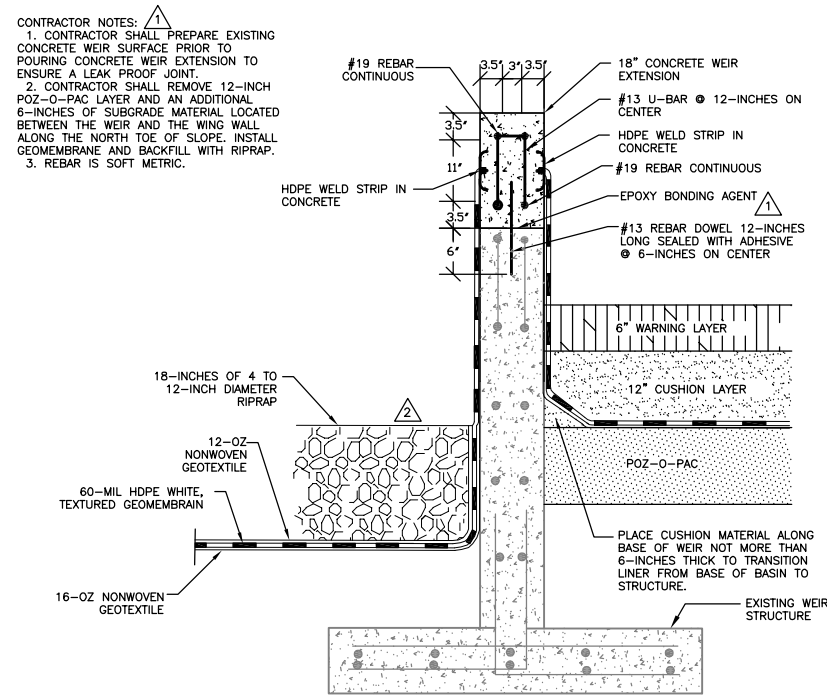
LINER SUBGRADE PREPARATION		
METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS		
DRAWING NO: D1965C020-03	SHEET NO.	
REFERENCE: .	C020	



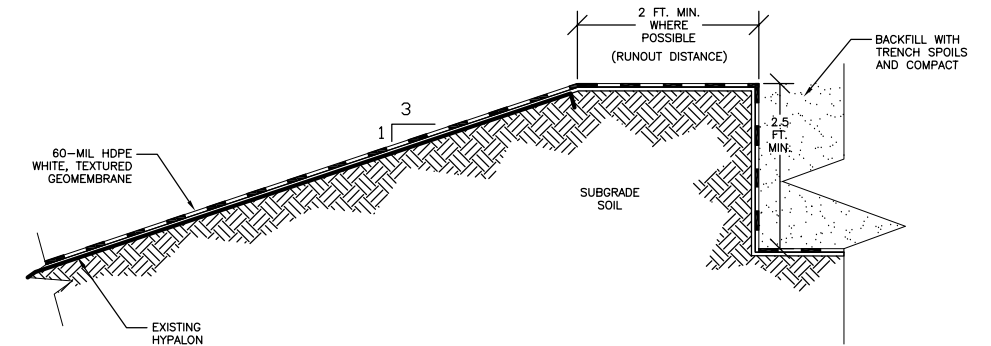
WARNING LAYER METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS		SHEET NO. C030
DRAWING NO: D1965C030--03 REFERENCE: -		



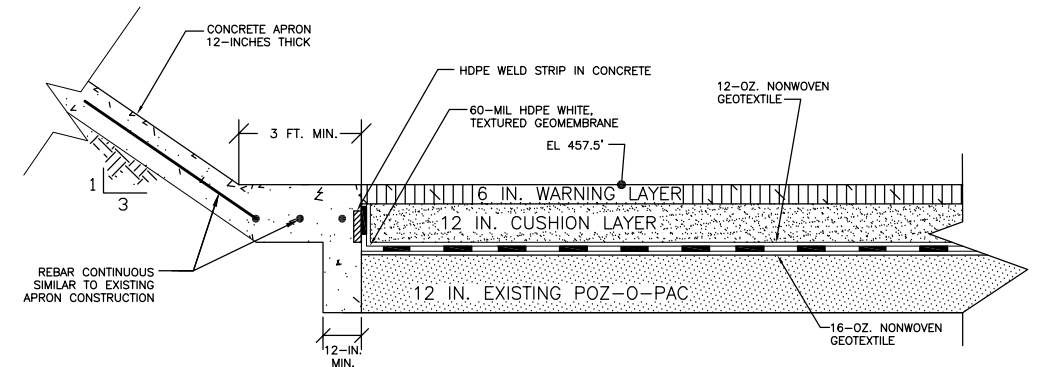
1
C020 MARKER POST DETAIL
NOT TO SCALE



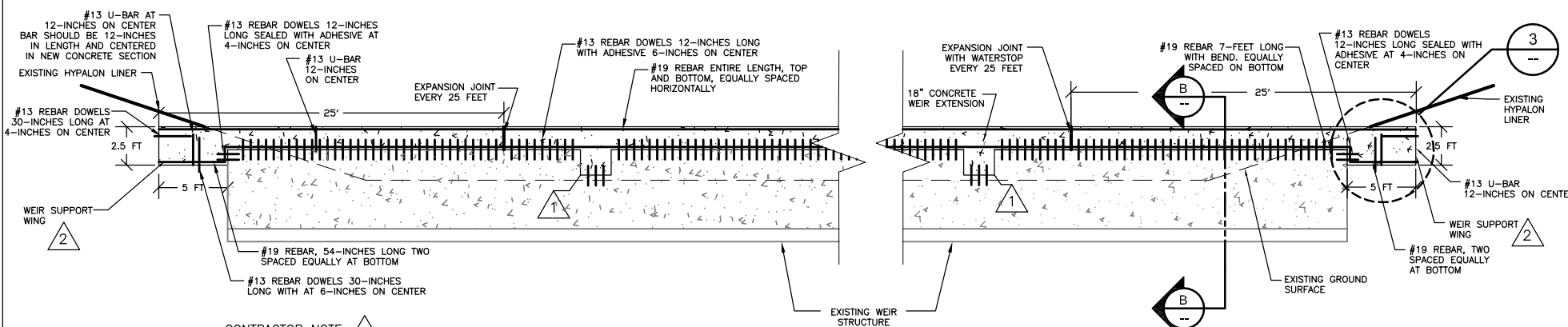
B
CONCRETE WEIR EXTENSION DETAIL
NOT TO SCALE



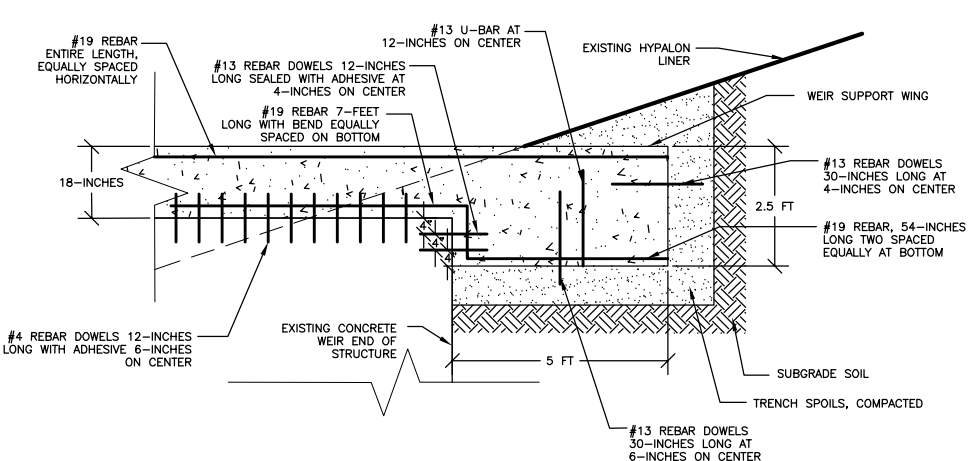
2
C030 ANCHOR TRENCH SECTION
NOT TO SCALE



C
C030 CONCRETE INLET APRON SECTION
NOT TO SCALE



A
C020 CONCRETE WEIR EXTENSION SECTION
NOT TO SCALE



3
WEIR SUPPORT WING DETAIL
NOT TO SCALE

CONTRACTOR NOTE:

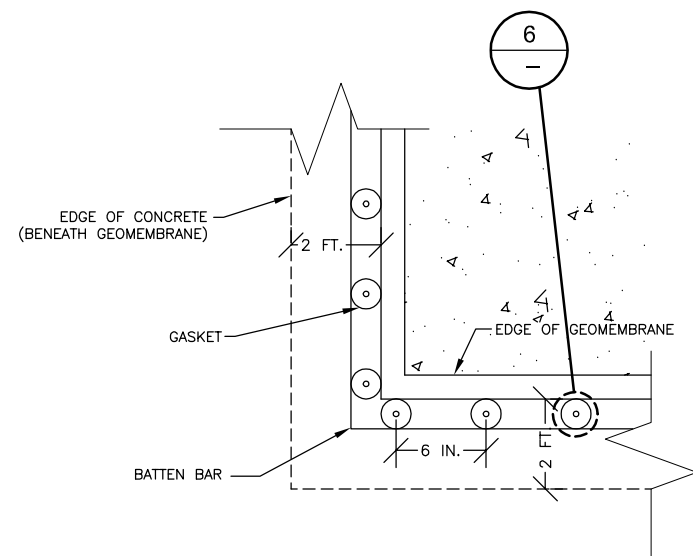
1. CONTRACTOR SHALL REMOVE METAL SLIDING GATES AND REPLACE WITH CONCRETE REBAR DOWELS AND ADHESIVE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
2. CONTRACTOR SHALL INSTALL WEIR SUPPORT WINGS AND BACKFILL WITH TRENCH SPOILS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
3. REBAR IS SOFT METRIC.

6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:

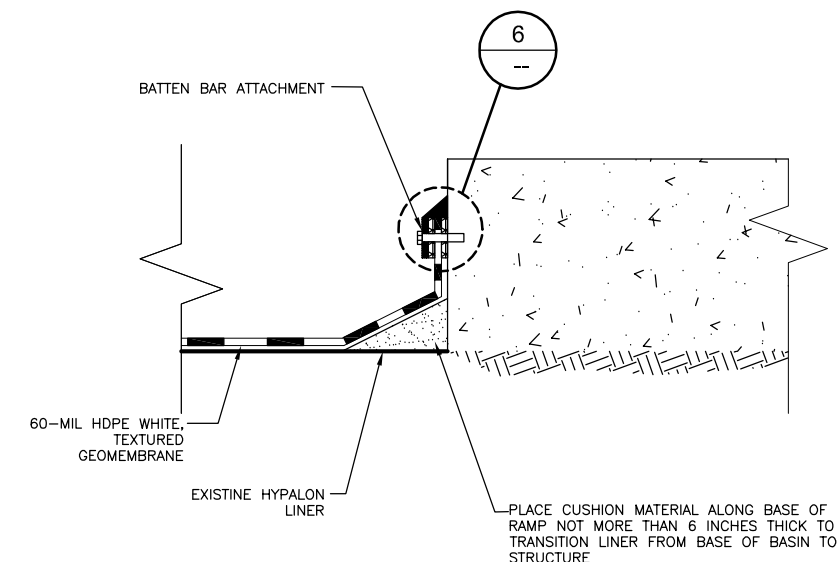


PROJECT NO.	1965/4.0
DRAWN BY:	KNW 08/12/09
CHECKED BY:	RJG 10/05/09
APPROVED BY:	HMS 10/05/09

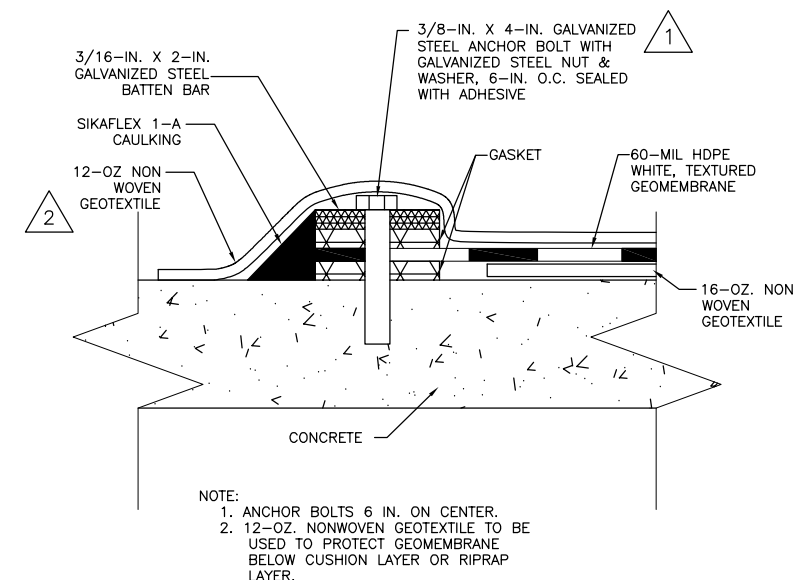
DETAILS AND SECTIONS	
METAL CLEANING BASIN LINER REPLACEMENT	
MIDWEST GENERATION	
POWERTON POWER STATION	
PEKIN, ILLINOIS	
DRAWING NO: D1965C031-03	SHEET NO. C031



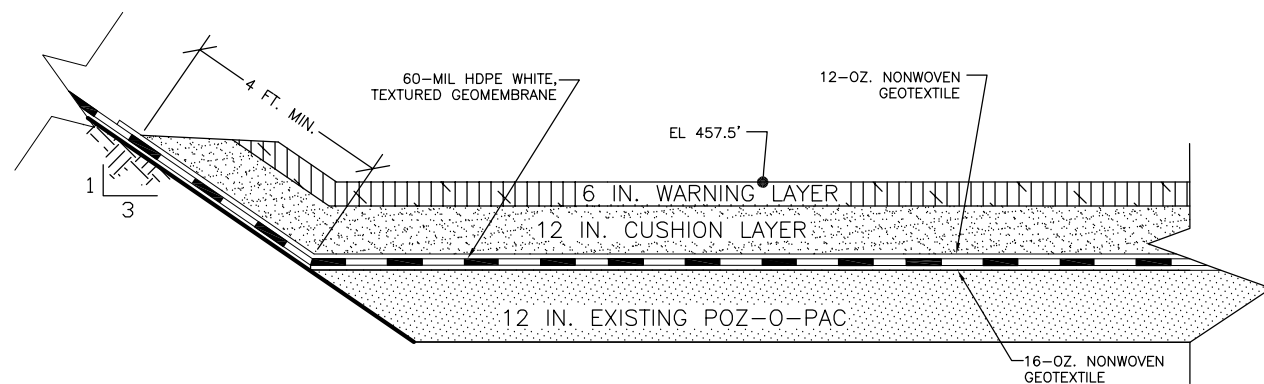
4 SUMP INLET APRON DETAIL
C030 NOT TO SCALE



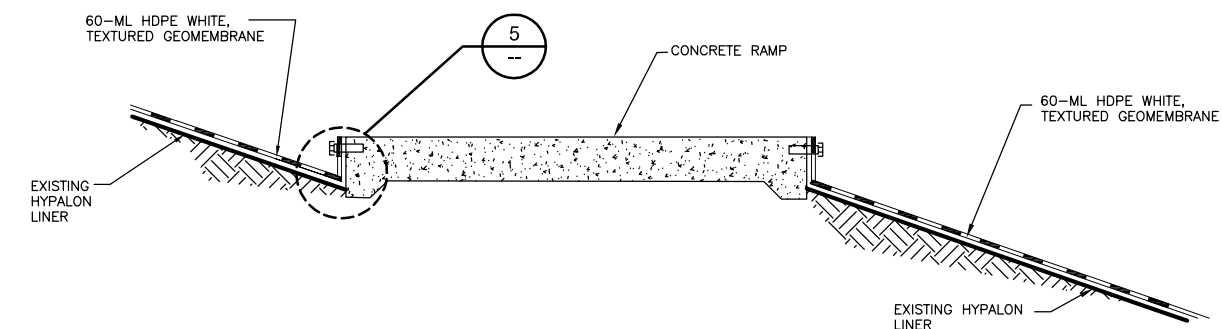
5 CONCRETE RAMP CONNECTION DETAIL
NOT TO SCALE



6 BATTEN BAR ATTACHMENT
NOT TO SCALE



D SLOPE TRANSITION SECTION
C030 NOT TO SCALE



E CONCRETE RAMP SECTION
C030 NOT TO SCALE

6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:



PROJECT NO.	1965/4.0
DRAWN BY:	KNW 08/25/09
CHECKED BY:	RJG 10/05/09
APPROVED BY:	HMS 10/05/09

DETAILS AND SECTIONS

METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C032-03
REFERENCE: 1965/4/

SHEET NO.
C032

ATTACHMENT 1-3
2010 LINER REPLACEMENT SPECIFICATIONS

SECTION 02600

HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

- A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

- A. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- B. ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
- C. ASTM D6392 – Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
- D. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.
- E. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
- F. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.
- G. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

- A. Geomembrane Installer: hired by Contractor or Owner responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.
- B. Geomembrane Manufacturer: hired by Geomembrane Installer, Contractor, or Owner to provide HDPE geomembrane.
- C. Leak Location Contractor: hired by Contractor or Owner and responsible for locating potential holes in the installed geomembrane using electrical methods.
- D. Geosynthetic Quality Assurance Consultant: Consultant, independent from the Manufacturer, and Installer, responsible for field oversight of geosynthetics installation, and related testing, usually under the direction of the Owner.

- D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the 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.
- D. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.
- E. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.
- F. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than 100ft².
- G. Patch: Unit area of a geomembrane that will be seamed in the field that is less than 100ft².
- H. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.
 - 2. Geomembrane Installer:
 - a. 5 years of continuous experience in installation of HDPE geomembrane.
 - b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.
 - c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.
 - 3. Leak Location Contractor:
 - d. 3 years of continuous experience in performing leak location surveys using electrical methods.
 - e. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

- f. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

B. Quality Assurance Program:

- 1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.
- 2. The Owner or Contractor may engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Geosynthetic Quality Assurance Consultant in accordance with Section 01300, Submittals:

- 1. Raw Materials:
 - a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.
 - b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.
 - c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.
- 2. Geomembrane Manufacturer's Certification:
 - a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).
- 3. Geomembrane Installer's Seaming Personnel
 - a. Training completed by personnel.
 - b. Seaming experience for each personnel.
- 4. Geomembrane Manufacturer Production Information:
 - a. Corporate background information indicating compliance with qualification requirements.
 - b. Quality control plan for manufacturing.

- c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e. mill certificates).
- 5. Geomembrane Installer's Information:
 - a. Corporate background information indicating compliance with qualification requirements.
 - b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.
 - c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.
 - d. Installation quality control plan.
- 6. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.
- 7. Installation Sequence and Schedule shall be included as part of Construction Progress Schedule.
- 8. Description of seaming apparatus to be used.
- B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals
 - 1. Leak Location Contractor's Work Plan:
 - a. Corporate background information indicating compliance with qualification requirements.
 - b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.
 - c. Resumes of personnel performing leak location survey, along with pertinent experience information.
 - d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

- e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.
 - f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.
- C. During installation, submit the following to the Geosynthetic Quality Assurance Consultant:
 - 1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.
 - 2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.
- D. Within 10 days of geomembrane installation completion, submit the following to Geosynthetic Quality Assurance Consultant:
 - 1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.
 - 2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.
 - 3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.
- E. The Geosynthetic Quality Assurance Consultant will review and inspect HDPE geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.
- F. The Geosynthetic Quality Assurance Consultant will provide written final acceptance of the geomembrane installation after completion of material placement above geomembrane. Written conditional geomembrane installation acceptance can be provided to the Contractor prior to completion of material placement above geomembrane when the following conditions are satisfied, if necessary, and requested by the Contractor:
 - 1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.
 - 2. All installation quality assurance/control documentation has been completed and submitted to the Geosynthetic Quality Assurance Consultant or Owner.
 - 3. Verification of the adequacy of all field seams, repairs and associated testing is complete.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Geosynthetic Quality Assurance Consultant.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Geosynthetic Quality Assurance Consultant.
2. Store geomembrane rolls to ensure adequate protection against exposure to the following:
 - a. Equipment;
 - b. Strong oxidizing chemicals, acids, or bases;
 - c. Flames, including welding sparks;
 - d. Temperatures in excess of 160 deg. F;
 - e. Dust;
 - f. Ultraviolet radiation (i.e. sunlight); and
 - g. Inclement weather.
3. Whenever possible, provide a 6-inch minimum air space between rolls.
4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. High Density Polyethylene (HDPE) White Textured Geomembrane.

1. HDPE geomembrane shall be white, textured, 60-mil product approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.

2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:
 - a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program and submitted to the Geosynthetic Quality Assurance Consultant with the written conformance certification.
 - b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.
 - c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.
 - d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.
3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

B. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.
2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

C. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.
2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.
3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.
4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

- A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Geosynthetic Assurance Consultant. Nonconforming material shall either be retested at the direction of the Geosynthetic Quality Assurance Consultant or removed from site and replaced at Contractor's expense.
- B. Conformance Test Methods
 - 1. Samples will be located and collected by the Geosynthetic Quality Assurance Consultant at a rate of one sample per 100,000 square feet of geomembrane delivered to site.
 - 2. One sample will be obtained from each geomembrane production batch delivered to the site.
 - 3. Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.
 - 4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.
 - 5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.
- C. Role of Testing Laboratories
 - 1. The Geosynthetic Quality Assurance Consultant will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Geosynthetic Quality Assurance Consultant will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.
 - 2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Geosynthetic Quality Assurance Consultant.
 - 3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in GRI GM 13. Results shall not be substituted for quality assurance testing described herein.
- D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Geosynthetic Quality Assurance Consultant. Two additional tests (retests) shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.
2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Geosynthetic Quality Assurance Consultant reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Geosynthetic Quality Assurance Consultant may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.
3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

- A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.
- B. The following topics relating to geomembrane installation shall be addressed:
 1. Responsibilities of each party.
 2. Lines of authority and communication.
 3. Methods for documenting, reporting and distributing documents and reports.
 4. Procedures for packaging and storing archive samples.
 5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.
 6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.
 7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.
9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.
10. Deployment techniques including allowable subgrade for geomembrane.
11. Procedures for covering of the geomembrane to prevent damage.
12. Plan for minimizing wrinkles in the geomembrane.
13. Measurement and payment schedules.
14. Site health and safety procedures/protocols.

3.02 SUBGRADE PREPARATION

- A. Contractor shall prepare a subgrade surface in accordance with Section 02300, Earthwork.
- B. The Contractor shall not excavate more than the amount of anchor trench required for one day of geosynthetics deployment, unless otherwise specified by the Geosynthetic Quality Assurance Consultant. Rounded corners shall be provided in the trenches where the geosynthetics enter the trench to allow them to be uniformly supported by the subgrade and to avoid sharp bends. The geosynthetics shall not be supported by loose soils in anchor trenches.
- C. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Geosynthetic Quality Assurance Consultant and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with written acceptance of subgrade surface over which geomembrane is deployed (Part 1 .05C) for each day of deployment.

3.03 GEOMEMBRANE DEPLOYMENT

- A. Geomembrane shall not be deployed until all applicable certifications/quality control certificates listed in Subsection 1.05 of this section and conformance testing listed in Subsection 2.02 of this section are submitted and approved by the Geosynthetic Quality Assurance Consultant. Any geomembrane deployed prior to approval by the Geosynthetic Quality Assurance Consultant shall be at the sole risk of the Geomembrane Installer and/or Contractor. If material installed prior to approval by the Geosynthetic Quality Assurance Consultant does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

- B. Geomembrane will be deployed according to submitted panel layout drawing as approved by the Geosynthetic Quality Assurance Consultant. The Geosynthetic Quality Assurance Consultant is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.
- C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.
- D. Geomembrane shall not be deployed if:
 - 1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Geosynthetic Quality Assurance Consultant.
 - 2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.
 - 3. Winds are excessive as determined by Geomembrane Installer in agreement with the Geosynthetic Quality Assurance Consultant.
 - 4. The Geosynthetic Quality Assurance Consultant will have the authority to suspend work during such conditions.
- E. The Geomembrane Installer shall be responsible for conformance with the following requirements:
 - 1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 5 psi or total weight exceeding 750 lbs. Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.
 - 2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).
 - 3. Method of deployment does not damage geomembrane.
 - 4. Method of deployment minimizes wrinkles.
 - 5. Temporary loading or anchoring does not damage geomembrane.
 - 6. Direct contact with geomembrane is minimized.
- F. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

- A. Seam Layout
 - 1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should

be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

B. Seaming Processes/Equipment

1. Approved processes for field seaming (panel to panel) are extrusion or hot wedge fusion-type seam methods. No other processes can be used without prior written authorization from the Geosynthetic Quality Assurance Consultant. Only equipment which has been specifically approved by make and model shall be used, if applicable.
4. The Geomembrane Installer will meet the following requirements regarding use, availability, and cleaning of welding equipment at job site:
 - a. Intersecting hot wedge seams shall be patched using extrusion welding process.
 - b. Electric generator for equipment shall be placed on a smooth base such that no damage occurs to geomembrane. A smooth insulating plate or fabric shall be placed beneath hot equipment after usage.
3. The Geomembrane Installer shall keep records for performance and testing of all seams.

C. Seaming Requirements/Procedures

1. Weather Conditions - Range of weather conditions under which geomembrane seaming can be performed are as follows:
 - a. Unless otherwise authorized in writing by Geosynthetic Quality Assurance Consultant, no seaming shall be attempted or performed at an ambient temperature below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C).
 - b. Between ambient temperatures of 32 degrees F (0 degrees C) and 41 degrees F (5 degrees C), seaming shall be performed only if geomembrane is preheated by either sun or a hot air device, provided there is no excessive ambient cooling resulting from high winds. Pre-qualification seams shall be produced under identical conditions.
 - c. Above 41 degrees F (5 degrees C), no preheating of geomembrane will be required.
 - d. Geomembrane shall be dry and protected from wind.
 - e. Seaming shall not be performed during any precipitation event.

- f. Seaming shall not be performed in areas where ponded water has collected below surface of geomembrane.
- 2. If the Geomembrane Installer chooses to use methods which may allow seaming at ambient temperatures below 41 degrees F or above 104 degrees F, the Geomembrane Installer shall demonstrate and submit certification to Geosynthetic Quality Assurance Consultant that methods and techniques used to perform seaming produce seams that are equivalent to seams produced at temperatures above 41 degrees F and below 104 degrees F. The Geosynthetic Quality Assurance Consultant may deny approval for use of the proposed technique regardless of demonstration results.
- 3. Overlapping - Geomembrane panels shall have finished overlap as follows:
 - a. Minimum of 6 inches for thermal fusion welding.
 - b. Insufficient overlap will be considered a failed seam.
- 4. Pre-qualification tests for geomembrane fusion welding shall be conducted by a minimum of 2 pre-qualification seams conducted per day per welding machine by each seaming technician performing welding with that machine. At least one test shall be performed at the start of each work day, with tests at intervals of no greater than 5 hours and additional pre-qualification tests following work interruptions, weather changes, changes to machine settings, or as directed by the Geosynthetic Quality Assurance Consultant. Pre-qualification seams shall be made under the same conditions as the actual seams.
 - a. Pre-qualification seam samples shall be 5 feet long by 1-foot wide (minimum) after seaming, with seam centered along its length. Each pre-qualification seam shall be labeled with the date, geomembrane temperature, seaming unit identifier, seam number or test location, technician performing the test seam and description of testing results.
 - b. Seam overlap shall be in accordance with Subsection 3.04(C)(3).
 - c. Pre-qualification seams shall be inspected for proper squeeze-out, footprint pressure, and general appearance.
 - d. Four specimens, each 1-inch in length, shall be cut from opposite ends of the pre-qualification seam sample by the Geomembrane Installer. The remainder of pre-qualification seam shall be retained by the Geosynthetic Quality Assurance Consultant and may be submitted for laboratory testing.
 - e. The Geomembrane Installer shall complete two shear tests and two peel tests in accordance with GRI GM 19.
 - f. Pre-qualification seams failed by inspection or testing may be retested at request of the Geomembrane Installer. If the second pre-qualification seam fails, then the seaming apparatus or seaming technique shall be

disqualified from use until two consecutive, satisfactory pre-qualification seams are obtained.

5. Seam Preparation

- a. Prior to seaming, seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
- b. Seams shall be aligned so as to minimize number of wrinkles and fishmouths.

6. General Seaming Procedures

- a. Fishmouths or wrinkles at seam overlaps shall be cut along ridge of the wrinkle to achieve a flat overlap. Cut fishmouths or wrinkles shall be repaired, and/or patched in accordance with Part 3.08.
- b. Seaming shall extend to the outside edge of geomembrane panels including material placed in anchor trenches.
- c. The intersecting thermal fusion seams shall be patched using the extrusion welding process.

3.05 NON-DESTRUCTIVE TESTING

- A. Each field seam shall be non-destructively tested over its entire length by the Installer. Testing shall be conducted as field seaming progresses, not at completion of all seams, unless specifically agreed to by the Geosynthetic Quality Assurance Consultant in writing.
- B. Vacuum Testing – shall be performed in accordance with ASTM D5641.
- C. Air Pressure Testing – shall be performed in accordance with ASTM D5820, and GRI GM 6, Pressurized Air Channel Test for Dual Seamed Geomembranes.
- D. Each seam tested non-destructively shall be marked with the date of the test, name of the testing technician, length of the seam, test method and results. The same shall also be recorded by the Geosynthetic Quality Assurance Consultant on the appropriate CQA documentation.
- E. Non-Destructive Seam Test Failures
 - 1. Seams failing non-destructive testing shall be repaired by the Geomembrane Installer according to Part 3.08. Seams shall be non-destructively retested. If the seam defect cannot be located, the entire section of seam affected shall be repaired and retested.

3.06 DESTRUCTIVE TESTING

- A. The Owner shall have the option to destructively test geomembrane panel seams completed in the field. Destructive seam testing shall be performed by the Geomembrane Installer under the observation of the Geosynthetic Quality Assurance Consultant.
- B. Sampling Procedure
 - 1. For each sample location, the Geosynthetic Installer will:
 - a. Assign a sample number and mark the sample accordingly.
 - b. Record the sample location on the as-built layout drawing.
 - c. By sample number, record reason for collecting sample (e.g., as part of statistical testing program, suspicious seam, retest, etc.).
 - d. Record pertinent information, including date, time, seam number, number of seaming unit, and name of seamer, on the seam sample.
 - 2. Each destructive sample shall be at least 12 inches wide (at least 6 inches on each side of seam) by 54 inches long. Samples will be cut by the Geomembrane Installer and distributed as follows:
 - a. A 12-inch by 12-inch portion shall be cut and tested in accordance with Subsection 3.06(C) by the Geomembrane Installer.
 - b. A 12-inch by 12-inch portion shall be cut and retained by the Geomembrane Installer. The Geomembrane Installer may elect to omit this requirement.
 - c. A 12-inch by 12-inch portion shall be cut and retained by the Geosynthetic Quality Assurance Consultant as an archive sample.
 - d. A 12-inch by 18-inch portion shall be submitted by the Geosynthetic Quality Assurance Consultant for laboratory testing as described in Part 3.06(D).
 - 3. Ten specimens, each 1 inch wide by 12 inches long with seam centered perpendicular to width, shall be collected and field tested by the Geomembrane Installer prior to shipping the sample to the laboratory. If all samples pass field tensiometer test described in Part 3.06(C), then the laboratory sample shall be submitted for testing by the Geosynthetic Quality Assurance Consultant.
 - 4. Holes cut into geomembrane resulting from destructive seam sampling shall be immediately repaired by Geomembrane Installer in accordance with repair procedures described in Part 3.08.

C. Field Test Methods

1. Ten 1-inch-wide samples described above under Part 3.06(B)(3) shall be field tested for peel (5 samples) and shear (5 samples) in accordance with GRI GM 19.
2. One seam sample shall be field tested for peel and shear at the end of each continuous field seam 100 feet or greater in length.
3. Testing shall be performed in accordance with ASTM D6392 using a field tensiometer or equivalent device to qualitatively and quantitatively determine mode of failure.
4. Seam shall be considered passing if failure in both peel and shear meet criteria listed in GRI GM 19.
5. The procedures specified in Subsection 3.06(D) shall be implemented when sample passes field tensiometer test.

D. Laboratory Test Methods

1. Laboratory testing of seam samples shall be conducted by the Geosynthetic Quality Assurance Laboratory under contract with the Geosynthetic Quality Assurance Consultant or Owner. Five specimens shall be tested in shear and five in peel.
2. Laboratory testing shall be conducted in accordance with GRI GM 19.
3. For both seam shear and peel tension tests, an indication will be given for each specimen tested which defines locus of failure.
4. For shear tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:
 - a. Maximum tension in pounds per square inch.
 - b. Elongation at break (up to a tested maximum of 100 percent).
 - c. Locus of failure using ASTM D6392 designations.
5. For peel tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:
 - a. Maximum tension in pounds per square inch.
 - b. Seam separation (expressed as percent of original seam area).

c. Locus of failure.

6. Retesting of seams due to nonconformance with specifications may be performed at the discretion of the Geosynthetic Quality Assurance Consultant.

E. Destructive Seam Test Failure

1. Shear and peel test results derived from testing described in Parts 3.06(C) and 3.06(D) shall comply with GRI GM 19 for seam to be considered acceptable.
2. The Geomembrane Installer has two options in determining the repair boundary whenever a seam has failed destructive testing:
 - a. The seam can be reconstructed between the two previously tested and passed destructive sample locations; or,
 - b. The Geomembrane Installer can trace the welding path to an intermediate location at least ten feet from point of failed test in each direction and obtain destructive test samples collected from these locations. If destructive tests on these samples are acceptable, then the seam shall be reconstructed between the intermediate locations. If either sample fails, the process may be repeated until an acceptable seam test has been performed on both sides of the original failed sample. If a passing sample is not realized on one (or both) side of the original failed sample, then seam repair must extend to the end(s) of the seam. Retesting of seams according to this procedure shall utilize the sampling methodology described in Part 3.06(B). The Owner reserves the right to terminate this process, at the discretion of the Geosynthetic Quality Assurance Consultant, after the second retesting. An additional sample taken from the reconstructed zone must pass destructive seam testing if destructive sample failure(s) causes reconstruction.
3. The Geosynthetic Quality Assurance Consultant shall be responsible for documenting all actions taken in repairing seams. The Geomembrane Installer will be responsible for keeping the Geosynthetic Quality Assurance Consultant informed of seaming progress.
4. Additional fees for destructive seam test failures shall be assessed to the Contractor and deducted from payment. This fee shall be assessed only if the failing sample is a laboratory sample.

3.07 ELECTRONIC LEAK LOCATION SURVEY

- A. The Owner shall have the option to conduct an electronic leak location survey. Leak location survey shall be performed by the Leak Location Contractor under the observation of the Geosynthetic Quality Assurance Consultant.
- B. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.
- C. Contractor shall ensure that the layers above and below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of layers above and/or below the geomembrane is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.
- D. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.
- E. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.
- F. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.
- G. After the final layer is placed above the geomembrane, conduct a leak location survey on the final layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.
- H. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.
- I. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.
- J. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.08 of this Section.

3.08 DEFECTS AND REPAIRS

- A. The geomembrane shall be examined by the Geomembrane Installer and the Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The

Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.

- B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:
1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;
 2. Capping - used to repair large lengths of failed seams; and
 3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Engineer.
- C. Patches or caps.
1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.
 2. Round corners of patch and/or cap (suggest 3-inch radius).
 3. Repair procedures, equipment, materials, and techniques will be approved by the Geosynthetic Quality Assurance Consultant prior to repair.
 4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.
- D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.
- E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Geosynthetic Quality Assurance Consultant.
- F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.
- G. The Geosynthetic Quality Assurance Consultant will document repairs, repair testing, and retesting results.
- H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.09 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

- A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:
 - 1. Use minimum 1-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.
 - 2. Use standard welding procedures to seam the geomembrane boot to the geomembrane.
 - 3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.10 SURVEY DOCUMENTATION

- A. The Geomembrane Installer shall survey the completed geomembrane prior to covering and provide the Geosynthetic Quality Assurance Consultant with 24-hour notification of survey. The Contractor shall document the location of all seams (panel corners acceptable), destructive test samples (if conducted) and repairs. The Contractor shall provide survey data to the Geosynthetic Quality Assurance Consultant within two working day of survey completion.

3.11 DAILY FIELD INSTALLATION REPORTS

- A. At the beginning of each day, the Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with a report for all work completed the previous day.
- B. The Daily Field Installation Report shall include the following:
 - 1. The total amount and location of geomembrane placed.
 - 2. The total length and location of seams completed, technician name and welding unit numbers.
 - 3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).
 - 4. Results of pre-qualification test seams, if available.
 - 5. Results of non-destructive testing.
- C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

3.12 MATERIAL ABOVE GEOMEMBRANE

- A. The Geosynthetic Quality Assurance Consultant and Geomembrane Installer shall verify the area of geomembrane completion prior to placement of material over the geomembrane.
- B. Soils - Apply following general criteria for covering of the geomembrane:
 - 1. Do not place soils on the geomembrane at an ambient temperature below 32 degrees F, (0 degrees C) nor above 104 degrees F (40 degrees C), unless otherwise specified.
 - 2. Do not drive equipment used for placing soil directly on the geomembrane.
 - 3. A minimum thickness of 1 foot of soil is specified between a low ground pressure dozer (maximum contact pressure of 5 lb/sq. inch) and the geomembrane.
 - 4. A minimum thickness of 2 feet of soil is required between rubber-tired vehicles and the geomembrane.
 - 5. Do not compact soils placed directly on geomembrane.
 - 6. Damage to the geomembrane resulting from placement of cover soils shall be repaired in accordance with Part 3.08 by the Geomembrane Installer at the Contractor's expense.
 - 7. Do not push soil downslope. Soil shall be placed over the geomembrane starting from base of the slope, up to top of the slope.

END OF SECTION

**ATTACHMENT 1-4
2010 LINER REPLACEMENT PERMIT
FROM ILLINOIS EPA**

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL PERMIT**

LOG NUMBERS: 2748-09

PERMIT NO.: 2009-EB-2748

**FINAL PLANS, SPECIFICATIONS, APPLICATION
AND SUPPORTING DOCUMENTS**

DATE ISSUED: NOV 13 2009

PREPARED BY: Natural Resource Technology Group

SUBJECT: MIDWEST GENERATION LLC - Powerton Generating Station - Metal Cleaning Basin Liner Replacement - Discharge Tributary to the Illinois River

PERMITTEE TO CONSTRUCT AND OPERATE

Midwest Generation, LLC
235 Remington Blvd., Suite A
Bolingbrook, IL 60440

Permit is hereby granted to the above designated permittee(s) to construct and operate water pollution control facilities described as follows:

The Metal Cleaning Basin at the Powerton Generating Station located at 13082 East Manito Rd. in Pekin, Illinois will undergo a liner upgrade by the addition of a 60 mil HDPE geomembrane liner. At the base, a 12 inch thick sand or limestone cushion layer and a 6 inch coarse aggregate warning layer will be placed on top of the new HDPE liner.

Once complete the liner system will consist of the existing chlorosulfonated polyethylene liner and the new 60 mil HDPE geomembrane liner. The DMF of 1.19 MGD and working volume of 5.4 million gallons at 3 to 6 feet of freeboard for the Metal Cleaning Basin will remain unchanged.

This operating permit expires on September 30, 2014.

This Permit is issued subject to the following Special Condition(s). If such Special Condition(s) require(s) additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplemental Permit.

SPECIAL CONDITION 1: The Permittee to Construct shall be responsible for obtaining an NPDES Storm Water Permit prior to initiating construction if the construction activities associated with this project will result in the disturbance of one (1) or more acres total land area.

An NPDES Storm Water Permit may be obtained by submitting a properly completed Notice of Intent (NOI) form by certified mail to the Agency's Division of Water Pollution Control - Permit Section."

SPECIAL CONDITION 2: The operational portion of this permit shall be governed by NPDES Permit No. IL0002232.

SPECIAL CONDITION 3: All sludges generated on site shall be disposed of at a site and in a manner acceptable to the Agency.

SPECIAL CONDITION 4: The existing Midwest Generation waste storage lagoon shall adhere to the following groundwater protection elements:

Page 1 of 2

THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE REVERSE SIDE MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

SAK:JAR:2748-09.docx

DIVISION OF WATER POLLUTION CONTROL

cc: EPA-Peoria FOS
Natural Resource Technology Group
Records - Industrial
Binds


Alan Keller, P.E.
Manager, Permit Section

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL PERMIT

LOG NUMBERS: 2748-09

PERMIT NO.: 2009-EB-2748

FINAL PLANS, SPECIFICATIONS, APPLICATION
AND SUPPORTING DOCUMENTS

PREPARED BY: Natural Resource Technology Group

DATE ISSUED: NOV 13 2009

SUBJECT: MIDWEST GENERATION LLC - Powerton Generating Station - Metal Cleaning Basin Liner Replacement - Discharge Tributary to the Illinois River

1. A minimum of three monitoring wells must be installed around the waste storage lagoon, no more than 25 feet from the outermost edge of the waste storage lagoon. At least one of the monitoring wells must be located down gradient of the waste storage lagoon. The monitoring wells should be screened in the upper most water bearing materials. Provide drillers logs and well completion reports, and an updated monitoring well location map after well completion.
2. At least six groundwater samples must be collected from each monitoring well within one year, to establish a statistically valid representation of existing (background) concentrations.
3. Sample monitoring wells for the chemical parameters listed in 35 IAC 620.410(a) and (d). The sampling plan will be required as part of the permit. The following parameters listed below should also be sampled.

Specific Conductance
Temperature
Depth to Water (bls)
Depth to Water (bmp)
Elevation of MP
Elevation of GW Surface

4. After a background concentration for each constituent is determined, monitoring will be conducted and reported monthly during waste storage lagoon use.
5. In the event that any Class I: Potable Resource Groundwater Quality Standards are exceeded in any potable water supply well, and is attributable to the operation of the waste storage lagoon, an alternative water supply shall be supplied with all costs of providing the alternative supply being borne by the owner of waste storage lagoon.
6. A corrective action plan is required, if monitoring well analysis indicates impacted groundwater from the waste storage lagoon.
7. The liner must be protected from degradation.
8. Copies of the groundwater monitoring well sample analysis shall be submitted to the following addresses:

Illinois EPA
Division of Water Pollution Control
Compliance Assurance Section
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

Illinois EPA
DWPC - Peoria Region
5415 North University Ave.
Peoria, Illinois 61614

Illinois EPA
Hydrogeology and Compliance Unit
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

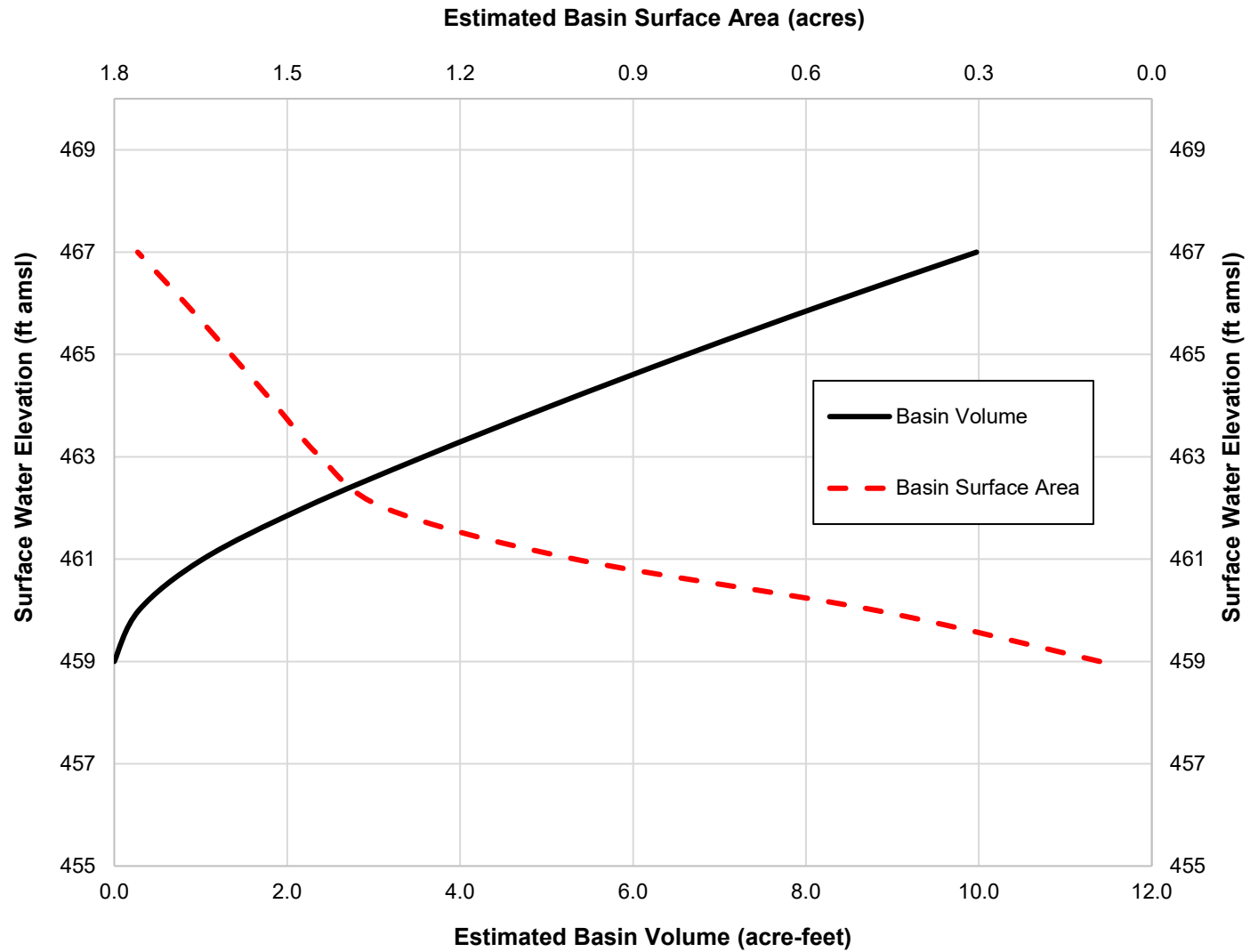
**READ ALL CONDITIONS CAREFULLY:
STANDARD CONDITIONS**

The Illinois Environmental Protection Act (Illinois Revised Statutes Chapter 111-12, Section 1039) grants the Environmental Protection Agency authority to impose conditions on permits which it issues.

1. Unless the construction for which this permit is issued has been completed, this permit will expire (1) two years after the date of issuance for permits to construct sewers or wastewater sources or (2) three years after the date of issuance for permits to construct treatment works or pretreatment works.
2. The construction or development of facilities covered by this permit shall be done in compliance with applicable provisions of Federal laws and regulations, the Illinois Environmental Protection Act, and Rules and Regulations adopted by the Illinois Pollution Control Board.
3. There shall be no deviations from the approved plans and specifications unless a written request for modification of the project, along with plans and specifications as required, shall have been submitted to the Agency and a supplemental written permit issued.
4. The permittee shall allow any agent duly authorized by the Agency upon the presentations of credentials:
 - a. to enter at reasonable times, the permittee's premises where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit;
 - b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit;
 - c. to inspect at reasonable times, including during any hours of operation of equipment constructed or operated under this permit, such equipment or monitoring methodology or equipment required to be kept, used, operated, calibrated and maintained under this permit;
 - d. to obtain and remove at reasonable times samples of any discharge or emission of pollutants;
 - e. to enter at reasonable times and utilize any photographic, recording, testing, monitoring or other equipment for the purpose of preserving, testing, monitoring, or recording any activity, discharge, or emission authorized by this permit.
5. The issuance of this permit:
 - a. shall not be considered as in any manner affecting the title of the premises upon which the permitted facilities are to be located;
 - b. does not release the permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the proposed facilities;
 - c. does not release the permittee from compliance with other applicable statutes and regulations of the United States, of the State of Illinois, or with applicable local laws, ordinances and regulations;
 - d. does not take into consideration or attest to the structural stability of any units or parts of the project;
 - e. in no manner implies or suggests that the Agency (or its officers, agents or employees) assumes any liability, directly or indirectly, for any loss due to damage, installation, maintenance, or operation of the proposed equipment or facility.
6. Unless a joint construction/operation permit has been issued, a permit for operating shall be obtained from the agency before the facility or equipment covered by this permit is placed into operation.
7. These standard conditions shall prevail unless modified by special conditions.
8. The Agency may file a complaint with the Board for suspension or revocation of a permit:
 - a. upon discovery that the permit application contained misrepresentations, misinformation or false statement or that all relevant facts were not disclosed; or
 - b. upon finding that any standard or special conditions have been violated; or
 - c. upon any violation of the Environmental Protection Act or any Rules or Regulation effective thereunder as a result of the construction or development authorized by this permit.

**ATTACHMENT 1-5
RETROFITTED METAL CLEANING BASIN
AREA-CAPACITY CURVE**

Retrofitted Metal Cleaning Basin Area-Capacity Curve



ATTACHMENT 2-1
CCR CHEMICAL CONSTITUENTS ANALYSIS

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
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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.

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Case Narrative

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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 4.6° 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 Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

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

Lab Sample ID: 500-201436-2

Date Collected: 06/23/21 14:23

Matrix: Solid

Date Received: 06/24/21 15:35

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

Lab Sample ID: 500-201436-3

Date Collected: 06/23/21 15:00

Matrix: Solid

Date Received: 06/24/21 15:35

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

Definitions/Glossary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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	

Eurofins TestAmerica, Chicago

QC Association Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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	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

Eurofins TestAmerica, Chicago

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Lab Sample ID: LCS 500-607902/13-A
Matrix: Solid
Analysis Batch: 608143

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 608919

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 608919

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 607925

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 607925

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
Chloride	200	205		mg/Kg		103	85 - 115

Lab Sample ID: LCSD 500-607760/3-A
Matrix: Solid
Analysis Batch: 607925

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
Chloride	200	206		mg/Kg		103	85 - 115	0	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-607760/1-A
Matrix: Solid
Analysis Batch: 607876

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

Eurofins TestAmerica, Chicago

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

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

Date Collected: 06/23/21 14:23

Date Received: 06/24/21 15:35

Lab Sample ID: 500-201436-2

Matrix: Solid

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

Date Collected: 06/23/21 15:00

Date Received: 06/24/21 15:35

Lab Sample ID: 500-201436-3

Matrix: Solid

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

Eurofins TestAmerica, Chicago

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Chain of Custody Record

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																											
Company: Midwest Generation EME LLC				PWSID:		Analysis Requested																													
Address 13082 E Manito Road				Due Date Requested		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_CI_E 500-201436 COC QR Code 500-201436 COC Job #: 500-201436 Preservation Codes A HCL M Hexane B NaOH N None C Zn Acetate O AsNaO2 D Nitric Acid P Na2O4S E NaHSO4 Q Na2SO3 F MeOH R Na2S2O3 G Amchlor S H2SO4 H Ascorbic Acid T TSP Dodecahydrate I Ice U Acetone J DI Water V MCAA K EDTA W pH 4-5 L EDA Z other (specify) Other																													
City Pekin				TAT Requested (days)																															
State Zip IL, 61554				Compliance Project: ☐ Yes ☐ No																															
Phone 815-372-4589(Tel)				PO # 4502051132																															
Email joseph.kotas@nrg.com				WO # 36733393																															
Project Name Powerton Station				Project #: 50000647		Total Number of Containers																													
Site:				SSOW#:																															
Sample Identification				Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=waste/soil, 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_CI_E		500-201436 COC		QR Code		500-201436 COC		Job #: 500-201436		Preservation Codes		Other			
FAB				6/23/21		13:30		G		Solid																									
FAB2				6/23/21		13:30		C		Solid																									
										Solid																									
ASH BASIN				6/23/21		14:23		C		Sol																									
ASH2				6/23/21		14:23		C		Sol																									
Metals Z				6/23/21		15:00		C		Sol																									
Metals CB				6/23/21		15:00		C		Sol																									
Possible Hazard Identification												Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)																							
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological												☐ 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: J K Kotas						Date/Time: 6/23/21 4:30						Company:						Received by: Stephannie Hernandez						Date/Time: 6/24/21 1535						Company: ETA-CHH					
Relinquished by:						Date/Time:						Company:						Received by:						Date/Time:						Company:					
Relinquished by:						Date/Time:						Company:						Received by:						Date/Time:						Company:					
Custody Seals Intact.						Custody Seal No						Cooler Temperature(s) °C and Other Remarks.																							
☐ Yes ☐ No												4.9 → 4.6																							

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

SHIP DATE 23JUN21
ACTWGT 30 00 LB
CAD 100275867/NET4340
DIMS 14x12x22 IN
BILL SENDER

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

UNIVERSITY PARK IL 60484

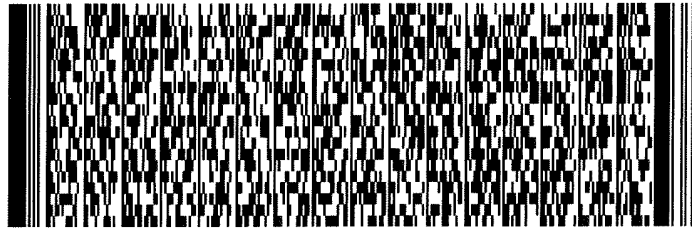
(708) 534-5200 X 153

REF

500-201436 Wayb

INV
PO

DEPT



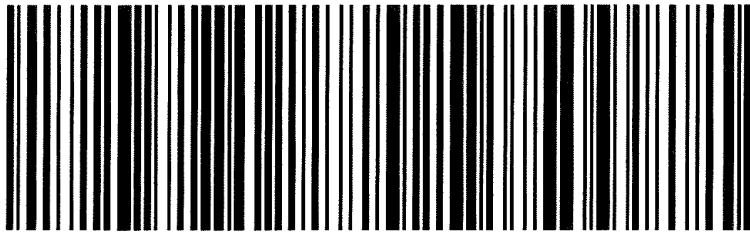
56DJ3B38/FE4A

THU - 24 JUN 4:30P
STANDARD OVERNIGHT

TRK# **7740 8262 9809**

UF JOTA

60484
ORD
IL-US



489t.

for 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

Fairing 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 charges, along with the cancellation of your FedEx account number.

Use 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 for 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 value, 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 from 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 direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims 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

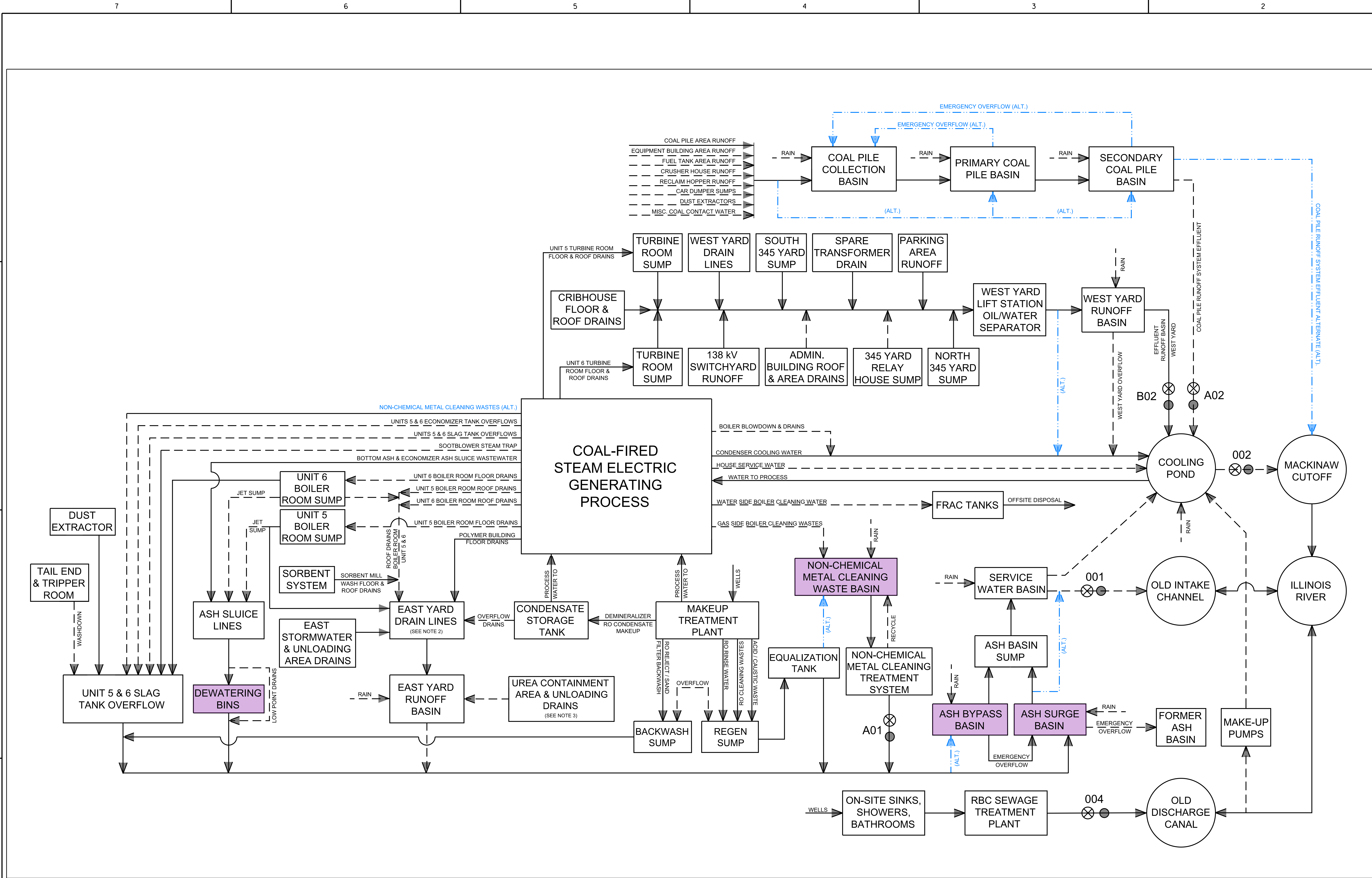
List Number: 1

Creator: Hernandez, Stephanie

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ 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 $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT 2-2
POWERTON PROCESS FLOW DIAGRAM

PD11153/041864/S:\C:\v\l\Design\m2-Powerton - CCR\Drawings\PDH-CSK-PFD-001.dgn
Form 606-0401-01-08, ANSI (Imperial), MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



LEGEND	
	TYPICAL
	INTERMITTENT
	ALTERNATE
	OUTFALL NUMBER
	SAMPLING POINT
	CCR TREATMENT/STORAGE FACILITY
NOTES	
1. THIS DRAWING WAS DEVELOPED USING MIDWEST GENERATION, LLC DRAWING "GENERAL FLOW DIAGRAM WITH NPDES OUTFALLS, NPDES PERMIT NO. IL0002232," PREPARED BY APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC (DATED NOVEMBER 2019) AND USED WITH PERMISSION FROM MIDWEST GENERATION, LLC. SARGENT & LUNDY HAS NOT INDEPENDENTLY VERIFIED THE INFORMATION SHOWN ON THIS DRAWING.	
2. "EAST YARD DRAIN LINES" INCLUDES FAN BAY DRAINS, DRAINS ON EAST HALF OF PROPERTY.	
3. VALVE IS LOCATED ON SUMP FROM UREA CONTAINMENT AREA & UNLOADING DRAINS TO THE EAST YARD RUNOFF BASIN.	
4. OUTFALL 006, TREATED ASBESTOS CONTAMINATED STORMWATER, IS NOT INCLUDED IN THIS DIAGRAM AND IS BEING PROPOSED FOR REMOVAL DUE TO THERE NO LONGER BEING DEMOLITION DEBRIS.	

HOLD INFORMATION											
NO.	DESCRIPTION										
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.											
RELEASE INFORMATION											
REV.	DATE	DESCRIPTION									
0	11-25-2020	FOR USE									
ISSUE PURPOSE: FOR USE											
SPECIFICATION: ---											
PROJECT NO.: 12661-097											
CAD FILE NAME: POW-CSK-PFD-001.DGN											
PREPARED BY: J. CHAVEZ											
REVIEWED BY: T. DEHLIN											
APPROVED BY: T. DEHLIN											
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.											
 SARGENT & LUNDY^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780											
MWG PROJECT MIDWEST GENERATION, LLC POWERTON GENERATING STATION UNITS 5 & 6 DRAWING TITLE EXISTING WATER BLOCK FLOW DIAGRAM <table><tr><th colspan="2">DRAWING NUMBER</th><th>REVISION</th></tr><tr><td colspan="2">POW-CSK-PFD-001</td><td>0</td></tr><tr><td>SHEET</td><td>1 OF 1</td><td></td></tr></table>			DRAWING NUMBER		REVISION	POW-CSK-PFD-001		0	SHEET	1 OF 1	
DRAWING NUMBER		REVISION									
POW-CSK-PFD-001		0									
SHEET	1 OF 1										

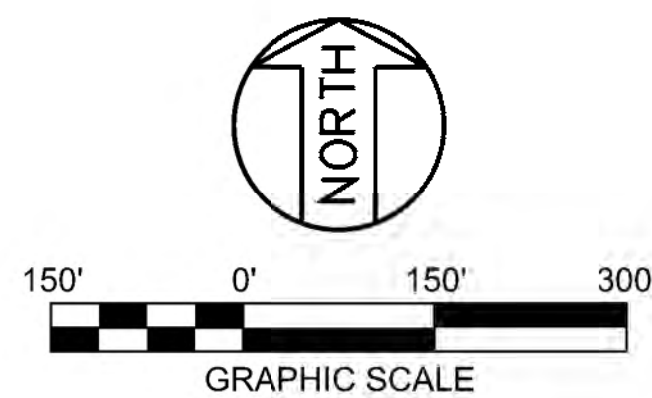
11/24/2020 3:15:33 PM
...#0r-owings#POW-CSK-PFD-001.dgn

ATTACHMENT 2-3
ON-SITE TRANSPORTATION PLAN

FIGURE	REV.	TITLE
FIGURE 2	0	METAL CLEANING BASIN SITE TRANSPORTATION MAP



FOR PERMIT
NOT FOR CONSTRUCTION



LEGEND	
—	TYPICAL VEHICLE ACCESS TO METAL CLEANING BASIN
—	LARGE VEHICLE ACCESS TO METAL CLEANING BASIN
—	METAL CLEANING BASIN BOUNDARY

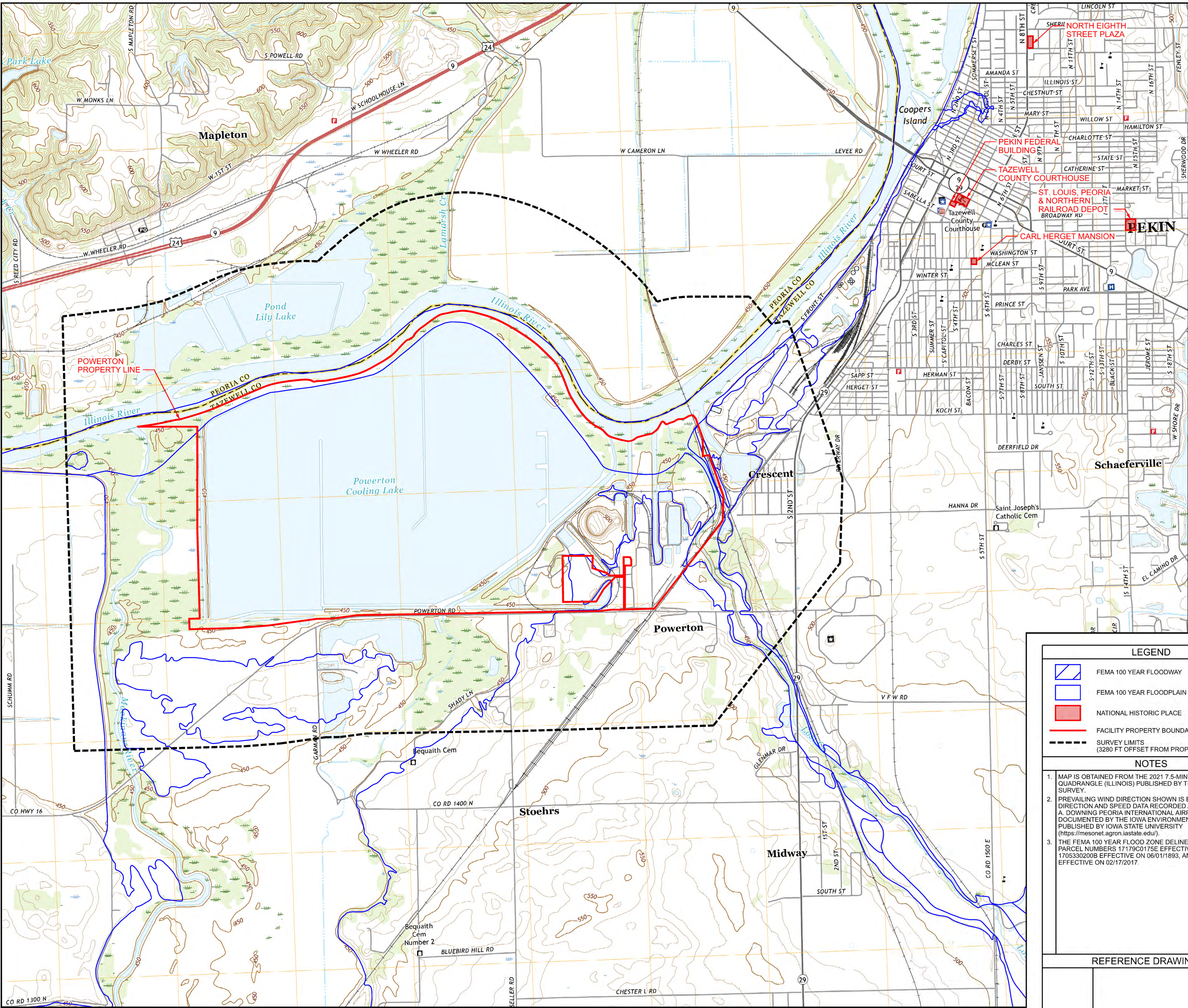
NOTES	

REFERENCE DRAWINGS	
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.	

HOLD INFORMATION				
NO.	DESCRIPTION			
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.				
RELEASE INFORMATION				
REV.	DATE	DESCRIPTION		
0	07-19-2023	FOR PERMIT		
ISSUE PURPOSE: PERMIT				
SPECIFICATION: N/A				
PROJECT NO.: A12661.152				
CAD FILE NAME: MCB-FIGURE 2.DGN				
PREPARED BY: M. KARNIA / J. CHAVEZ				
REVIEWED BY: T. DEHLIN				
APPROVED BY: T. DEHLIN				
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.				
 SARGENT & LUNDY^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780				
				
PROJECT				
MIDWEST GENERATION, LLC POWERTON GENERATING STATION METAL CLEANING BASIN RETROFIT				
DRAWING TITLE				
METAL CLEANING BASIN SITE TRANSPORTATION MAP				
DRAWING NUMBER		REVISION		
FIGURE 2		0		
SHEET	1 OF 1			

**ATTACHMENT 3
SITE LOCATION MAP**

PL12193010684D:006 Civil Home Work12:Powerton CCRMetal Cleaning Basin Retrofit Construction Permit Application FiguresMCB-Attachment 3.dgn
Form GDC-0401-01-06, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



FOR PERMIT
NOT FOR CONSTRUCTION



LEGEND

- FEMA 100 YEAR FLOODWAY
- FEMA 100 YEAR FLOODPLAIN BOUNDARY
- NATIONAL HISTORIC PLACE
- FACILITY PROPERTY BOUNDARY LINE
- SURVEY LIMITS (3280 FT OFFSET FROM PROPERTY LINE)

- NOTES**
- MAP IS OBTAINED FROM THE 2021 7.5-MINUTE PEKIN QUADRANGLE (ILLINOIS) PUBLISHED BY THE U.S. GEOLOGICAL SURVEY.
 - PREVAILING WIND DIRECTION SHOWN IS BASED ON WIND DIRECTION AND SPEED DATA RECORDED AT GENERAL WAYNE A. DOWNING PEORIA INTERNATIONAL AIRPORT AS DOCUMENTED BY THE IOWA ENVIRONMENTAL MESONET PUBLISHED BY IOWA STATE UNIVERSITY (<https://mesonet.agron.iastate.edu/>).
 - THE FEMA 100 YEAR FLOOD ZONE DELINEATION IS FROM FEMA PARCEL NUMBERS 17179C0175E EFFECTIVE 02/17/2017, 1705330200B EFFECTIVE ON 06/01/1893, AND 17179C0160E EFFECTIVE ON 02/17/2017.

REFERENCE DRAWINGS

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

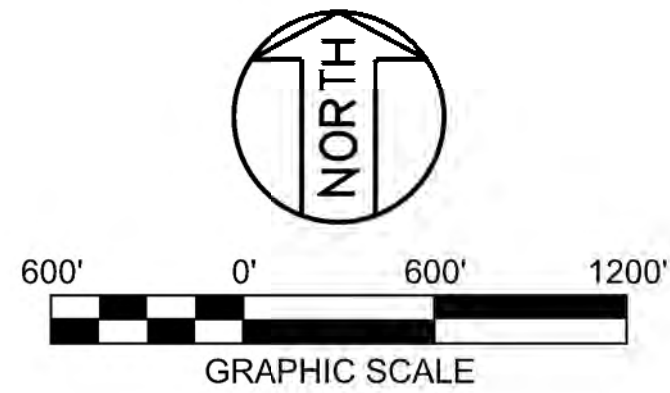
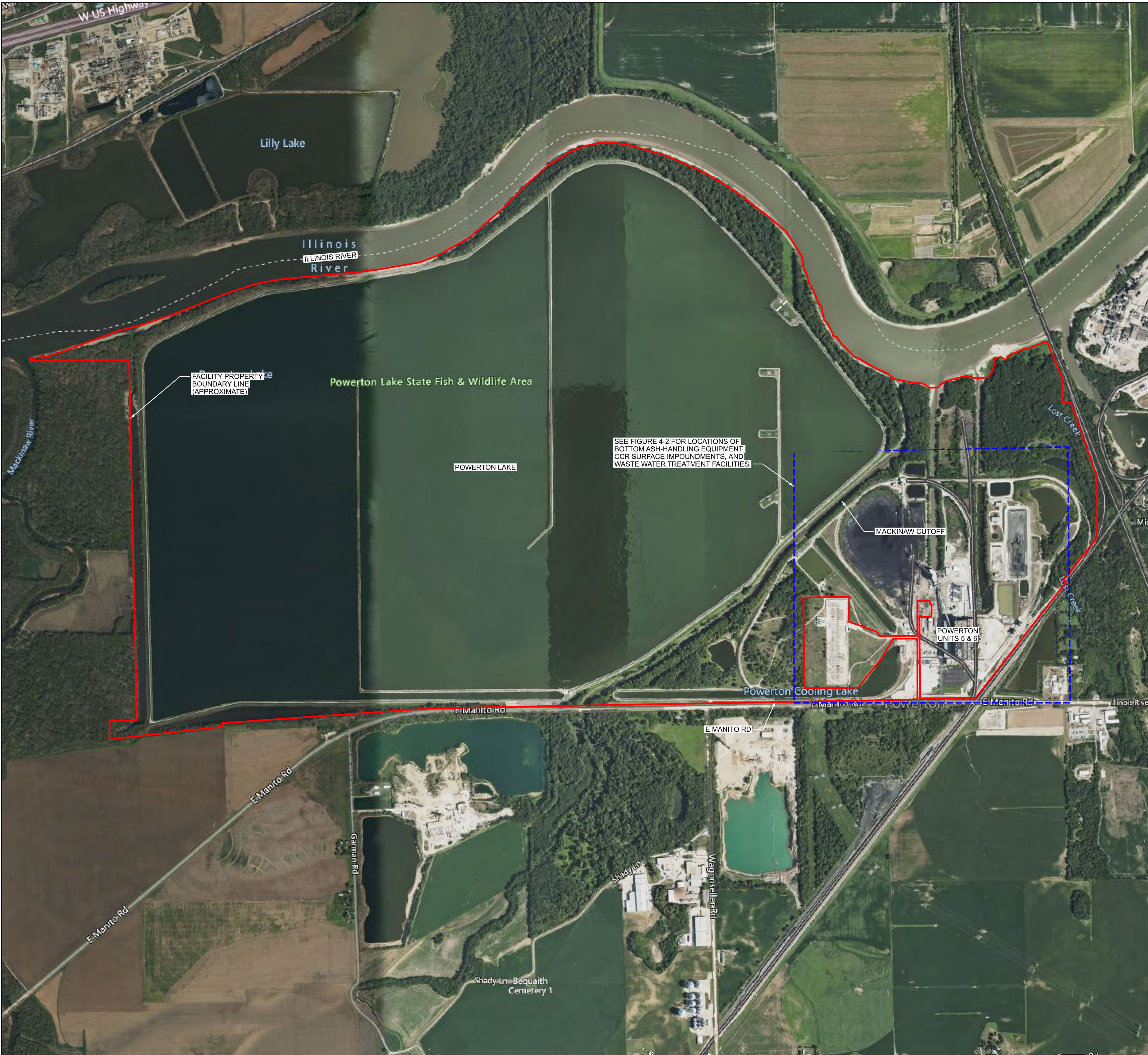
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTOR(S) PERFORMING THE WORK.

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUB-CONTRACTOR(S) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	07-19-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: N/A		
PROJECT NO.: A12661.152		
CAD FILE NAME: MCB-ATTACHMENT 3.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 SARGENT & LUNDY ^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
MWG Midwest Generation, LLC		
PROJECT		
MIDWEST GENERATION, LLC POWERTON GENERATING STATION METAL CLEANING BASIN RETROFIT		
DRAWING TITLE		
SITE LOCATION MAP		
DRAWING NUMBER		REVISION
ATTACHMENT 3		0
SHEET	1 OF 1	

ATTACHMENT 4
SITE PLAN MAPS

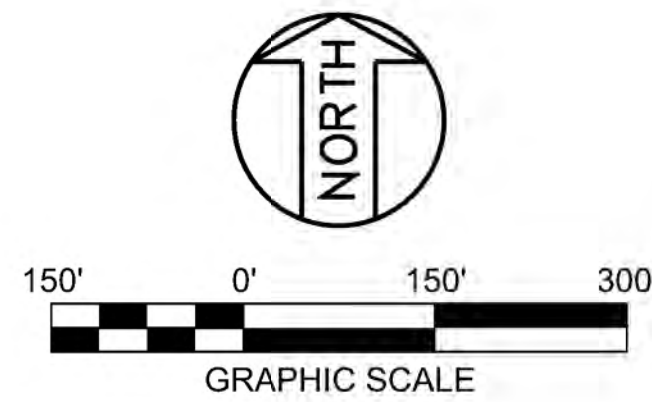
FIGURE	REV.	TITLE
FIGURE 4-1	0	SITE PLAN MAP
FIGURE 4-2	0	BOTTOM ASH-HANDLING EQUIPMENT AND CCR SURFACE IMPOUNDMENTS



LEGEND		
FACILITY PROPERTY BOUNDARY LINE		
NOTES		
1. AERIAL IMAGE IS FROM GOOGLE EARTH PRO V.7.3 AND IS DATED 09/14/2017.		
REFERENCE DRAWINGS		
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.		

FOR PERMIT
NOT FOR CONSTRUCTION

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	07-19-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: N/A		
PROJECT NO.: A12661.152		
CAD FILE NAME: MCB-FIGURE 4-1.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 Sargent & Lundy^{LLC} SARGENT & LUNDY^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
MWG Midwest Generation, LLC		
PROJECT		
MIDWEST GENERATION, LLC POWERTON GENERATING STATION METAL CLEANING BASIN RETROFIT		
DRAWING TITLE		
SITE PLAN MAP		
DRAWING NUMBER		REVISION
FIGURE 4-1		0
SHEET	1 OF 1	



NOTES

1. AERIAL IMAGE IS FROM GOOGLE EARTH PRO V.7.3 AND IS DATED 09/14/2017.

REFERENCE DRAWINGS

FOR PERMIT
NOT FOR CONSTRUCTION

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

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RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	07-19-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: N/A		
PROJECT NO.: A12661.152		
CAD FILE NAME: MCB-FIGURE 4-2.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 SARGENT & LUNDY^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
 MWG Midwest Generation, LLC		
PROJECT		
MIDWEST GENERATION, LLC POWERTON GENERATING STATION METAL CLEANING BASIN RETROFIT		
DRAWING TITLE		
BOTTOM ASH-HANDLING EQUIPMENT AND CCR SURFACE IMPOUNDMENTS		
DRAWING NUMBER		REVISION
FIGURE 4-2		0
SHEET	1 OF 1	

ATTACHMENT 5-1
CONSTRUCTION PLANS & SPECIFICATIONS



Midwest Generation, LLC

POWERTON GENERATING STATION

SPECIFICATION P-1800

METAL CLEANING BASIN RETROFIT

S&L PROJECT NO.: 12661-152

REVISION 0C

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-19-2023





SECTION 000106

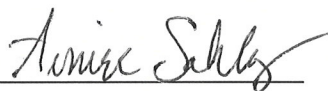
ISSUE SUMMARY AND APPROVAL PAGE

<u>Rev.</u>	<u>Purpose of Issue</u>	<u>Date</u>	<u>Sections Affected</u>
0A	Client Comment	03-14-2023	All
0B	Public Comment	03-24-2023	All
0C	Permit	07-19-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications and Bills of Materials, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

<u>Rev.</u>	<u>Prepared By</u>	<u>Reviewed By</u>	<u>Approved By</u>
0A	A. Sahlas	T. Dehlin	--
0B	A. Sahlas	T. Dehlin	--

0C	 _____ A. Sahlas	 _____ T. Dehlin	 _____ T. Dehlin
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Midwest Generation, LLC
Powerton Generating Station
Project No. 12661-152
Certification Page



Specification P-1800
Rev. 0C
Issue: Permit
Date: 07-19-2023

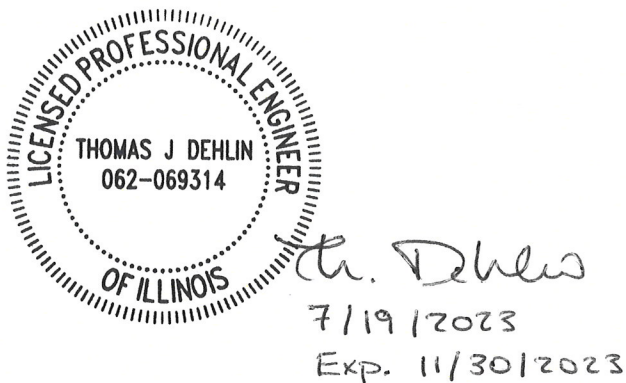
SECTION 000107
CERTIFICATION PAGE

Sargent & Lundy (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin Date: July 19, 2023

Seal:





SECTION 000110

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DIVISION 31 - EARTHWORK

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Section 319020	High Density Polyethylene Geomembrane Liner with Geocomposite
Section 319025	Geosynthetic Clay Liner
Section 319050	Leachate Collection and Removal System

ATTACHMENTS

Attachment 1	Design Drawings
Attachment 2	Reference Drawings
Attachment 3	2021 Structural Stability & Factor of Safety Assessment

END OF SECTION 000110



SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

- | | | |
|-------|-------------------|---|
| 101.1 | Owner: | Midwest Generation, LLC (MWG) |
| 101.2 | Design Engineer: | Sargent & Lundy (S&L) |
| 101.3 | Project Name: | Metal Cleaning Basin Retrofit |
| 101.4 | Project Location: | Powerton Generating Station
13082 E. Manito Rd.
Pekin, IL 61554 |

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

- 102.1 The purpose of this project is to retrofit the Metal Cleaning Basin at Midwest Generation, LLC's Powerton Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845.
- 102.2 The Metal Cleaning Basin will be retrofitted by first removing all boiler wash water sediments remaining in the basin; removing the basin's existing gravel warning, sand cushion, and riprap layers; and decontaminating the basin's existing geomembrane liner and appurtenant structures, which will remain in place. Following material removal and decontamination of the basin facilities remaining in-place, a new composite liner system and new leachate collection and removal system (LCRS) will be installed within the Metal Cleaning Basin over the basin's existing decontaminated and leak-tested geomembrane liner.

103. SCOPE OF WORK

- 103.1 In general, this Specification covers the technical requirements for a General Work (GW) Contractor to retrofit the Metal Cleaning Basin at the Powerton Generating Station. The Work includes the following activities:
- a. Furnishing and installing temporary sediment and erosion control best management practices (BMPs) prior to and during all phases of earth disturbance work.
 - b. Retrofitting the Metal Cleaning Basin by:
 - b1. Removing all boiler wash water sediments, gravel warning layer, sand cushion, and riprap layers above the basin's existing geomembrane liner with offsite disposal of dry waste material in a permitted landfill approved by the Owner and disposal of liquid waste in the retrofitted Bypass Basin or as otherwise directed by the Owner.
 - b2. Decontaminating the basin's existing geomembrane liner and appurtenant structures, for re-use in the retrofitted basin, including conducting and documenting visual inspections and analytical testing to demonstrate the existing liner is no longer contaminated with CCR constituents.
 - b3. Ensuring all appropriate measures are taken to protect the Metal Cleaning Basin's existing HDPE geomembrane liner system from damage.



- b4. Placing, compacting, and grading Structural Fill to establish the lines and grades for the basin's LCRS as specified on the Design Drawings.
 - b5. Installing a new composite liner system over the existing, decontaminated geomembrane liner and Structural Fill placed within the basin. The composite liner system consists of an HDPE geomembrane liner over a geosynthetic clay liner (GCL).
 - b6. Installing a new LCRS over the new composite liner system. The LCRS consists of drainage geocomposite – an HDPE geonet core with a non-woven geotextile heat-laminated to each side of the geonet – over a perforated HDPE collection pipe installed within a pipe bedding layer.
 - b7. Installing a Sand Filter Layer above the drainage geocomposite.
 - b8. Installing a Protective Warning Layer above the Sand Filter Layer on the basin floor.
 - b9. Installing riprap on a gravel bedding layer above the Sand Filter Layer along the basin's side slopes to protect the Sand Filter Layer from erosion.
 - c. Restoring and cleaning the project site.
 - d. Developing fueling and maintenance facilities and practices to protect the project site from hydrocarbon spills or other environmental impacts that may impact the project site, adjacent property, or the Illinois River and connected waterways.
- 103.2 In addition, the Work shall include but not be limited to the following:
- a. Engineering and construction services required to perform or install the Work.
 - b. Surveying to ensure the Work is located as indicated on the Design Drawings.
 - c. Furnishing all installation equipment and tools including any calibrated instruments required for monitoring and testing.
 - d. Maintaining the project site in a dry condition that includes dewatering of all areas that collect storm water or groundwater in the area controlled by the GW Contractor, redirecting any surface water as a result of rainfall or water generated by the installation Work. Any groundwater and/or surface water which requires removal from the area of work shall be disposed of in compliance with the Powerton Generating Station's National Pollutant Discharge Elimination System (NPDES) discharge permit in effect at the time of the Work. The methods and proposed place of discharge shall be approved by the Owner prior to disposing of the water.
 - e. Disposing of excess excavated material and other construction related debris in an off-site permitted landfill approved by the Owner.
 - f. Maintaining a record of the installation (i.e., as-built drawings) in accordance with the technical requirements of this Specification.
 - g. Furnishing the services of qualified personnel at the project site to perform the Work.
 - h. Progress reporting as specified in the Commercial Terms and Conditions.
 - i. Daily site cleanup and disposal of waste and debris.
 - j. Participation in the Owner's on-site safety program, including the Owner's CCR Safety and Health Plan Training.
 - k. GW Contractor shall allow access to all work areas by Owner, Design Engineer, CQA Contractor staff, and other parties as approved by Owner. GW Contractor shall not install,



modify, repair or work on any elements of the project that are subject to the CQA testing and inspection services without notifying the CQA Contractor at least 2 workdays in advance. Work on weekends or holidays shall be scheduled as soon as possible with the CQA Contractor. Failure to provide CQA Contractor adequate advanced notice to staff the site shall result in a hold on work until the CQA Contractor staff arrive on site.

- 103.3 The Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The Work shall be performed exclusively by the GW Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of all people located on the work site, including the GW Contractor's personnel (or that of its subcontractor(s)) performing the Work.
- 103.4 Performance of the Work shall include all the labor, supervision, administration, management, material procurement, tools, installation and testing equipment, miscellaneous material, and consumables to perform the Work specified herein.
- 103.5 Provide all installation equipment and all incidental items not shown or specified but reasonably implied for successful completion of the Work and in strict accordance with the Design Drawings and this Specification, including inspection, testing and quality standards.
- 103.6 Provide installation quality assurance and quality control submittals where required.
- 103.7 Prepare red-lined as-built drawings for review upon completion of the Work to document any variances between the construction issue of the Design Drawings and the actual installation. Finalize as-built drawings after the Owner and the Design Engineer review.
- 103.8 All other work as indicated on the Design Drawings, as specified herein, or as required to properly complete the Work.

104. DIVISION OF RESPONSIBILITY & CONTRACTOR QUALIFICATIONS

104.1 Owner:

- a. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor. The Owner will ultimately be responsible for the retrofit construction for the Metal Cleaning Basin and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings.

104.2 Design Engineer:

- a. S&L is the Design Engineer and is responsible for designing the retrofitted features for the Metal Cleaning Basin.
- b. The Design Engineer will assure that the retrofit design meets or exceeds the construction requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.
- c. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.



104.3 Permitting Authority:

- a. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit application for retrofitting the Metal Cleaning Basin to assure compliance with state regulations and for granting the construction permit for the project.
- b. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm the Metal Cleaning Basin was retrofitted as specified in Project Specifications and the Design Drawings.

104.4 GW Contractor:

- a. The GW Contractor is the firm with whom the Owner establishes a contract for the satisfactory performance of the Work.
- b. The GW Contractor is responsible for the work, quality, and safety of their staff and all subcontractors and suppliers.
- c. The GW Contractor may devise the Work into the following division of responsibilities between an Earthwork Contractor and a Geosynthetics Contractor.

104.5 Earthwork Contractor:

- a. The Earthwork Contractor is the contractor responsible for:
 - a1. Earthwork and sitework.
 - a2. Removal of existing boiler wash water sediments and protective layers above the Metal Cleaning Basin's existing geomembrane liner.
 - a3. Placement of fill material to support the basin's new composite liner system and to establish the lines and grades of the basin's new LCRS.
 - a4. Placement of fill material over liner run-outs.
 - a5. Placement of bedding material around and installation of the leachate collection pipe.
 - a6. Installation of the granular materials above the basin's new LCRS.
- b. The GW Contractor may self-perform or subcontract the Earthwork Contractor's scope of work.

104.6 Geosynthetics Contractor:

- a. The Geosynthetics Contractor is the contractor responsible for supplying and installing all geosynthetic materials for the project, including geosynthetic clay liner (GCL), high-density polyethylene (HDPE) geomembrane, drainage geocomposite, and non-woven geotextile.
- b. The GW Contractor may self-perform or subcontract the Geosynthetics Contractor's scope of work.
- c. Qualifications:
 - c1. The Geosynthetics Contractor shall be approved by the manufacturer(s) of the geosynthetics materials for installing the geosynthetic materials supplied for the project.



c2. The Geosynthetics Contractor shall be approved by the Owner.

c3. The Geosynthetics Contractor shall have a minimum 5-year history of successfully performing similar work.

104.7 Construction Quality Assurance (CQA) Contractor:

a. The CQA Contractor is the firm with whom the Owner establishes a contract to perform all CQA work as specified on the Design Drawings and in Specification P-1801.

b. The CQA Contractor is independent of the GW Contractor and their subcontractors.

105. MATERIAL AND SERVICES FURNISHED BY OTHERS

105.1 The following work has been, or will be, performed and/or provided by Others:

a. Initial dewatering and removal of a significant quantity of boiler wash sediments from the Metal Cleaning Basin.

a1. The GW Contractor shall be responsible for dewatering (if necessary) and removing all boiler wash water sediments remaining in the Metal Cleaning Basin after the GW Contractor mobilizes to the site.

a2. Estimated quantity of boiler wash water sediments and existing protective layer materials to be removed from the basin will be provided by Owner during the bid period for the Work.

b. Construction Quality Assurance services as detailed in Specification P-1801 will be procured by the Owner.

106. DEFINITIONS

106.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.

106.2 The term "Work" means the material and services furnished to retrofit the Metal Cleaning Basin as identified on the Design Drawings and as specified herein.

106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material that has been accepted by the Owner.

107. INTENT OF DOCUMENTS

107.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor, material, equipment, and transportation necessary for the proper execution of the Work.

107.2 Discrepancies between the Design Drawings and this Specification or errors or omissions, or mis-descriptions in either the Design Drawings or in this Specification, shall be referred to the Design Engineer for interpretation and adjustment prior to beginning the Work. Do not proceed without the Design Engineer's written acceptance.

108. PERFORMANCE OF THE WORK

108.1 The GW Contractor shall provide materials and employ construction practices that are sustainable to the greatest extent possible, including disposal of waste.

108.2 The GW Contractor shall provide a representative that will input and provide daily force reports and daily production reports.



- 108.3 The performance of the Work, as specified herein and as indicated on the Design Drawings, shall comply with the current safety and health standards authorized by the U.S. Department of Labor's Occupational Safety and Health Administration, as well as state and local jurisdictional requirements.
- 108.4 The GW Contractor shall take all appropriate precautions to ensure the safety of all people working on site.
- 108.5 The GW Contractor shall maintain the necessary skilled and qualified labor force for the Work to ensure the on-time completion of the Work.
- 108.6 The GW Contractor's personnel shall be competent, capable, qualified, and able to perform the duties required to the satisfaction of the Owner. A supervisor vested with authority to make decisions binding on the GW Contractor shall be assigned to the task to resolve installation problems as they arise so as not to delay completion of the Work.
- 108.7 The GW Contractor shall be solely responsible for advising the Design Engineer in writing of any conflicts between this Specification and the Design Drawings and the GW Contractor's drawings, including performance and levels of quality. The GW Contractor agrees that its obligations, liabilities, and warranties shall not be diminished or extinguished due to its meeting the requirements of this Specification and the Design Drawings.
109. REGULATORY REQUIREMENTS
- 109.1 The GW Contractor shall at all times be solely responsible for complying with all applicable laws, ordinances, regulations, and codes, including those relating to safety of all persons, in connection with the Work. No obligation of the Owner or Design Engineer shall impose upon them any duty to review the GW Contractor's compliance with safety measures.
110. PROTECTION OF PROPERTY AND PERSONNEL SAFETY
- 110.1 The GW Contractor shall take adequate precautions to protect existing structures, fences, pavements, above-ground utilities, and underground utilities and to avoid damage thereto. The GW Contractor shall, at no addition expense to the Owner, repair any damage caused by its operations or by that of its subcontractors.
- 110.2 The GW Contractor shall conduct safety training of all its personnel (including any subcontractors) in accordance with the Owner's safety requirements, including the Owner's CCR Safety and Health Plan.
- 110.3 The GW Contractor shall take adequate precautions to protect the Illinois River, other waterways, and adjacent properties from environmental damage.
111. CLEAN-UP AND DISPOSAL OF DEBRIS
- 111.1 The GW Contractor shall be responsible for clean-up and disposal of all debris resulting from the installation work. All excess excavated material and other construction related debris shall be properly disposed of (i.e., in an environmentally responsible way) offsite in a permitted landfill approved by the Owner.
- 111.2 Clean up, disposal, and site restoration, if required, shall be in compliance with the applicable requirements of all access permits. If any additional permits are required for disposal of debris, these shall be the responsibility of the GW Contractor.



111.3 Work areas shall be kept clean and orderly at all times with as little disturbance as possible to existing conditions. Upon completion of work at each site, all tools, equipment, material, and debris shall be completely removed and the area left in a clean condition.

112. EXISTING SITE CONDITIONS

112.1 Prior to performing any Work in any part of the project site, the GW Contractor shall make a thorough field check for the purposes of verifying existing conditions that may affect the Work. The GW Contractor shall include a thorough investigation of the potential interferences and difficulties that it may encounter in the proper and complete execution of the Work, including the field location and identification of underground and overhead utilities within and adjacent to the limits of the Work. The GW Contractor shall advise the Owner immediately of the discovery of any conditions, including the existence of underground and overhead utilities that may affect the timely and safe execution of the Work.

112.2 The GW Contractor shall be responsible for location of underground utilities and obstructions prior to performance of the Work and shall promptly notify Owner of any potential interferences that may impact performance of the Work. Modifications to the design to resolve these interferences shall not be implemented until approved by the Owner.

112.3 The GW Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface material and obstacles, including underground or embedded utilities, to be encountered insofar as this information is reasonably ascertainable from:

- a. An inspection of the site (including field location and identification of underground utilities).
- b. Reference drawings made available by the Owner.
- c. Drawings and specifications that are a part of the Contract.
- d. The character and extent of existing work within or adjacent thereto.
- e. Any other work being performed thereon at the time of the submission of bids.

112.4 Should the GW Contractor fail to perform any of the obligations set forth above, the GW Contractor's later plea of ignorance of existing or foreseeable conditions which create difficulties or hindrances in the execution of the Work will not be considered as an excuse for any failure on the part of the GW Contractor to fulfill in every detail the requirements of the Contract nor will such a plea be acceptable as the basis of a claim for additional compensation or time to complete the work.

113. VERIFICATION OF DIMENSIONS ON DRAWINGS AND MEASUREMENTS AT SITE

113.1 The GW Contractor shall make a thorough field check for the purpose of verifying existing conditions that may affect the Work, such as existing topographic data shown on the Design Drawings, difficulties that might be encountered in the execution of the Work for any reason, and dimensions and other questions relating to interconnection of the Work with the existing Metal Cleaning Basin construction.

113.2 The GW Contractor shall satisfy itself as to the accuracy of the dimensions of the existing Metal Cleaning Basin construction as such dimensions relate to the dimensions given on



any drawing issued by the Design Engineer. It shall be understood that neither the Design Engineer nor the Owner guarantee the exactness of such dimensions.

- 113.3 Should the GW Contractor discover any variation in the dimensions of existing conditions and the dimensions given on any drawings issued by the Design Engineer, the GW Contractor shall give immediate notice thereof to the Owner and the GW Contractor shall not proceed with the Work until such variation is resolved.

114. SOIL DATA

- 114.1 A structural stability and factor of safety assessment for the Metal Cleaning Basin was prepared in June 2021. Site specific soil data and geotechnical recommendations are provided and referenced therein. The geotechnical information in and referenced by this assessment indicates the general character of the subsurface conditions at the site. This information is made available for the GW Contractor's information and for interpretation of soil and water conditions that may be encountered at the site. The logs and test data that are provided are not to be taken as a complete description of the site soil and water information, but only display what was found in borings at the indicated locations. The Owner and the Design Engineer take no responsibility for the accuracy of this information.

- 114.2 The GW Contractor may obtain additional subsurface information, as it deems necessary, for installation purposes.

115. LINES AND GRADES

- 115.1 The GW Contractor shall use the existing benchmarks established at the site, as identified on the survey drawings included in the reference documents for the project, to lay out lines and grades on the project site. The GW Contractor is fully responsible for the correctness of such lines and grades and for proper execution of work to such lines and grades.

- 115.2 The Owner reserves the right to verify correctness of lines and grades during progress of the Work. Such verification by the Owner will not relieve the GW Contractor of responsibility as herein specified.

- 115.3 The GW Contractor shall preserve and maintain existing benchmarks and reference points established at the project site. Should the GW Contractor, during execution of the Work, destroy or remove any existing benchmark or reference point, the cost to the Owner for re-establishing the benchmark or reference point will be charged to the GW Contractor.

116. CONTROL AND CHARGE OF CONTRACTOR'S WORK

- 116.1 The Design Engineer shall have no authority to stop the Work by the GW Contractor for any reason.

- 116.2 The GW Contractor shall be responsible for the safety of its employees and subcontractors and for maintaining the safety of the job site.

- 116.3 The GW Contractor shall be solely responsible for construction means, methods, techniques, sequences, and procedures used in the construction of the Work. The Owner, however, reserves the right to request, and the Contractor shall supply, detailed information regarding the Work such as procedures or work methods.

- 116.4 Only the Owner (or its authorized representative) has the authority to stop the Work (in accordance with the Commercial Terms and Conditions) if such Work is determined to be



not in accordance with this Specification, the Design Drawings, or the Contract documents.

117. DESIGN DRAWINGS

117.1 The Design Drawings prepared by the Design Engineer indicate the physical dimensions of the Work to be installed as defined by the Scope of Work and form a part hereof.

117.2 Refer to Attachment 1 of this Specification for the applicable Design Drawings for this project.

118. REFERENCE DOCUMENTS

118.1 The reference documents assembled by the Design Engineer are for information only.

118.2 Refer to Attachments 2 and 3 of this Specification for applicable reference documents for this project.

END OF SECTION 011100



SECTION 319005

EARTHWORK

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the material and work requirements associated with preparing and placing Structural Fill within the Metal Cleaning Basin and other tasks associated with installing a new composite liner system for the Metal Cleaning Basin. The Structural Fill will support the basin's new composite liner system and will establish the lines and grades for the basin's new leachate collection and removal system (LCRS). This work is further defined and depicted on the Design Drawings.

101.2 The work shall include, but not be limited to, the following items:

- a. Clearing, grubbing, and topsoil stripping.
- b. Excavating the granular protective layers covering the basin's existing liner.
- c. Cleaning and decontaminating the existing liner system and basin appurtenances remaining in-place.
- d. Placing and compacting Structural Fill.
- e. Preparing the Structural Fill surface to be lined with the Metal Cleaning Basin's new composite liner system.
- f. Preparing concrete surfaces that will come into contact with geosynthetic materials.
- g. Excavating crest anchor trenches where indicated on the Design Drawings.
- h. Placing fill materials over run-outs and in crest anchor trenches for geosynthetic materials.
- i. Placing crushed stone to re-surface existing roads on the top of the Metal Cleaning Basin's dikes where indicated on the Design Drawings.
- j. Disposing excess or unsuitable excavated earthen material and debris in an off-site, permitted landfill approved by the Owner.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

- a. GW Specification P-1800:
 - a1. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a2. Section 319025 – Geosynthetic Clay Liner.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - a3.1 Refer to Section 319050 for material and installation requirements for granular materials associated with the Metal Cleaning Basin's new LCRS.



b. CQA Specification P-1801:

b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of the Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

a. C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

b. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))

c. D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

d. D2974 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

103.5 IDOT – Illinois Department of Transportation:

a. Standard Specifications for Road and Bridge Construction (Adopted January 1, 2022).

103.6 ITP – Illinois Test Procedure:

a. 27 Sieve Analysis of Fine and Coarse Aggregates

b. 96 Resistance by Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

c. 104 Soundness of Aggregate by Use of Sodium Sulfate

104. SUBMITTALS

104.1 The GW Contractor shall submit drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).

104.2 Submittals with Bid Proposal:

a. Catalog data on all compaction equipment and proofrolling equipment the Earthwork Contractor plans to use on the project.

b. Earthwork Contractor's plan for placing Structural Fill material to meet the requirements specified herein while preventing damage to the Metal Cleaning Basin's existing geomembrane liner.



104.3 Submittals After Award:

a. Earthwork Equipment:

- a1. Earthwork Contractor's demonstration that all earthwork equipment to be used to transport and place Structural Fill material will not exert a ground pressure greater than 8 psi.

b. Structural Fill Material:

- b1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Structural Fill material signed by the supplier or a qualified geotechnical engineering consultant that certify the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
b1.1 Sieve Analysis	ASTM C136	Percent Passing Selected Sieves
b1.2 Classification of Material	ASTM D2487	Classification
b1.3 Organic Content	ASTM D2974	Percent of Organic Material
b1.4 Atterberg Limits ⁽²⁾	ASTM D4318	Liquid Limit and Plasticity Index

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.
 (2) Atterberg limits are only required if cohesive/fine grained materials are to be used for Structural Fill.

c. Crushed Stone Surfacing for Roads:

- c1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the crushed stone material to be used to re-surface the existing roads on top of the basin dikes, which shall be signed by the supplier or a qualified geotechnical engineering consultant certifying the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
c1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
c1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
c1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

105. QUALITY ASSURANCE

- 105.1 Material and construction procedures shall be subject to inspection and testing by the CQA Contractor hired by Owner. Such inspections and tests will not relieve the Earthwork Contractor of responsibility for providing and placing materials in compliance with specified requirements.



- 105.2 The Owner reserves the right, at any time before final acceptance, to reject material not complying with the specified requirements. The Earthwork Contractor shall correct all deficiencies which inspections, laboratory tests, or field tests have indicated are not in compliance with specified requirements. The Earthwork Contractor shall perform additional tests, at their expense, as may be necessary to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work.
- 105.3 The Earthwork Contractor shall promptly correct errors or flaws in the work or material identified during construction and which prevent proper installation. The Earthwork Contractor shall make immediate substitution of the noncomplying material or shall make field changes to make the noncomplying material acceptable. The correction or substitution shall be performed at no cost to the Owner.
- 105.4 CQA activities shall be performed as described herein and in Specification P-1801.

PART 2 - PRODUCTS

201. MATERIAL FOR STRUCTURAL FILL

201.1 Definitions:

- a. Structural Fill is fill placed within the Metal Cleaning Basin to support the basin's new composite liner system, as identified on the Design Drawings.

201.2 Satisfactory Material:

a. Granular Material:

- a1. Granular material for use as Structural Fill shall be rounded and not crushed, with less than one percent organic or other deleterious material, free of excess moisture, and a maximum particle size less than one inch.
- a2. Acceptable granular materials are soils which are classified as coarse-grained soils in the Unified Soil Classification System, ASTM D2487. Classifications are GW, GP, GC, SW, SP, or SC, or combinations of these such as SP-SC.
- a3. No material with a silt content of greater than 12 percent (i.e., SM or GM) shall be used for Structural Fill.

b. Cohesive Material:

- b1. Cohesive material is suitable for use as Structural Fill if it contains not more than two percent organic or other deleterious material, has a maximum particle size of one inch, has a liquid limit of less than 45, and has a plasticity index of less than 25.
- b2. Acceptable cohesive materials are soils which are classified as fine-grained soils in the Unified Soil Classification System, ASTM D2487. Classification is CL.

201.3 Unsatisfactory Material:

a. Material unsatisfactory use as Structural Fill is as follows:

- a1. Soils classified as silt, silty, or organic soils in the Unified Soil Classification System, ASTM D2487. Classifications are SM, GM, ML, MH, PT, OL and OH.
- a2. Clay soils classified as CH in the Unified Soil Classification System, ASTM D2487.
- a3. Soils classified as CL-ML (plasticity index of 4 to 7) in the Unified Soil Classification System, ASTM D2487.



a4. Rock material without a soil matrix in which nesting of rocks could occur.

a5. Uncontrolled fill.

a6. Debris.

201.4 Material Sources:

a. Structural Fill material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner.

202. RESTRICTIONS ON THE USE OF MATERIAL FOR ANY PURPOSE

202.1 Any material which is frozen is considered unsatisfactory for use as fill.

202.2 Fill and backfill soils placed by previous construction shall be considered unsatisfactory for use as fill unless they meet the requirements for satisfactory material. This specifically includes using any of the existing protective layers below the Metal Cleaning Basin's new composite liner system or on roads outside of the basin.

203. CRUSHED STONE SURFACING FOR ROADS

203.1 Material Requirements:

a. Crushed stone for re-surfacing existing roads on the top of the basin dikes shall be composed of gravel, crushed gravel, or crushed stone that is processed to meet the following requirements:

a1. The material shall conform to Gradation CA 6 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.

a2. The material quality shall be Class D or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

203.2 Material Sources:

a. Crushed stone surfacing material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner.

PART 3 - EXECUTION

301. DEMOLITION, CLEARING, GRUBBING AND STRIPPING

301.1 General:

a. The work required is shown on the Design Drawings. No work shall be performed outside of the designated area without prior written approval of the Owner.

b. All work incidental to excavation or fill work will not be specifically indicated on the Design Drawings but shall be performed as part of the work.

301.2 Demolition:

a. Demolition and removal of minor items which are incidental to the earthwork may be required. The Earthwork Contractor shall identify any such items during their pre-bid walkdown. The Earthwork Contractor shall demolish such items as required as part of the performance of the work.

b. All waste resulting from demolition work shall be disposed of by the Earthwork Contractor in an offsite disposal area.



301.3 Clearing, Grubbing, and Topsoil Stripping:

- a. All vegetation within areas to be excavated or to receive fill shall be cleared and grubbed, stripped of topsoil and debris, and shall be inspected and approved by the Owner prior to beginning the earthwork operations.
- b. Weeds, small roots, heavy grass, and other vegetation remaining after clearing and grubbing operations shall be removed with the topsoil.
- c. Disposal:
 - c1. Stripped topsoil shall be placed in an onsite stockpile area as directed by Owner. Topsoil may be removed from the stockpile area at a later date and used to cover finished slopes and other designated areas.
 - c2. If any material remains in the topsoil stockpile area after construction is complete, the stockpile area side slopes shall be graded to a maximum slope of 20 percent (five horizontal to one vertical), the top of the pile shall be sloped to drain properly and provided with devices to control erosion, and the stockpile shall be seeded.

302. EXCAVATION

- 302.1 All material within the Metal Cleaning Basin and above the basin's existing liner shall be carefully removed. The limits and specifications for this excavation work are specified on the Design Drawings.
- 302.2 All material excavated from the Metal Cleaning Basin shall be disposed of as specified on the Design Drawings.

303. PLACEMENT OF STRUCTURAL FILL

303.1 Acceptable Placement Methods:

- a. Acceptable placement methods for Structural Fill include:
 - a1. Using a conveyor truck to place material from outside of the basin.
 - a2. Using a crane to place material from outside of the basin.
 - a3. Transporting material into the basin to the point of dumping using trucks or scrapers, while complying with maximum ground pressure requirements.
 - a4. Alternate placement method(s) proposed by the Earthwork Contractor and approved by the Owner.
- b. Requirements for Transportation of Structural Fill Materials into Basin:
 - b1. Under no circumstances shall any equipment (wheeled or tracked) traverse the Metal Cleaning Basin's existing geomembrane liner or new liner when less than 10 inches of earthen material are above the subject liner.
 - b2. Equipment transporting material into the basin shall use the permanent ramp along the basin's eastern dike.
 - b3. Only earthmoving equipment with low ground pressure shall be used to transport material inside of the basin. The Earthwork Contractor shall demonstrate that equipment entering the basin will not exert a ground pressure greater than 8 psi. The ground pressure is



influenced by the tread pattern / tire contact area and is not the reading from a tire pressure gauge.

- b4. Equipment operating within the basin shall avoid hard braking on ramps and avoid sharp turns or quick stops that could pinch or tear the existing geomembrane liner.
- b5. Structural Fill shall be placed by the “dump and spread” method in which lightweight equipment with low ground pressure is used to spread the material.
- b6. Material placement over the existing geomembrane liner during periods of warm weather can cause wrinkling and damage to the liner. Placement of the initial lift of Structural Fill shall be halted when the air temperature is greater than 85°F or less than 40°F.
- b7. When Structural Fill is being placed, a worker shall safely walk alongside earthmoving equipment spreading the material to spot and remove rocks, stones, roots, and other debris that may be present in the Structural Fill that could cause damage to the existing geomembrane liner.

303.2 Moisture Content of Structural Fill Material:

- a. At the time of compaction, the moisture content of Structural Fill material shall be within ± 3 percent of optimum moisture content as determined by ASTM D1557.
- b. Fill material containing excessive moisture shall not be compacted unless the material has dried and the moisture content is within the specified limits.
- c. Fill material that is too dry shall have moisture added and then be blended so that the moisture content is uniform prior to compaction.
- d. For granular materials, non-compliance with moisture content shall not be the sole criteria for rejection of the work.

303.3 Lift Thickness:

- a. Fill material shall be placed in horizontal layers in thicknesses compatible with the material being placed, equipment being used, and the compaction requirements.
- b. Unless otherwise approved by the Owner, the loose thickness shall not exceed the following:
 - b1. 12 inches maximum loose lift thickness for the lowest lift in contact with the Metal Cleaning Basin’s existing geomembrane liner.
 - b2. 8 inches maximum loose lift thickness for compaction by self-propelled equipment.
 - b3. 4 inches maximum loose lift thickness for compaction by hand-operated equipment.

303.4 Placement Structural Fill:

- a. Each layer of fill shall be evenly spread and moistened or aerated as required to achieve the required moisture content.
- b. Each lift of Structural Fill in the Metal Cleaning Basin shall be uniformly placed to cover the entire length and width of the basin prior to compaction or placement of the next lift.
- c. As allowed by the design of the LCRS, the top surface of each layer shall be approximately level but shall have sufficient crown or cross fall to provide adequate



drainage of water at all times during the construction period. The crown or crossfall shall be at least 1 in 50 (2 percent) but no greater than 1 in 20 (5 percent).

- d. Fill placed on slopes steeper than 20 percent (i.e., 5 horizontal to 1 vertical) shall be overfilled a minimum of 6 inches beyond the face of the slope, measured horizontally, and then cut back and trimmed to the required line and grade to expose a smooth surface uniformly compacted to the required density. Installing the fill slope to lines and grades shown on the Design Drawings and then compacting is not acceptable on the basin side slopes.
- e. Prior to placing Structural Fill material on the existing concrete ramp and concrete aprons within the Metal Cleaning Basin, the Earthwork Contractor shall intentionally roughen the existing concrete surfaces receiving Structural Fill to a minimum amplitude of 1/4 inch.

303.5 Compacting Structural Fill:

- a. Equipment:
 - a1. Each layer of fill shall be compacted by tamping, pneumatic-tired roller, or other mechanical means acceptable to the Owner that will produce the specified compaction. Sheepfoot, modified sheepfoot, padfoot, or other non-smooth drums shall not be used to compact Structural Fill placed for this work.
 - a2. At locations where it would be impractical because of inaccessibility to use self-propelled compacting equipment, fill layers shall be compacted using hand directed compaction equipment.
 - a3. When soils are used that develop a densely packed surface as a result of spreading or compacting equipment, the surface of each layer of fill shall be sufficiently roughened after compaction to ensure bonding of the succeeding layer.
- b. Inspection and Testing:
 - b1. All work is subject to inspection and testing by the CQA Contractor. The CQA Contractor shall have access to the work at all times. Testing shall be in accordance with the Contract. Refer to Specification P-1401 for inspection and testing requirements.
 - b2. Each layer of compacted fill shall be tested before proceeding with the next layer.
 - b3. It is the Earthwork Contractor's responsibility to request inspection prior to proceeding with further work that would make parts of the work inaccessible for inspection.
 - b4. If the fill material fails to meet the required density, the material shall be removed and replaced or reworked, altering the construction method as necessary to obtain the required density and compaction. Sufficient time shall be allotted between lifts for the necessary testing of the soils.
- c. Compaction Density:
 - c1. Structural Fill shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

303.6 Fine Grading:

- a. Structural Fill shall be fine graded using equipment with low ground pressure.



303.7 Reporting Damage:

- a. If damage occurs to the Metal Cleaning Basin's existing geomembrane liner while placing Structural Fill material, the Earthwork Contractor shall report the damage(s) to the Owner and Geosynthetics Contractor immediately so that repairs can be performed without delay.
- b. Repairs to the existing geomembrane liner shall be made by the Geosynthetics Contractor as specified in Section 319020 at no additional cost to the Owner.

304. REQUIREMENTS FOR PREPARATION AND ACCEPTANCE OF STRUCTURAL FILL SURFACE SUPPORTING COMPOSITE LINER

304.1 Intersections Between Planes:

- a. Intersections between planes shall be rounded as specified below to provide a firm bearing for the geosynthetic clay liner (GCL) without abrupt change:

	<u>Intersection of Slope</u>	<u>Radius of Rounding</u>
a1.	Side slope and bottom plane	3 feet minimum
a2.	Side slope and top of dike or grade	6 inch minimum
a3.	Intersection of 2 bottom planes (planes sloped at 10% or less)	Straight line is acceptable

304.2 Earthwork Contractor's Responsibility:

- a. The Earthwork Contractor shall be responsible for preparing the surface of the Structural Fill beneath the GCL prior to placement of the GCL.
- b. The subgrade is subject to inspection and acceptance by the Owner and the CQA Geosynthetics Inspector prior to installation of the GCL.

304.3 Inspection:

- a. The Earthwork Contractor, the Owner, the Geosynthetics Contractor, and the CQA Geosynthetics Contractor shall inspect and document the following:
 - a1. Lines, grades, and slopes are in conformance with the Design Drawings.
 - a2. Surface has been graded and rolled such that it is free of irregularities, protrusions, loose soil, and abrupt changes in grade.
 - a3. The surface is free of debris, clods, stones, roots, and organic material.
 - a4. That no settlement or erosion has occurred.
 - a5. That there are no side slope failures.
 - a6. That there are no moisture seeps, puddling, or ponding.
 - a7. That there are no soft spots.



304.4 Certification:

- a. The Geosynthetics Contractor shall provide written certification that the surface is acceptable. The acceptance shall be recorded and copies of the certification given to both the Earthwork Contractor, the CQA Contractor, and the Owner.
- b. Only as much surface as will be lined the following day shall be inspected, certified, and documented as acceptable.

304.5 Geosynthetic Contractor's Responsibility:

- a. After the surface for the Metal Cleaning Basin's new composite liner system has been accepted by the Geosynthetics Contractor, the responsibility for changes or repair work become the Geosynthetics Contractor's.
- b. Necessary changes or repairs made to the surface after the surface has been accepted by the Geosynthetics Contractor shall be made at no additional cost to the Owner.

305. PREPARATION OF CONCRETE SURFACES

305.1 All concrete surfaces on which Structural Fill material will be placed shall be intentionally roughened in accordance with Paragraph 303.4e.

305.2 All concrete surfaces that will come in contact with the Metal Cleaning Basin's new composite liner system shall be free of sharp edges or rough spots that can puncture or abrade the new liner materials. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor. Where specified on the Design Drawings, geotextiles shall be placed between the concrete surface and the new composite liner system components to act as protective cushioning layers for the new liner components.

306. CREST ANCHORAGE OF GEOSYNTHETIC MATERIALS

306.1 Anchor Trench Excavation and Shaping:

- a. Where specified on the Design Drawings, anchor trenches shall be excavated by the Earthwork Contractor at the top of the basin slope to the lines and widths shown on the Design Drawings prior to the Geosynthetics Contractor deploying the geosynthetic clay liner component of the Metal Cleaning Basin's new composite liner system.
- b. A slightly rounded corner shall be provided in the trench where the geosynthetic materials adjoin the trench to avoid sharp bends in the geosynthetic materials. The radius of rounding is shown on the Design Drawings. No loose soil shall be allowed to underlie the geosynthetic materials in the anchor trench.
- c. Anchor trenches shall be adequately drained to prevent ponding or softening of the adjacent soils while the trenches are open.

306.2 Fill Placement Over Liner Run-Outs and in Anchor Trenches:

- a. The Earthwork Contractor shall place fill over liner run-outs or in an anchor trench after all geosynthetic materials are in place and seams are welded.
- b. Fill placement over liner run-outs and in anchor trenches shall occur during the morning or during extended periods of overcast skies when the geosynthetic materials are at their most contracted states.
- c. The first lift of fill placed above geosynthetic materials in an anchor trench may be 12 inches in thickness.



- d. If compacted using hand-operated equipment, backfill shall be placed in lifts not exceeding 4 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.
- e. If compacted using self-propelled equipment, backfill shall be placed in lifts not exceeding 8 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

307. GRADING TOLERANCES

- 307.1 The acceptable deviation from lines and grades indicated on the Design Drawings shall be as shown in Table 319005-1.
- 307.2 Slopes shall be finished in conformance with the lines and grades shown on the Design Drawings. When completed, the average plane of a slope shall conform to the slope indicated on the Design Drawings, and no point on the completed slope shall vary from the designated plane by more than 6 inches measured at right angles to the slope.

308. CLEAN-UP

- 308.1 All waste, excess materials, and debris shall be disposed of in an offsite disposal area approved by the Owner.

TABLE 319005-1
ACCEPTABLE DEVIATIONS FROM DESIGN LINES AND GRADES

Type of Installation (Excavation or Fill)	Maximum Acceptable Deviation from Line (feet)	Maximum Acceptable Deviation from Grade ⁽¹⁾ (feet)
General Earthwork		
Top of Structural Fill	±0.3	+0.1 to -0.0
Roads		
Road Embankment	±0.2	+0.1 to -0.0
Leachate Collection & Removal System		
Leachate Collection Pipe Trench	±0.3	+0.1 to -0.0

Note:

- (1) After initial settlement has taken place. Initial settlement is that settlement that will occur up to the time of determination and acceptance of final grade elevation as approved by the Owner.

END OF SECTION 319005

SECTION 319020

HIGH-DENSITY POLYETHYLENE GEOMEMBRANE LINER WITH GEOCOMPOSITE

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the minimum material and installation requirements for the high-density polyethylene (HDPE) geomembrane liner to be used as the upper component of the retrofitted Metal Cleaning Basin's new composite liner system, and the minimum material and installation requirements for the drainage geocomposite to be used in the retrofitted Metal Cleaning Basin's new leachate collection and removal system (LCRS), all in accordance with the Design Drawings and as specified herein.

101.2 The Work shall include, but not be limited to, the following items:

- a. Manufacture, shipping, handling, and storage of HDPE geomembrane and drainage geocomposite materials.
- b. Preparation and inspection of surfaces to be lined.
- c. Placement and seaming of geomembrane.
- d. Placement and joining drainage geocomposite.
- e. Crest anchorage of geomembrane and drainage geocomposite using liner run-outs or anchor trenches as specified on the Design Drawings.
- f. Attachment of the geomembrane to concrete structures and existing marker posts.
- g. Non-destructive field testing of geomembrane seams.
- h. Removal of samples of geomembrane seams and transportation to an independent third-party laboratory for destructive testing.
- i. Repair of defective geomembrane seams.
- j. Repair of defects in the geomembrane and at locations where samples were taken.
- k. Visual inspection of the completed geomembrane liner.

101.3 Definitions and Qualifications:

- a. The following definitions of terms shall apply throughout this section:
 - a1. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor's work.
 - a2. GM/GC Manufacturer: The manufacturer who is responsible for manufacturing and transporting the HDPE geomembrane liner and drainage geocomposite materials to the site.
- b. Qualifications:
 - b1. The GM/GC Manufacturer shall be approved by the Owner. Owner's considerations when approving the GM/GC Manufacturer may include, but are not limited to, financial, safety, and prior performance aspects of the manufacturer.

- b2. The GM/GC Manufacturer shall have an internal QA/QC program to ensure and to verify the manufactured products consistently meet or exceed the requirements of this section.
- b3. The GM/GC Manufacturer shall have at least 10 years of experience manufacturing products similar to those required for this Work.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

- 102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:
- a. GW Specification P-1800:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319025 – Geosynthetic Clay Liner.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - b. CQA Specification P-1801:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

- 103.1 Standards, specifications, manuals, codes, and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 103.4 ASTM — ASTM International:
- a. A276 Specification for Stainless and Heat Resisting Steel Bars and Shapes.
 - b. B633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - c. D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - d. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - e. D1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
 - f. D1505 Test Method for Density of Plastics by the Density-Gradient Technique.
 - g. D1603 Standard Test Method for Carbon Black Content in Olefin Plastics.
 - h. D4218 Standard Test Method for Determination of Carbon Black Content of Polyethylene Compounds by the Muffle-Furnace Technique.

- i. D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.
- j. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- k. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- l. D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- m. D4716 Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- n. D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
- o. D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
- p. D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
- q. D5261 Test Method for Measuring Mass per Unit Area of Geotextiles.
- r. D5397 Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
- s. D5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- t. D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
- u. D5721 Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.
- v. D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
- w. D5885 Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Colorimetry.
- x. D5994 Test Method for Measuring Core Thickness of Textured Geotextile.
- y. D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- z. D6364 Standard Test Method for Determining Short-Term Compression Behavior of Geosynthetics.
- aa. D6392 Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-fusion Methods.
- bb. D7005 Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.
- cc. D7179 Standard Test Method for Determining Geonet Breaking Force
- dd. D7466 Standard Test Method for Measuring Asperity Height of Textured Geomembranes
- ee. D8117 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by Differential Scanning Calorimetry.

- 103.5 Geosynthetic Research Institute (GRI):
- a. GM6 Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembrane.
 - b. GM9 Cold Weather Seaming of Geomembranes
 - c. GM10 Specification for the Stress Crack Resistance of Geomembrane Sheet.
 - d. GM13 Standard Specification for Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
 - e. GM14 Standard Guide for Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.
 - f. GM19a Standard Specification for Seam Strength and Related Properties of Thermally Bonded Homogenous Polyolefin Geomembranes/Barriers.
- 103.6 Industrial Fabrics Association International (IFAI):
- a. Field Sewing of Geotextiles by V. Diaz and B. Myles, 1989.
104. SUBMITTALS
- 104.1 The GW Contractor shall submit the following drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 104.2 Submittals with the Bid Proposal:
- a. Geosynthetics Contractor:
 - a1. Geosynthetics Contractor's name, address, and telephone number.
 - a2. Geosynthetics Contractor's qualifications, including letter or certificate from the GM/GC Manufacturer documenting the manufacturer's approval of the Geosynthetics Contractor (or subcontracted Installer) to install the geomembrane and drainage geocomposite materials supplied for the project.
 - a3. Installer's qualifications if the Geosynthetics Contractor is proposing to subcontract the geomembrane and/or drainage geocomposite installation work.
 - b. HDPE Geomembrane and Drainage Geocomposite Materials:
 - b1. Certification of Compliance from the GM/GC Manufacturer , signed by its authorized representative, indicating that the materials meet the criteria specified herein and that those requirements are guaranteed by the manufacturer.
 - b2. One representative sample of each type of geosynthetic material.
 - b3. GM/GC Manufacturer's Quality Control and Quality Assurance Policies and Procedures for the geomembrane and drainage geocomposite materials being supplied for the project.

- c. Warranty:
 - c1. Written warranties from the GM/GC Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as applicable.
 - c1.1 The minimum period of warranty for materials shall be 20 years with first year non-prorated.
 - c1.2 The minimum period of warranty for installation shall be 5 years with the first year non-prorated.
 - c2. Warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the GM/GC Manufacturer and the Geosynthetics Contractor.
- 104.3 Submittals After Award:
 - a. Geomembrane Resin:
 - a1. Certification signed by the GM/GC Manufacturer's authorized representative stating that the resin meets the criteria specified herein.
 - a2. Certification signed by the GM/GC Manufacturer's authorized representative stating the origin of the resin and that all resin is from the same supplier (including resin supplier's name, identification brand name, and number).
 - a3. Copies of GM/GC Manufacturer's and resin supplier's QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch used to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index and percent carbon black.
 - b. Geomembrane Sheeting:
 - b1. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane to be shipped to the site, along with chain of custody and certification that the samples submitted are from the geomembrane material to be delivered to the site. The number of samples shall be determined in accordance with the number of CQA conformance tests specified in Specification P-1801.
 - b2. Signed certification that the properties of the manufactured sheeting meet the criteria specified herein and are guaranteed by the GM/GC Manufacturer.
 - b3. Statement certifying that no post consumer resin (PCR) has been added to the formulation.
 - b4. Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).
 - b5. Copies of all of the GM/GC Manufacturer's QA/QC certificates. The certificates shall include documents of test results.
 - c. Drainage Geocomposite:
 - c1. Copy of the raw material producers' certificates describing the origin and identification of the raw materials.
 - c2. Copy of the raw material producers' QC certificates.

- c3. Statement certifying that the manufactured drainage geocomposite is free of per- and polyfluoroalkyl substances (PFAS).
- c4. Copy of the GM/GC Manufacturer's QA/QC certificates on tests performed on the geonet core, geotextile cap and carrier, and double-sided laminated geocomposite as specified in Table 319020-2 and a summary of the results of the tests.
- c5. Certification that the properties of the manufactured material meet the criteria specified herein and are guaranteed by the GM/GC Manufacturer.
- d. Extrudate Resins or Rod for Seaming Geomembranes:
 - d1. Certification that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.
- e. Installation Data:
 - e1. GM/GC Manufacturer's proposed geomembrane panel layout for each installation.
 - e2. GM/GC Manufacturer's recommended procedures for making and testing seams if different from those specified herein.
 - e3. GM/GC Manufacturer's recommended procedures for repairing damaged geomembrane sections and seams if different from those specified herein.
 - e4. GM/GC Manufacturer's details of geomembrane liner anchorage and attachment to structures if different from those specified herein and from the details shown on the Design Drawings.
- 104.4 Submittals After Installation is Complete:
 - a. Geosynthetics Contractor:
 - a1. As-built panel layout.
 - a2. Drawing showing locations of repairs and types of repairs made.
 - a3. Locations of destructive tests.
 - a4. Results of destructive tests.
 - a5. Results of non-destructive tests.
- 105. QUALITY ASSURANCE
 - 105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of the responsibility for providing materials and installation in compliance with specified requirements.
 - 105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
 - 105.3 CQA activities shall be performed as described herein and in Specification P-1801.

PART 2 - PRODUCTS

201. HIGH-DENSITY POLYETHYLENE GEOMEMBRANE

201.1 Manufacturers of HDPE Geomembrane Products:

- a. The products of the following manufacturers meeting the requirements herein are acceptable:
 - a1. AGRU America, 500 Garrison Road, Georgetown, SC 29440.
 - a2. Solmax, 19103 Gundle Road, Houston, TX 77073.
 - a3. Others as approved by the Owner.

201.2 General Requirements:

- a. All HDPE geomembrane shall be textured on both sides and meet the requirements of Table 319020-1.
- b. The top surface of the HDPE geomembrane shall be white.
- c. Textured surfaces shall be manufactured using a co-extrusion process, have uniform texturing appearance, and be free from agglomerated texturing material and such defects that would affect the specified properties of the HDPE geomembrane.
- d. Each roll of HDPE geomembrane shall have 6-inch wide (minimum) smooth edges to provide suitable seaming surfaces. Textured HDPE geomembrane without smooth edges may be provided if approved by the Owner.
- e. The HDPE geomembrane shall be manufactured from first quality, virgin resin. Blending of resins shall not be allowed. No recycled or reworked geomembrane may be used except edge trim generated during the manufacturing process, which shall be limited to at most 10%. No post-consumer resin (PCR) of any type shall be added to the formulation.
- f. The resin used to produce the HDPE geomembrane shall be formulated to be resistant to chemical and ultraviolet degradation.
- g. The HDPE geomembrane shall be free of plasticizers, leachable additives, and per- and polyfluoroalkyl substances (PFAS).
- h. During manufacture, each roll of HDPE geomembrane shall be continuously monitored across the width to assure uniformity of thickness. Thickness measurements shall meet the requirements of Table 319020-1.
- i. The HDPE geomembrane shall be free of factory seams.
- j. The HDPE geomembrane shall be free from dirt, oil, foreign matter, scratches, cracks, creases, bubbles, blisters, pits, tears, holes, pores, pinholes, voids, undispersed raw material, any sign of contamination or other defects that may affect serviceability, and shall be uniform in color, thickness, and surface texture.
- k. Panels of HDPE geomembrane shall be capable of being seamed in the field to yield seams that are as resistant to waste liquids as the sheeting.
- l. The HDPE geomembrane shall be manufactured in the United States or Canada.

TABLE 319020-1
HIGH-DENSITY POLYETHYLENE TEXTURED GEOMEMBRANE REQUIREMENTS⁽¹⁾

Property	ASTM Test Method	Polyethylene Base Compound	Geomembrane	Testing Frequency
Nominal Thickness (mil)	--	--	60	--
Resin Properties				
Density of Base Resin, g/cc (min.)	D1505 / D792	0.932		5,000 lbs. of Resin
Oxidative Induction Time (OIT) (min. ave.)				
a. Standard OIT (minutes)	D8117	100	--	5,000 lbs. of Resin
-- or --				
b. High Pressure OIT (minutes)	D5885	400	--	5,000 lbs. of Resin
Oven Aging at 85°C	D5721	--	--	
a. Standard OIT (min. ave.), % retained after 90 days	D8117	55	--	One per Formulation
-- or --				
b. High Pressure OIT (min. ave.), % retained after 90 days	D5885	80	--	One per Formulation
UV Resistance				
High Pressure OIT (min. ave.), % retained after 1600 hrs.	D5885	50	--	One per Formulation
Analytical Properties				
Formulated Density, g/cc (min.)	D1505 / D792	--	0.940	5,000 lbs. of Resin
Carbon Black Content, % (range)	D4218	2.0 – 3.0	--	5,000 lbs. of Resin
Carbon Black Dispersion for 10 Different Views	D5596	Note (2)	--	5,000 lbs. of Resin
Mechanical Properties				
Thickness, mils	D5994	--	--	One per Roll
Minimum Average			57	
Lowest Individual for 8 out of 10 Values			54	
Lowest Individual for 10 out of 10 Values			51	
Asperity Height, mils (min. ave.)	D7466	--	16	Every Second Roll ⁽³⁾
Tensile Properties in Each Direction (min. ave.)	D6693 (Type IV Specimen at 2 ipm)			5,000 lbs. of Resin
Tensile Stress at Yield, ppi (min.)		--	126	
Elongation at Yield, % (min.)		--	12	
Tensile Stress at Break, ppi (min.)		--	90	
Elongation at Break, % (min. 2" gage length)		--	100	
Tear Resistance, lbs. (min. ave.)	D1004		42	5,000 lbs. of Resin
Puncture Resistance, lbs. (min. ave.)	D4833		90	5,000 lbs. of Resin
Bonded Seam Strength ⁽⁴⁾	D6392	--	--	
Shear Strength, ppi		--	120	
Peel Adhesion (Hot Wedge), ppi		--	91	
Peel Adhesion (Extrusion Fillet), ppi		--	78	
Environmental Aging Effect on Properties				
Stress Crack Resistance, hours (min.)	D5397	--	500	Per GRI GM10

Notes:

- Requirements shown in this table meet the minimum requirements of GRI Standard GM13, Revision 16 (March 17, 2021) except for bonded seam strength.
- Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
- Alternate measurement side for double-sided textured sheet.
- Seam strength requirements shown in this table meet the minimum requirements of GRI Standard GM19a, Revision 10 (March 18, 2021).

201.3 Panel Layout:

- a. Prior to manufacture of the geomembrane, a panel layout of the surface to be lined shall be made. Each panel to be used for the installation shall be given a numeric or alphanumeric identification number.
- b. Each panel identification number shall be related in writing to the manufacturing roll number that identifies the resin type, batch number, and date of manufacturer.
- c. The panel layout shall be made considering the following requirements:
 - c1. Panel lengths shall include slope gain and run-out distance / anchorage.
 - c2. Perpendicular tie-ins shall be made a minimum of 5 feet beyond the toe of the slope.
 - c3. A minimum 6-inch overlap shall be allowed at double fusion welded seams.
 - c4. All field seams on slopes shall be oriented parallel to the slope (oriented along, not across the slope).
 - c5. The number of seams in corners or odd shaped geometric locations shall be minimized.

201.4 Packaging and Shipping:

- a. All HDPE geomembrane liner material shall be shipped to the project site in rolls. No HDPE geomembrane liner material shall be folded.
- b. Packaging and transportation of all HDPE geomembrane liner materials to the project site shall be the responsibility of the GM/GC Manufacturer, who shall retain responsibility of the material until the material is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the HDPE geomembrane liner material at the project site.
- c. A label shall be attached or adhered to each roll of the HDPE geomembrane. The label shall identify the following:
 - c1. Name of GM/GC Manufacturer.
 - c2. Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier's name, resin production plant, resin brand name type, and production date of the resin).
 - c3. Order number.
 - c4. Date of manufacture.
 - c5. Manufacturing lot number.
 - c6. Geomembrane thickness and type.
 - c7. Roll identification number.
 - c8. Roll dimensions (length and width) and weight.
 - c9. Panel number, which shall be referenced to the proposed HDPE geomembrane liner panel layout drawing prepared by the GM/GC Manufacturer.

202. DRAINAGE GEOCOMPOSITE

202.1 Manufacturers of Drainage Geocomposite Products:

a. The products of the following manufacturers meeting the requirements herein are acceptable:

a1. AGRU America, 500 Garrison Road, Georgetown, SC 29440.

a2. Solmax, 19103 Gundle Road, Houston, TX 77073.

a3. Others as approved by the Owner.

202.2 General Requirements:

a. The drainage geocomposite shall consist of a HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet.

b. HDPE Geonet:

b1. The geonet shall be a profiled geonet manufactured by extruding two sets of polyethylene strands to form a three-dimensional structure in a diamond shape to provide planar water flow.

b2. The HDPE geonet formulation shall consist of a minimum of 97 percent of polyethylene resin, with the balance being carbon black and antioxidants for protection during extrusion and long-term service performance. No fillers, extenders, or other materials shall be mixed into the formulation.

b3. Regrind or reworked polymer which is previously processed HDPE geonet in chip form is acceptable if:

b3.1 It is the same formulation as the geonet being produced.

b3.2 No more than 25% rework material is used in the formulation.

b4. No PCR of any type shall be added to the formulation.

c. Non-Woven Geotextiles:

c1. The geotextiles shall be non-woven, spun bonded fabric manufactured from long chain polymeric filaments, yarns, staple fibers, or other structural components of polyester or polypropylene formed into a stable network (mesh).

c2. The nominal weight of each geotextile shall be 8 oz/sy.

202.3 Material Requirements:

a. The drainage geocomposite shall meet the requirements of Table 319020-2.

TABLE 319020-2
DRAINAGE GEOCOMPOSITE MATERIAL REQUIREMENTS

Property	Value	ASTM Test Method	Test Frequency
Geonet Core (Before Lamination)			
Thickness ⁽¹⁾	300 mil (min. ave.)	D5199	Per 50,000 lb.
Density of Formulated Material ⁽²⁾	0.95 g/cm ³ (min. ave.)	D1505 / D792	Per 50,000 lb.
Carbon Black Content	1.5% to 3.0%	D1603 / D4218	Per 100,000 lb.
Tensile Strength	75 lb/in. (min. ave.) ⁽³⁾	D7179	Per 50,000 lb.
Compressive Strength	120 psi (min. ave.)	D6364 ⁽⁴⁾	Per 100,000 lb.
Geotextile Cap and Carrier (Before Lamination)			
Mass per Unit Area	8 oz/sy (Min. ARV)	D5261	Varies ⁽⁵⁾
Grab Strength	200 lb (Min. ARV)	D4632	
Grab Elongation	50% (Min. ARV)	D4632	
Tear Strength	80 lb (Min. ARV)	D4533	
Puncture Strength	430 lb (Min. ARV)	D6241	
Permittivity	0.2 sec ⁻¹ (Min. ARV)	D4491	
AOS	0.25 (Max. ARV)	D4751	
UV Stability	50% Retained (500 hr)	D4355	
Double-Sided Laminated Composite			
Flow Rate / Width	0.42 gpm / ft (min. ave.)	D4716 ⁽⁶⁾	Per 200,000 lb.
Hydraulic Gradient	0.03		
Pressure	1,500 psf		
Seating Dwell Time	15 min.		
Ply Adhesion	1.0 lb/in. (min. ave.) ⁽⁷⁾	D7005	Per 100,000 lb.

Notes:

- (1) The diameter of the presser foot shall be 2.22 in. and the pressure shall be 2.9 psi.
- (2) The density of the base resin will be slightly lower than the density of the formulated material.
- (3) This is the average peak value for five equally spaced machine direction tests across the roll width.
- (4) Test shall be conducted using ASTM D6364 Section 6.3, the movable plate method.
- (5) Because the specified geotextile properties are based on average roll values (ARV), the statistics needed to obtain such values will dictate the frequency of testing.
- (6) Geocomposite shall be tested for ASTM D4716 flow rate per unit width between rigid end plates. Test values are for machine direction only.
- (7) This is the average of five equally spaced machine direction tests across the roll width. Both sides of the geocomposite shall be tested for ply adhesion.

202.4 Packing and Shipping:

- a. The drainage geocomposite shall be shipped to the project site in rolls. No material shall be folded.
- b. Packaging and transportation of all drainage geocomposite materials to the project site shall be the responsibility of the GM/GC Manufacturer, who shall retain responsibility until the drainage geocomposite is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the drainage geocomposite material at the project site.
- c. A label shall be attached or adhered to each roll of the drainage geocomposite. The label shall identify the following:
 - c1.1 Name of GM/GC Manufacturer.
 - c1.2 Product identification (e.g., brand name, product code).
 - c1.3 Order number.
 - c1.4 Date of manufacture.
 - c1.5 Manufacturing lot number.
 - c1.6 Drainage geocomposite thickness and type.
 - c1.7 Roll identification number.
 - c1.8 Roll dimensions (length and width) and weight.
 - c1.9 Panel number.

203. MATERIALS FOR ATTACHMENT OF GEOMEMBRANE TO CONCRETE

203.1 Batten Strip:

- a. Batten strip material shall be hot rolled, annealed, and pickled Type 316L stainless steel in accordance with ASTM A276.
- b. Strips shall be 1/4 inch thick by 2 inches wide. Random lengths are acceptable.

203.2 Expansion Anchors:

- a. Expansion anchors shall be stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633. Wedges shall be manufactured from ANSI Type 304 stainless steel. Hilti Kwik Bolt 3 Expansion Anchors, or equal, are acceptable.
- b. Wedge-type anchors shall have a minimum yield strength of 60,000 psi. Stud-type anchors shall have a minimum tensile strength of 65,000 psi.
- c. Anchors shall be 3/8-inch diameter by 3 1/2-inches long.
- d. Washers for anchors shall be Type 18-8 stainless steel flat washers for 3/8-inch diameter bolt size.

203.3 Neoprene Gaskets for Batten Strips:

- a. Neoprene gaskets shall be 1/4-inch thick by 2-inches wide, closed cell neoprene sponge sealing strips. Operating temperature range of neoprene shall be -40°F to +220°F.

- b. Neoprene gaskets placed against concrete shall have a pressure sensitive adhesive on the side of the gasket placed against the concrete.

PART 3 - EXECUTION

301. ONSITE HANDLING AND STORAGE

301.1 Unloading:

- a. Handling and unloading of materials shall be responsibility of the Geosynthetics Contractor.
- b. Upon arrival at the site, the rolls of geomembrane liner and drainage geocomposite shall be carefully unloaded by the Geosynthetics Contractor in accordance with the GM/GC Manufacturer's recommendations and in a manner to ensure that the material is not damaged.

301.2 Inspection:

- a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of geomembrane and drainage geocomposite for damage or defects. This inspection shall be done without unrolling any rolls unless damage to the inside of a roll is found or suspected.
- b. Any damage or defects shall be noted and immediately reported to the Owner, the GM/GC Manufacturer, and the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner (or their authorized representative), is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.

301.3 Storage:

- a. The Owner will provide on-site, outdoor storage space in a location near the area to be lined.
- b. The Geosynthetics Contractor shall store and stage the rolls such that on-site transportation and handling are minimized.
- c. The Geosynthetics Contractor shall be responsible for protecting the rolls of geomembrane liner and drainage geocomposite from damage, moisture, theft, and vandalism.
- d. The rolls of geomembrane and drainage geocomposite shall be placed on a smooth surface free of rocks and standing water.

302. PREPARATION OF SURFACES TO BE LINED

302.1 Geosynthetic Clay Liner:

- a. See Section 319025 regarding installation, inspection, and acceptance of the geosynthetic clay liner (GCL) underlying the HDPE geomembrane liner.

302.2 Preparation of Concrete Surfaces:

- a. All concrete surfaces that will come in contact with a geomembrane shall be free of sharp edges or rough spots that can puncture or abrade the geomembrane. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor.

- b. Where specified on the Design Drawings, one or more layers of geomembrane scuff strips shall be placed between the concrete and the geomembrane liner to act as a protective layer for the geomembrane liner.

303. INSTALLATION OF HDPE GEOMEMBRANE LINER

303.1 Weather:

- a. Geomembrane shall not be placed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds that acceptable welds can be made at the prevailing temperature. Trial welds shall be as described in Paragraph 303.7c. Under no circumstances shall geomembrane be deployed when the air temperature is below 5°F.

- a1. If the air temperature is above 32°F, trial welds shall be as described in Paragraph 303.7c.

- a2. If the air temperature is at or below 32°F, trial welds and field seaming shall be as described in GRI Test Method GM9.

- b. Geomembrane shall not be deployed or placed in any of the following conditions:

- b1. During any rainfall or snowfall.

- b2. In ponded water.

- b3. During high winds.

- b4. In the presence of excessive moisture due to fog or dew.

- b5. On frozen subgrade.

303.2 Precautions to Prevent Wind Damage:

- a. If possible, work shall be oriented in the direction of the prevailing wind.
- b. To prevent uplift of the geomembrane by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the edges of the exposed sheets using sandbags, tires, or other means which will not damage the geomembrane.

303.3 Other Precautions to Prevent Damage:

- a. Protection of the geomembrane from damage due to foot traffic on the slopes shall be provided.
- b. Provisions of facilities for safe entrance and egress of employees from sloped depressions shall be provided.

303.4 Panel Layout:

- a. The panels shall be placed in accordance with the GM/GC Manufacturer's panel layout drawing to ensure that they are placed in the proper direction for seaming.
- b. If panels are installed in a location other than indicated on the panel layout drawing, the revised location shall be indicated on an "as-built" layout drawing. The "as-built" record drawing shall be submitted to the Owner and the CQA Contractor after all of the geomembrane has been placed and seamed.

303.5 Panel Deployment:

- a. Only the panels that can be anchored and seamed together in one shift shall be unrolled.
- b. Unroll and layout panels in as close to the final position as possible. Pulling geomembrane panels should be minimized to reduce the chance of permanent tension.
- c. The methods and equipment used to deploy the panels shall not damage the geomembrane or the supporting surface.
- d. Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the geomembrane at the lowest expected operating temperature.

303.6 Replacement of Damaged Geomembrane:

- a. Any area of a panel which, in the judgement of the Owner and/or the CQA Contractor, becomes seriously damaged (torn, twisted, or crimped permanently) shall be replaced at no additional cost to the Owner.

303.7 Field Seaming:

a. Method of Seaming:

- a1. The primary welding procedure for seams shall be double wedge fusion welding.
- a2. Extrusion welding shall be used only for repairs, detail work, and for seaming where double wedge fusion welding is not possible.
- a3. The rods used for extrusion welding shall be the same type of resin as the geomembrane, unless otherwise approved by the Owner.
- a4. The use of solvents or adhesives is not permitted.

b. General Requirements for Seaming:

- b1. On slopes steeper than 10 horizontal to 1 vertical, seams shall be oriented parallel to the line of maximum slope (oriented up and down, not across the slope) when possible. No seams oriented across the slope shall be used unless approved by the Owner.
- b2. Seams parallel to the toe of the slope shall be located a minimum of 5 feet from the toe.
- b3. Seams parallel to the crest of the slope shall be located a minimum of 2 feet from the crest.
- b4. Seams at the bottom of a slope shall be overlapped so that the upslope sheet is positioned above the downslope sheet.
- b5. Seaming shall extend to the outside edge of panels to be covered with fill material or to be placed in an anchor trench. Seams at sheet corners of three or four sheets shall be completed with a patch having a minimum dimension of 24 inches, extrusion welded to the parent sheets.
- b6. All cross seams between the two rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of geomembrane.

- c. Trial Welds Prior to Beginning Seaming:
 - c1. Trial welds are required for pre-qualification of personnel, equipment, and procedures for making seams on identical geomembrane material under the same climatic conditions as the actual field production seams will be made.
 - c2. Trial welds shall be made as follows:
 - c2.1 Prior to each seaming period.
 - c2.2 Every 4 to 5 hours (i.e., at the beginning of the work shift and after the lunch break).
 - c2.3 Whenever personnel or equipment are changed.
 - c2.4 When climatic conditions result in wide changes in geomembrane temperature.
 - c2.5 When requested by CQA Geosynthetics Inspector for any seaming crew or piece of welding equipment if problems are suspected.
 - c3. Once qualified by passing a trial weld, welding technicians shall not change parameters without performing another trial weld.
 - c4. Trial welds shall be made on both double wedge fusion welds and on extrusion welds.
 - c5. A test strip shall be prepared by joining two pieces of geomembrane, each piece shall be at least 6 inches wide. The length of double wedge fusion welded seams shall be a minimum of 10 feet long. The length of an extrusion welded seam shall be a minimum of 4 feet long. The CQA Geosynthetics Inspector shall witness the fabrication of each test strip.
 - c6. All test welds shall be tested by destructive testing. Testing can be done as soon as the seam cools.
 - c7. A minimum of three 1-inch wide sample strips shall be cut from each test strip, one from each end and one from the middle. The location of each sample shall be selected by the CQA Geosynthetics Inspector. The test strips shall be tested in peel at 2 inches per minute using a field tensiometer. The CQA Geosynthetics Inspector shall witness all tests.
 - c8. If any of the test specimens fail, a new test strip shall be fabricated and the tests repeated for the new strip. If additional specimens fail, the seaming apparatus and the seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and successful trial welds have been achieved.
 - c9. The trial weld is considered acceptable if, when tested for peel adhesion using the field tensiometer, all three specimens meet the criteria specified in Table 319020-1 for both peel and shear under Bonded Seam Strength, or the three specimens exhibit Film Tear Bond (FTB) (yielding of the parent material before seam failure). In the case of a double wedge fusion welded seam, both welds must pass in order to be considered acceptable.
 - c10. If the specimens pass the tests, production seaming operations can begin.
 - c11. The Geosynthetics Contractor shall document all data on each trial weld, including:
 - c11.1 Date.
 - c11.2 Time.

- c11.3 Operator.
- c11.4 Machine number.
- c11.5 Ambient temperature.
- c11.6 Operating temperature.
- c11.7 Speed setting.
- c11.8 Pass/Fail designation.
- d. Preparation for Seaming:
 - d1. Prior to seaming, the surface of the geomembrane shall be wiped with a clean cloth to ensure that it is clean and free from moisture, grease, dust, dirt, and debris of any kind before seam welding is started.
 - d2. The panels shall be adjusted so that the seams are aligned to eliminate wrinkles and fish mouths. Where necessary, fish mouths and wrinkles shall be cut to achieve flat overlap.
- e. Seaming:
 - e1. Seaming shall be performed in accordance with the GM/GC Manufacturer's accepted procedure.
 - e2. Double Wedge Fusion Welds:
 - e2.1 The panels shall be overlapped a minimum of 4 inches prior to welding.
 - e2.2 A vehicle-mounted automated hot wedge welding apparatus shall be used to make each seam.
 - e3. Extrusion Fillet Welding:
 - e3.1 Geomembrane overlap shall be a minimum of 3 inches for extrusion welding.
 - e3.2 Geomembrane panels shall be temporarily bonded using a hot air device prior to extrusion welding.
 - e3.3 The edge of the geomembrane to be fillet welded shall be pre-beveled before heat-tacking the seam in place.
 - e3.4 The seam overlap shall be ground (abraded) no more than one hour prior to welding.
 - e3.5 Grinding shall be performed in accordance with the GM/GC Manufacturer's instructions in a manner that does not damage the geomembrane.
 - e3.6 Grinding shall not extend more than 1/4 inch past the area to be covered with extrudate during welding.
 - e3.7 All grind marks shall be covered with extrudate.
- 303.8 Non-Destructive Field Testing
 - a. General:
 - a1. All non-destructive field testing shall be performed and documented by the Geosynthetics Contractor.

- a2. The CQA Geosynthetics Inspector shall observe all non-destructive test procedures.
- a3. One hundred (100) percent of the seam length shall be tested using non-destructive procedures to check the continuity of the field seams. Non-destructive testing is not meant to qualify seam strength.
- a4. Air pressure testing shall be performed in accordance with ASTM D5820 and GRI GM6.
- a5. Vacuum box testing shall be performed in accordance with ASTM D5641 and as specified herein.
- a6. Continuity testing shall be performed as seaming progresses or as soon as a suitable length of seam is available, not at the completion of all field seaming.
- b. Double Wedge Fusion Welded Seams:
 - b1. Double wedge fusion welded seams shall be tested using air pressure testing.
 - b2. The procedure for testing shall be as specified in GRI GM6 for the type and thickness of geomembrane in use.
 - b3. The following pressures are applicable to all HDPE geomembrane. After an initial 2-minute pressure stabilization period, the pressure shall be maintained between 27 and 30 psi for 60 mil HDPE geomembrane. The pressure shall be sustained for a minimum of 5 minutes. The loss of pressure shall not exceed a maximum of 3 psi in 5 minutes. If the pressure does not stabilize in the first two minutes or the pressure loss exceeds the loss specified, the seam test shall be considered a failure.
 - b4. For every seam that fails a seam test:
 - b4.1 The leak or suspected leak shall be located and repaired.
 - b4.2 The repaired seam shall be re-tested as required until all leaks are identified and repaired and the seam passes a subsequent air pressure test.
 - b5. When the geometry of a double wedge fusion weld makes air testing impossible or impractical, vacuum testing may be used to test the seam.
- c. Extrusion Welded Seams:
 - c1. Extrusion welded seams shall be tested using vacuum chamber testing in accordance with ASTM D5641.
 - c2. The completed seam shall exhibit no leakage when tested between 4 and 8 psi minimum vacuum for approximately 10 seconds.
 - c3. If leaks are discovered during vacuum box testing, they shall be located, marked, and repaired.
 - c4. The repaired area shall be re-tested and exhibit no leakage.
- d. Inaccessible Seams:
 - d1. Where extrusion welded seam locations make use of vacuum box testing impractical, then the electric wire method of testing shall be used or the seam shall be cap stripped as approved by the Owner.

- d2. If cap stripping is approved by the Owner, the seams shall be cap stripped as described in Paragraph 303.11d with strips of the same type and thickness of geomembrane being installed. The cap stripping shall be performed in the presence of the CQA Geosynthetics Inspector and the Owner's representative.
- d3. The electric wire test method shall consist of placing a 24-gauge copper wire 1/8 inch beneath the top sheet overlap of the two sheets prior to welding with the extruder. The wire shall be embedded in the seam. After welding, a holiday spark detector, operating at 20,000 volts, shall be connected to one end of the wire, and slowly moved over the length of the seam. A seam defect between the probe and the embedded wire shall result in an audible alarm indicating where the defect is located.
- e. Test Reports:
 - e1. Test reports for all air pressure tests shall contain all data specified in ASTM D5820 and GRI GM6.
 - e2. Test reports for vacuum box testing shall contain all of the data specified in ASTM D5641.
 - e3. Test reports for other types of non-destructive tests shall contain the following data for each test as a minimum:
 - e3.1 Location.
 - e3.2 Type of test.
 - e3.3 Test parameters.
 - e3.4 Test data.
 - e3.5 Test number.
 - e3.6 Name of tester.
 - e3.7 Outcome of the test.
- 303.9 Destructive Testing
 - a. Testing:
 - a1. Destructive testing shall be performed by an independent third-party laboratory employed by the CQA Contractor on samples cut from production welds in the field by the Geosynthetics Contractor.
 - a2. Samples shall be taken by the Geosynthetics Contractor to the third-party laboratory and tested for shear strength and peel adhesion. For double wedge seam samples, both welds shall be tested for peel adhesion.
 - b. Location and Frequency:
 - b1. Test locations shall be determined after seaming. The location where the test samples shall be taken shall be marked by the CQA Geosynthetics Inspector. Locations may be prompted by the appearance of excessive heating, contaminations, offset welds, or a suspected defect. Destructive test samples shall be taken at a minimum average frequency of one per every 500 linear feet of seam length.

- b2. The Method of Attributes described in GRI GM14 may be exercised to minimize the number of test samples taken if more than 100 destructive seam samples will be required based on the sampling strategy given in Paragraph 303.9b1.
- b3. Each sample location shall be numbered and marked with permanent identification, and every sample location shall be indicated on a plan drawing prepared and maintained by the Geosynthetics Contractor. The following shall be recorded for each sample:
 - b3.1 Date and time.
 - b3.2 Ambient temperature.
 - b3.3 Seam number and location.
 - b3.4 Welding apparatus used.
 - b3.5 Name of Master Geomembrane Seamer.
 - b3.6 Reason for taking the sample.
 - b3.7 Size of sample.
 - b3.8 Test results.
 - b3.9 Name of tester.
- b4. Samples shall be cut by the Geosynthetics Contractor in the presence of the CQA Geosynthetics Inspector.
- b5. Test samples shall be cut every shift and taken by the CQA Geosynthetics Inspector to the third-party laboratory the same day that the sample is prepared.
- c. Sample Size:
 - c1. The minimum sample size shall be 12-inches wide with a seam 16-inches long centered length wise in the sample.
 - c2. As agreed to with the Owner, a sample may be increased in size to accommodate the requirements of the third-party testing laboratory.
- d. Field Testing:
 - d1. A one-inch wide specimen shall be cut from each end of each sample for field testing.
 - d2. Each one-inch wide specimen shall be tested with a field tensiometer for peel adhesion.
 - d3. The CQA Geosynthetics Inspector shall witness each field test.
 - d4. A test is considered acceptable if a specimen meets the criteria specified in Table 319020-1 for both peel and shear under Bonded Seam Strength, or exhibits Film Tear Bond (FTB). For double wedge fusion welds, both welds must pass the test. If either sample fails the field test, it shall be assumed that the seam will not pass the specified laboratory testing and the sample shall be given a fail designation.
- e. Laboratory Testing:
 - e1. Samples shall be tested for shear strength and peel adhesion in accordance with ASTM D6392. Five specimens shall be tested for each test method.

- e2. All samples shall meet minimum requirements for shear strength and peel adhesion given in Table 319020-1 under Bonded Seam Strength.
- f. Test Results:
 - f1. In accordance with CQA Specification P-1801, verbal laboratory test results will be given by the CQA Contractor to the Geosynthetics Contractor within 24 hours of receipt of the samples. Written results will follow within one week.
 - f2. All test locations shall be marked with a pass/fail designation on the liner and on the drawings maintained by the Geosynthetics Contractor for submittal to the Owner after the geomembrane liner is installed.
- g. Re-Testing if Failure Occurs:
 - g1. If a seam fails testing, one additional sample shall be taken 10 feet on each side of the location of the failed test. Additional samples shall continue to be taken at 10-foot intervals until tests show that seam strength is adequate and the zone in which the seam requires reconstruction is identified. Additional field and laboratory tests required to determine failed seams and any necessary patching and rework shall be performed at no additional cost to the Owner.
 - g2. All passing seams shall be bounded by two locations from which samples passing laboratory destructive tests have been taken.
 - g3. The entire seam length failing strength tests shall be reconstructed at no additional cost to the Owner.
 - g4. If the length of reconstructed seam exceeds 150 feet, a sample shall be taken of the reconstructed seam every 150 feet and shall pass destructive testing.
- 303.10 Inspection:
 - a. After seaming is complete, the Geosynthetics Contractor and the CQA Geosynthetics Inspector shall conduct a detailed walk-down to visually check all seams and non-seam areas of the HDPE geomembrane liner.
 - b. All defects, holes, blisters, tears, signs of damage during installation, areas of undispersed carbon, and holes from destructive or non-destructive testing shall be marked and repaired.
- 303.11 Repair of Defects and Seams
 - a. Patching:
 - a1. Patching shall be used to repair large holes, tears, and destructive sample locations.
 - a2. All patches shall be round or oval or shall have rounded corners.
 - a3. All patches shall be made of the base HDPE geomembrane material and shall extend a minimum of 3 inches beyond the edges of the defect.
 - a4. Patches shall be extrusion welded to the base sheet.
 - b. Grinding and Welding:
 - b1. Grinding and welding shall be used to repair sections of extruded fillet seams with small defects.

c. Spot Welding:

c1. Spot welding shall be used to repair small tears, pinholes, or other minor localized flaws.

d. Capping:

d1. Capping shall be used to repair lengths of extrusion welded seams with large defects and to repair double wedge fusion welded seams.

d2. Cap strips shall be made with strips of the same type and thickness of the geomembrane being installed. Strips shall extend a minimum of 6 inches beyond the weld and shall have rounded corners.

d3. Cap strips shall be extrusion welded to the base sheet.

e. Cut Out and Replacement:

e1. When approved by the Owner, a length of defective seam may be cut out and replaced with a strip of new material seamed into place.

f. Verification of Repairs:

f1. All repairs shall be non-destructive tested using one of the procedures described in Paragraph 303.8.

f2. Repairs passing non-destructive testing shall be deemed acceptable.

f3. Repairs of a seam in excess of 150 feet in length shall have one destructive seam test per 150 feet in length.

304. INSTALLATION OF DRAINAGE GECOMPOSITE

304.1 General Requirements:

a. In the presence of wind, all drainage geocomposite shall be weighted with sand bags or the equivalent. Weights shall be installed during deployment and shall remain in place until deployment of the cover material.

b. The drainage geocomposite shall not be welded to the geomembrane liner.

c. All necessary precautions shall be taken to prevent damage to underlying geomembrane during placement of the drainage geocomposite.

d. During placement of the drainage geocomposite, care shall be taken not to entrap dirt or excessive dust that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the drainage geocomposite, it shall be cleaned and all dirt removed prior to placement of the cover material. Care shall be taken in the handling of sand bags to prevent rupture or damage of the sand bag.

304.2 Placement of Drainage Geocomposite:

a. On slopes, the drainage geocomposite shall be secured with temporary ballasting material (e.g., sand bags) at the top of the slope or, as specified in the Design Drawings, in an anchor trench and then rolled down the slope in such a manner as to continuously keep the drainage geocomposite in tension. If necessary, the drainage geocomposite shall be positioned by hand after unrolling to minimize wrinkles and folds.

- b. The drainage geocomposite shall be placed on side slopes with no horizontal seams along the slope and so that the long dimension is parallel to the slope.
- c. No horizontal seam shall be located within 5 feet of the toe of a slope.
- d. The drainage geocomposite shall be positioned on both the slopes and the bottom so that the geonet core overlaps by a minimum of 4 inches.
- e. Drainage geocomposite placed in the corners of the side slope shall be cut to eliminate excessive overlap of material.
- e1. The drainage geocomposite shall only be cut using scissors or other cutting tools approved by the GM/GC Manufacturer that will not damage the underlying geomembrane.
- e2. Cutting tools shall not be left on the drainage geocomposite.

304.3 Joining Geonet Cores:

- a. The geonet cores between adjacent drainage geocomposite panels shall be joined using white or yellow self-locking straps. Metal fastening devices are not permitted and shall not be used.
- b. Adjacent panels on slopes shall be joined on 5-foot centers.
- c. Adjacent panels on the basin floor shall be joined on 10-foot centers.
- d. End seams on the basin floor shall be joined on 1-foot centers.
- e. Horizontal and end seams in anchor trenches shall be joined on 1-foot centers.

304.4 Joining Geotextile Caps:

- a. Sewing on Basin Floor:
 - a1. On the basin floor and interior slopes flatter than 10H:1V (i.e., 10%), the geotextile caps between adjacent drainage geocomposite panels shall be continuously sewn or continuously heat bonded in accordance with the GM/GC Manufacturer's recommendations.
 - a2. Spot seaming is not allowed.
- b. Sewing on Basin Slopes:
 - b1. On basin slopes greater than 10H:1V (i.e., 10%), the geotextile caps between adjacent drainage geocomposite panels shall be continuously sewn. All seams shall be vertical (i.e., parallel with the slope). No horizontal seams (i.e., across the slope) shall be permitted on basin slopes greater than 10H:1V (i.e., 10%).
 - b2. Spot seaming and heat bonding are not allowed.
- c. Sewing Requirements:
 - c1. Sewing shall be done using polyester or heat-set UV stabilized polypropylene sewing thread with chemical and ultraviolet light resistance properties equal to or exceeding the values specified in Table 319020-2. The thread color shall contrast with the color of the geotextile cap to assist in inspection of the seam. Tex size or denier number of the thread shall be specified by the Geosynthetics Contractor.

- c2. Seams shall be “prayer” or “flat” seams. Seams shall be formed by mating the edge of the geotextile caps and sewing the caps together with continuous stitches located a minimum of four inches from the mated edges.
- c3. Sewing procedures shall conform to the latest procedures recommended by the GM/GC Manufacturer.
- c4. Stitching:
 - c4.1 For drainage geocomposites placed on the interior slopes of the basin, stitching shall be two rows (SSa-2) of stitching using a 01 two-thread locking chain stitch as described in the IFAI with 6 to 10 stitches per inch. Thread strength shall be such field seam strength will be a minimum of 90 percent of the tensile strength of the geotextile cap.
 - c4.2 For drainage geocomposites used elsewhere in the basin, stitching shall be one row (SSa-1) of stitching using a Type 401 two-thread locking chain stitch as described in the IFAI with a minimum of 5 stitches per inch, or the seam shall be heat bonded. Thread strength shall be selected by the Geosynthetics Contractor.
- c5. Seam Inspections:
 - c5.1 Visual examinations shall be conducted to ensure that 100 percent of the seams are sewn or heat bonded as required.
 - c5.2 Seam sampling and testing are not required.
- 304.5 Protection of HDPE Geomembrane:
 - a. The Geosynthetics Contractor shall be responsible for protection of the HDPE geomembrane liner during installation of the drainage geocomposite and shall be responsible for repair of any damage caused to the liner by installation of the drainage geocomposite.
- 304.6 Repair of Holes or Tears:
 - a. All holes or tears in the drainage geocomposite shall be repaired by placing a patch of drainage geocomposite over the hole or tear. The patch shall extend 2 feet beyond the edges of the hole or tear. If the hole or tear width across the roll is more than 50% of the width of the roll, the damaged drainage geocomposite shall be removed and replaced.
 - b. A patch’s geonet core shall be secured to the original geonet core by tying every 12 inches.
 - c. A patch’s geotextile cap shall be sewn into place by hand or machine so as the patch will not accidentally shift out of position or be moved when it is covered. The thread shall be the same as specified for sewing seams.
- 305. CREST ANCHORAGE
- 305.1 At the top of a slope, the HDPE geomembrane liner and the drainage geocomposite shall extend to the run-out distance indicated on the Design Drawings or, if otherwise indicated on the Design Drawings, shall be anchored in an anchor trench.
- 305.2 Prior to the placement of the geosynthetic clay liner (GCL) underlying the HDPE geomembrane liner, and if specified on the Design Drawings, the Earthwork Contractor shall excavate the crest anchor trench to the lines and widths shown on the Design Drawings and in accordance with the excavation and shaping requirements specified in Section 319005.

- 305.3 After installation of the LCRS in accordance with Section 319050, the Earthwork Contractor shall place fill over the geosynthetic materials along the specified run-out distance or in the anchor trench as shown on the Design Drawings.
306. ATTACHMENT TO CONCRETE
- 306.1 Geomembrane shall be attached to concrete using batten strips in accordance with details on the Design Drawings.
307. ATTACHMENT TO PIPE PENETRATIONS
- 307.1 Geomembrane shall be attached to pipe penetrations through the lining in accordance with details on the Design Drawings.
- 307.2 Prefabricated or field fabricated HDPE sleeves (pipe boots) used for attaching the geomembrane to the pipe shall be supplied by the GM/GC Manufacturer.

END OF SECTION 319020



SECTION 319025
GEOSYNTHETIC CLAY LINER

PART 1 – GENERAL

101. EXTENT

101.1 This section defines the minimum material and installation requirements for a geosynthetic clay liner (GCL) to be used as the lower component of the retrofitted Metal Cleaning Basin's new composite liner system, all in accordance with the Design Drawings and as specified herein.

101.2 The work shall include, but not be limited to, the following items:

- a. Manufacturing, shipping, handling, and storage of GCL.
- b. Preparation and inspection of surfaces to be lined.
- c. Placement and seaming of GCL.
- d. Crest anchorage of GCL using liner run-outs or anchor trenches as specified on the Design Drawings.
- e. Sealing GCL around existing marker posts and on existing concrete surfaces.
- f. Visual inspection of the completed GCL.
- g. Patching and repairs as necessary.

101.3 Definitions and Qualifications:

- a. The following definitions of terms shall apply throughout this section:
 - a1. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor's work.
 - a2. GCL Manufacturer: The manufacturer who is responsible for manufacturing and transporting GCL materials to the site.
- b. Qualifications:
 - b1. The GCL Manufacturer shall be approved by the Owner. Owner's considerations when approving the GCL Manufacturer may include, but are not limited to, financial, safety, and prior performance aspects of the manufacturer.
 - b2. The GCL Manufacturer shall have an internal QA/QC program to ensure and to verify the manufactured products consistently meet or exceed the requirements of this section.
 - b3. The GCL Manufacturer shall have at least 10 years of experience manufacturing products similar to those required for this Work.



102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

- 102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:
- a. GW Specification P-1800:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - b. CQA Specification P-1801:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

- 103.1 Standards, specifications, manuals, codes, and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 103.4 ASTM – ASTM International:
- a. D4643 Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.
 - b. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - c. D5887 Standard Test Method for Measurement of Index Flux through Saturated Geosynthetic Clay Liner Specimens using a Flexible Wall Permeameter.
 - d. D5889 Standard Practice for Quality Control of Geosynthetic Clay Liners.
 - e. D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
 - f. D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
 - g. D5993 Standard Test Method for Measuring Mass per Unit of Geosynthetic Clay Liners.
 - h. D6243 Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by Direct Shear Method.
 - i. D6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners
 - j. D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners



104. SUBMITTALS

- 104.1 The GW Contractor shall submit the following drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 104.2 Submittals with Bid Proposal:
- a. Geosynthetics Contractor:
 - a1. Geosynthetics Contractor's name, address, and telephone number.
 - a2. Geosynthetics Contractor's qualifications, including letter or certificate from GCL Manufacturer documenting the manufacturer's approval of the Geosynthetics Contractor (or subcontracted Installer) to install the GCL materials supplied by the GCL Manufacturer.
 - a3. Installer's qualifications if the Geosynthetics Contractor is proposing to subcontract the GCL installation work.
 - b. GCL Material:
 - b1. Copies of the GCL Manufacturer's catalog data describing the GCL material proposed for use on this project.
 - b2. Copies of GCL Manufacturer's QA certificates on tests performed on the material and a summary of results after the tests.
 - b3. Certification of Compliance from the GCL Manufacturer, signed by its authorized representative, stating that the GCL material meets the specification requirements and that those requirements are guaranteed by the GCL Manufacturer.
 - b4. GCL Manufacturer's Quality Control and Quality Assurance Policies and Procedures.
 - c. Warranty:
 - c1. Written warranties from the GCL Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as applicable.
 - c2. Warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the GCL Manufacturer and the Geosynthetics Contractor.
- 104.3 Submittals After Award:
- a. Installation Data:
 - a1. GCL Manufacturer's proposed GCL panel layout for each installation.
 - a2. GCL Manufacturer's recommended procedures for making seams if different from those specified herein.
 - a3. GCL Manufacturer's recommended procedures for repairing damaged GCL sections and seams if different from those specified herein.
 - a4. GCL Manufacturer's details of GCL anchorage and attachment to structures and penetrations if different from those specified herein and from the details shown on the Design Drawings.



104.4 Submittals Upon Shipment:

- a. Two representative samples of each GCL material to be used for the project.
- b. GCL Manufacturer's QA/QC certificates with each shipment of GCL. The QA/QC certificates shall include:
 - b1. GCL lot and roll numbers with corresponding shipping information.
 - b2. GCL Manufacturer's test data for the geotextile materials used in GCL production including, at a minimum, mass per unit area data and tensile test data.
 - b3. Certificates of analyses for the bentonite clay used in GCL production including, at a minimum, test data for the properties shown in Table 319025-1.
 - b4. GCL Manufacturer's test data for the finished GCL product including, at a minimum, test data for the properties shown in Table 319025-2.

104.5 Submittals After Installation is Complete:

- a. As-built panel layout.
- b. Plan drawing showing locations of repairs and types of repairs made.

105. QUALITY ASSURANCE

105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of the responsibility for providing and installing materials in compliance with specified requirements.

105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.

105.3 CQA activities shall be performed as described herein and in Specification P-1801.

PART 2 - PRODUCTS

201. GEOSYNTHETIC CLAY LINER (GCL)

201.1 Approved GCL Products:

- a. The products of the following manufacturers meeting the requirements herein are acceptable:
 - a1. CETCO BENTOMAT® DN.
 - a2. Solmax BentoLiner® NW.
 - a3. AGRU America GeoClay® N66.
 - a4. Owner-approved alternative(s) meeting the requirements herein.

201.2 General Requirements:

- a. The GCL shall be a needle punched GCL. The GCL shall be manufactured by placing a uniform layer of high-swell sodium bentonite encapsulated between two geotextiles and



then needle punching through both layers of the geotextile and the bentonite to push fibers from the geotextile cap through the bentonite layer and embed them in the geotextile carrier on the other side.

- b. The upper and lower support materials shall protect the bentonite but shall be sufficiently porous to allow bentonite flow-through to create a positive bentonite-to-bentonite seal at the seams.
- c. The support materials used in the manufacturing shall not interfere with the swelling, self-healing, or low permeability characteristics of the GCL.
- d. The GCL shall be fabricated such that bentonite will not be displaced when the liner is cut.
- e. Six-inch and nine- or twelve-inch overlap marks shall be marked longitudinally on both edges of the geotextile cap by the GCL Manufacturer to assist in obtaining the proper overlap. The lines shall be printed in easily visible, non-toxic ink.
- f. The minimum period of warranty for GCL materials shall be 5 years.

201.3 GCL Material Specifications:

- a. Sodium Bentonite. The bentonite utilized in the manufacture of the GCL, as well as any accessory bentonite provided for seaming and detail work, shall be Wyoming-grade sodium bentonite with the properties listed in Table 319025-1.

TABLE 319025-1
PROPERTIES OF BASE BENTONITE IN GCL MATERIALS

Property ⁽¹⁾	ASTM Test Method	Value	Min. Testing Frequency ⁽²⁾
Free Swell	D5890	24 mL / 2g min.	1/100,000 lb
Fluid Loss	D5891	18 mL max.	1/100,000 lb
Moisture Content	D4643	12% max.	1/100,000 lb

Notes:

(1) Properties of the base bentonite prior to incorporation into the finished GCL product.

(2) Minimum testing frequencies are per ASTM D5889. One test per 50 tonnes is also acceptable.



- b. Geosynthetic Clay Liner. The finished GCL shall have the properties listed in Table 319025-2.

TABLE 319025-2
PROPERTIES OF FINISHED GCL MATERIALS

Property	ASTM Test Method	Value	Min Testing Frequency ⁽¹⁾
Geotextile Properties			
Non-Woven Cap	D5261	6.0 oz/yd ² min.	1/20,000 SF
Non-Woven Carrier	D5261	6.0 oz/yd ² min.	1/20,000 SF
Finished GCL Properties			
Bentonite Mass/Area	D5993	0.75 lb/ft ² min. at 0% moisture content	1/20,000 SF
Moisture Content	D5993	35% max.	1/20,000 SF
Hydrated Internal Shear Strength	D6243	500 psf min. ⁽²⁾	1/20,000 SF
Tensile Strength ⁽³⁾	D6768	45 lb/in. min.	1/20,000 SF
Peel Strength	D6496	3.5 lb/in. min.	1/20,000 SF
Index Flux ⁽⁴⁾	D5887	2x10 ⁻⁹ m ³ /m ² /sec max.	1/20,000 SF
Hydraulic Conductivity ⁽⁴⁾⁽⁵⁾	D5887	1x10 ⁻⁹ cm/sec max.	1/20,000 SF

Notes:

- (1) Minimum testing frequencies listed are in accordance with ASTM D5889.
(2) Typical peak value for specimen sheared under a 200 psf normal stress.
(3) Machine (warp) direction of primary backing.
(4) Index flux and hydraulic conductivity measured at 5 psi effective confining stress and 2 psi head.
(5) Hydraulic conductivity based on 7-mm-thick bentonite layer.

201.4 Packing and Shipping:

- a. All GCL material shall be shipped to the project site in rolls. No GCL material shall be folded.
- b. Transportation of GCL materials to the project site shall be the responsibility of the GCL Manufacturer who shall retain responsibility of the material until the material is accepted at the project site. The Geosynthetics Contractor will be responsible for unloading the GCL material at the project site.
- c. The finished GCL shall be completely wrapped and adequately secured with a durable polyethylene protective cover in order to provide protection from ultraviolet degradation of the Primary Backing Material (PBM) and excessive loss of moisture during shipping and storage.
- d. A label shall be attached or adhered to each roll of the GCL. The label shall identify the following:
- d1. Name of GCL Manufacturer.
- d2. Product identification (brand name, product code).
- d3. Order number.



- d4. Date of manufacture.
 - d5. Manufacturing lot number.
 - d6. GCL thickness.
 - d7. Roll identification number.
 - d8. Roll dimensions (i.e., length and width) and weight.
 - d9. Panel number, which shall be referenced to the proposed GCL panel layout drawing prepared by the GCL Manufacturer.
 - e. The GCL shall be stenciled throughout each roll with the product name and name of the GCL Manufacturer, which can be cross-referenced to the roll number marked on the label and to the production and quality control data sheets.
202. **BENTONITE SEALING COMPOUND (BSC) AND GRANULAR BENTONITE (GB)**
- 202.1 The BSC and GB shall be supplied by the GCL Manufacturer and shall be comprised of the same bentonite used in the manufacturing of the GCL. The BSC shall be a mixture of non-aqueous liquid suspension agents which creates a paste-like texture.
- 202.2 The suspension agents used in the manufacture of the BSC shall be non-toxic, water-soluble and shall not restrict the bentonite's ability to swell and absorb water upon hydration.

PART 3 - EXECUTION

301. **ONSITE HANDLING AND STORAGE**
- 301.1 Unloading:
- a. Handling and unloading shall be the responsibility of the Geosynthetics Contractor.
 - b. Upon arrival at the site, the rolls of the GCL shall be carefully unloaded by the Geosynthetics Contractor in accordance with the GCL Manufacturer's recommendations and in a manner to ensure the material is not damaged.
- 301.2 Inspection:
- a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of GCL for damage (rips, tears, etc.). Any protective sleeve damage shall be repaired immediately with tape or additional plastic sheeting.
 - b. Any damage to a roll of GCL or its protective sleeve shall be noted and immediately reported to the Owner, the GCL Manufacturer, and the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner, is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.
- 301.3 Storage:
- a. The Owner will provide on-site, outdoor storage space in a location near the area to be lined.
 - b. The Geosynthetics Contractor shall store and stage the GCL rolls such that on-site transportation and handling are minimized.



- c. The Geosynthetics Contractor shall be responsible for protecting the GCL rolls from damage, moisture, theft, and vandalism.
- d. Rolls of GCL shall be:
 - d1. Stored horizontally in their original, unopened, wrapped cover in a clean, dry area.
 - d2. Stored off the ground on pallets or plywood in small stacks not to exceed five rolls in height. Rolls shall be stacked in a manner recommended by the GCL Manufacturer that prevents them from sliding or rolling.
 - d3. Covered with a heavy, protective tarpaulin or plastic sheeting.
- e. The Geosynthetics Contractor shall keep the GCL clean and free from debris prior to installation.
- f. Any rolls that come in contact with moisture while in storage shall be set aside by the Geosynthetics Contractor to await examination by the Owner. Damaged rolls shall also be set aside and inspected to determine suitability of the material for use.

302. PREPARATION OF SURFACE TO BE LINED

- 302.1 The Earthwork Contractor shall be responsible for the initial preparation and maintenance of the surfaces to be lined as specified in the Section 319005 prior to placement of the GCL.
- 302.2 The Geosynthetics Contractor shall provide written certification to both the Earthwork Contractor and the Owner that the surface on which the GCL is to be installed is acceptable. The surface then becomes the responsibility of the Geosynthetics Contractor.
- 302.3 The surface upon which the GCL is to be placed shall be free of standing water and maintained in a firm, clean, and smooth condition during liner installation.

303. GENERAL INSTALLATION REQUIREMENTS

- 303.1 Weather:
 - a. GCL shall not be deployed or placed in the following conditions:
 - a1. During any rainfall or snowfall.
 - a2. In ponded water.
 - a3. During high winds.
 - a4. In the presence of excessive moisture due to fog or dew.
 - a5. On frozen subgrade.
 - b. GCL shall not be deployed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds the overlying HDPE geomembrane liner sheets can be welded at the prevailing temperature in accordance with the field seaming requirements specified in Section 319020. Under no circumstances shall GCL be deployed when the air temperature is below 5°F.
- 303.2 Precautions to Prevent Wind Damage
 - a. If possible, work shall be oriented in the direction of the prevailing wind.



- b. To prevent uplift of the GCL by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the edges of the exposed sheets using sandbags, tires, or other means which will not damage the GCL.
- 303.3 Other Precautions to Prevent Damage
- a. Protection of the GCL from damage due to foot traffic on the slopes shall be provided.
 - b. Provisions of facilities for safe entrance and egress of employees from sloped depressions shall be provided.
- 303.4 Panel Layout:
- a. Horizontal panel seams are not allowed on slopes, except as required at the intersection of two slopes (valley). All panel seams on slopes shall be parallel to the flow line down the slope.
 - b. The panels shall be placed in accordance with the GCL Manufacturer's panel layout drawing to ensure that they are placed in the proper direction for overlapping.
 - c. If panels are installed in a location other than indicated on the panel layout drawing, the revised location shall be indicated on an "as-built" layout drawing prepared by the Geosynthetics Contractor. The as-built record drawing of the panel layout shall be submitted to the Owner and the CQA Contractor after all of the GCL has been placed and seamed.
304. PANEL DEPLOYMENT
- 304.1 Deploy only as much GCL as can be covered with the HDPE geomembrane liner (in accordance with section 319020) by the end of the day or in a reasonably short time in the event of precipitation.
- 304.2 Any rutting of the subgrade (i.e., Structural Fill) shall be smoothed and leveled prior to covering that area with GCL.
- 304.3 Where required by the Design Drawings, the anchor trench for the area to be lined shall be excavated before installation of the GCL begins.
- 304.4 Rolls of GCL shall be brought to the area to be lined with a front-end loader and support pipes set up such that the GCL roll is fully supported across its length, is freely suspended, and can unroll freely. The core bar and spreader bar shall not flex or bend excessively when a full roll is lifted.
- 304.5 The cap material shall face upwards toward the installer. The GCL shall be placed over the prepared surface in such a manner as to assure minimum handling.
- 304.6 Installation shall begin at a high elevation and proceed to a low elevation.
- 304.7 Pulling GCL panels shall be minimized to reduce the chance of permanent tension.
- 304.8 Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the GCL at the lowest expected operating temperature.



305. FIELD SEAMING

305.1 General Requirements for Seaming:

- a. Horizontal seams shall be located at least 5 feet from the toe of a slope.
- b. On slopes, all runs shall be continuous with the long dimension of all panels oriented parallel to the slope.
- c. Panels placed on the basin floor require no particular orientation.
- d. Once the first run has been laid, adjoining runs shall be laid with a 6 inch minimum overlap on the longitudinal seams and 24 inch minimum overlap on end seams. If the GCL Manufacturer recommends larger overlap seams, then the GCL Manufacturer's recommendations shall be followed.
- e. The edges of GCL panels shall be adjusted to smooth out wrinkles, creases, or "fishmouths" in order to maximize contact with the underlying panel.
- f. If the air temperature is higher than 85°F and the humidity is low, contraction may occur soon after placement when no confining stress has been placed over the GCL. To allow for the possibility of contraction under these conditions, the minimum seam overlap shall be increased to a minimum of 12 inches on longitudinal seams and 36 inches on end seams, or to 4% of the distance to the next parallel seam, whichever is greater.

305.2 Seaming:

- a. Seaming shall be performed in accordance with the GCL Manufacturer's written recommended procedures.
- b. All seams shall be formed by executing a bentonite-enhanced overlap to ensure that a continuous seal is achieved.
- c. The side of the overlying panel shall be pulled back to expose and examine the overlap areas. Seam overlap areas shall be clean and free from moisture, free from dust and debris of any kind before seaming is started. Any contamination shall be removed.
- d. A fillet of dry granular bentonite shall be poured in a continuous manner along the overlap zone (between the edge of the panel and the six-inch line) at a rate of at least one-quarter pound per linear foot. All dry granular bentonite used shall be that provided by the GCL Manufacturer.
- e. Seam overlap on the bottom of a slope shall be placed such that the direction of flow is from the top sheet to the bottom sheet to form a shingle effect and prevent flow into the seam.

306. SEALING AROUND AND AGAINST EXISTING STRUCTURES

306.1 The GCL shall be sealed to existing structures within the Metal Cleaning Basin.

306.2 A wedge of GB shall be installed at the point of intersection of an existing structure and the basin floor or sideslope. This GB wedge shall be placed between the existing liner and the new GCL and shall be at least 1.0 lbs per foot.

306.3 At the intersection of the GCL and an existing structure, the GCL shall extend higher on the structure than the termination point for the existing geomembrane liner.



306.4 If the attachment hardware for the existing geomembrane liner are sharp or protrude to the extent that they could damage the GCL, a supplement HDPE geomembrane rub sheet shall be installed between the GCL and existing attachment hardware.

306.5 Vertical GCL shall be anchored to an existing structure at an elevation higher than the existing HDPE geomembrane liner and lower than the new HDPE geomembrane liner as shown on the Design Drawings. As an alternate, the Geosynthetics Contractor may propose a self-adhering GCL product that demonstrates similar properties to the base GCL in accordance with GCL Manufacturer's written recommendations.

307. INSPECTION

307.1 After seaming is complete, the Geosynthetics Contractor and the CQA Geosynthetics Inspector shall conduct a detailed walkdown to visually check all seams and non-seam areas of the GCL.

307.2 All defects, holes, blisters, tears, and signs of damage during installation shall be marked for repair.

308. PATCHING AND REPAIRS

308.1 Patching shall be used to repair small defects, blisters, holes, and tears.

308.2 All dirt and debris present in the patched area shall be removed.

308.3 All patches shall be round or oval or shall have rounded corners.

308.4 All patches shall be made of the base GCL and shall extend a minimum of 12 inches beyond the edges of the defect. Accessory bentonite shall be placed around the perimeter of the affected area at a rate of one-quarter pound per lineal foot prior to placing the patch. Adhesive, such as wood glue, may be used if necessary to secure the patch.

309. CREST ANCHORAGE

309.1 At the top of a slope, the GCL shall extend to the run-out distance indicated on the Design Drawings or, if otherwise indicated on the Design Drawings, shall be anchored in an anchor trench.

309.2 Prior to the placement of the GCL and if indicated on the Design Drawings, the Earthwork Contractor shall excavate the crest anchor trench to the lines and widths shown on the Design Drawings and in accordance with the excavation and shaping requirements specified in Section 319005.

309.3 After installation of the LCRS in accordance with Section 319050, the Earthwork Contractor shall place fill over the geosynthetic materials along the specified run-out distance or in the anchor trench as shown on the Design Drawings.

310. PROTECTIVE COVER

310.1 The GCL shall be covered the same day with the HDPE geomembrane liner as shown on the Design Drawings in accordance with Section 319020. Precautions shall be taken to prevent damage to the GCL by restricting heavy equipment traffic.

310.2 To prevent premature hydration or contraction, only the amount of GCL that can be installed, inspected, repaired, and covered in the same day shall be installed.



- 310.3 Any leading edge or panels of GCL left unprotected shall be covered with a heavy, waterproofing tarp which is adequately secured and protected with sand bags or other ballast.
311. CORRECTIVE MEASURES FOR PREMATURE HYDRATION OF GCL
- 311.1 If the GCL is prematurely hydrated, becomes saturated, etc., then the following corrective action program shall be implemented:
- a. The affected panels shall be identified, documented, and exposed so that they can dry. Traffic over the impacted area shall be kept to a minimum during the drying process.
 - b. Once the affected panels have had enough time to dry, the Geosynthetics Contractor, the CQA Geosynthetics Inspector, and the Owner shall evaluate the impacted area for damage.
 - c. Following evaluation of the impacted area, the Geosynthetics Contractor shall recommend to either leave the GCL in place or to replace the GCL. The Geosynthetics Contractor's recommendation shall be made in writing, submitted with photographs documenting the evaluated area, and based on the extent of damage (or lack thereof).
 - c1. If the Geosynthetics Contractor's recommendation is to replace the affected GCL panels, then they shall be replaced at no additional cost to the Owner.
 - c2. If the Geosynthetics Contractor's recommendation is to leave the affected GCL panels in-place, and if the Owner or CQA Geosynthetics Inspector disagree with that recommendation, then the Owner will contact the GCL Manufacturer for their recommendation.
 - c2.1 If the GCL Manufacturer's recommendation is to replace the affected GCL panels, then they shall be replaced at no additional cost to the Owner.
 - c2.2 If the GCL Manufacturer's recommendation is to leave the affected GCL panels in-place, and if either the Owner or CQA Geosynthetics Inspector disagree with that recommendation, then the GCL panels shall be removed in accordance with a negotiated agreement between the Owner and the GW Contractor.

END OF SECTION 319025



SECTION 319050

LEACHATE COLLECTION AND REMOVAL SYSTEM

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the minimum material and installation requirements for the components of the Metal Cleaning Basin's new leachate collection and removal system (LCRS) including high-density polyethylene (HDPE) leachate collection and sideslope riser pipes, Coarse Aggregate Bedding Material, Sand Filter Layer material, Protective Warning Layer material, Riprap Bedding Layer material, and riprap, all in accordance with the Design Drawings and as specified herein.

101.2 The components and dimensions of the LCRS are shown on the Design Drawings. The division of work shall include, but not be limited to, the following items:

a. The following items shall be furnished and installed by the Earthwork Contractor:

a1. Coarse Aggregate Bedding Material.

a2. Sand Filter Layer.

a3. Protective Warning Layer.

a4. Perforated leachate collection pipe.

a5. Solid sideslope riser pipe and cover.

b. The following items shall be furnished and installed by the Geosynthetics Contractor in accordance with Sections 319020 and 319025:

b1. HDPE geomembrane.

b2. HDPE scruff strips.

b3. Drainage geocomposite.

b4. Geotextiles.

b5. Geosynthetic clay liner (GCL).

c. The following items will be furnished and installed by Others:

c1. Wheeled submersible pump with flexible hose.

c2. Flowmeters.

c3. Control station for pumps and meters.

c4. Electrical and instrument conduit.

101.3 Definitions:

a. The following definitions of terms shall apply throughout this section:

a1. Pipe Manufacturer: The manufacturer who is responsible for manufacture of LCRS pipe materials and fittings and for transporting these materials to the site.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

- a. GW Specification P-1800:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a3. Section 319025 – Geosynthetic Clay Liner.
- b. CQA Specification P-1801:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

- a. D2434 Standard Test Method for Permeability of Granular Soils (Constant Head)
- b. D2487 Standard Practice for Classification of Soils for Engineering Purposes.
- c. D2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
- d. D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
- e. D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- f. D6473 Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control
- g. D6825 Standard Guide for Placement of Riprap Revetments
- h. F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

103.5 IDOT – Illinois Department of Transportation:

- a. Standard Specifications for Road and Bridge Construction (Adopted January 1, 2022).

103.6 ITP – Illinois Test Procedure:

- a. 27 Sieve Analysis of Fine and Coarse Aggregates

- b. 96 Resistance by Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- c. 104 Soundness of Aggregate by Use of Sodium Sulfate
- d. 203 Deleterious Particles in Coarse Aggregate
- 103.7 NSF – National Sanitation Foundation International:
 - a. NSF Listings: Plastics and Plumbing System Components.
- 104. SUBMITTALS
- 104.1 The GW Contractor shall submit drawings and data at least 30 days prior to use. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems specified by the Owner.
- 104.2 Submittals with Bid Proposal:
 - a. HDPE Pipe:
 - a1. Pipe Manufacturer's name, address, and telephone number.
 - a2. Pipe Manufacturer's literature providing specifications of the pipes that will be supplied for the project.
 - a3. Pipe Manufacturer's signed certification that the pipes that will be supplied comply with the requirements of this Specification.
 - a4. Pipe Manufacturer's signed certification that no reclaimed polymer has been added to the resin.
- 104.3 Submittals After Award:
 - a. Coarse Aggregate Bedding Material:
 - a1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Coarse Aggregate Bedding Material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
a1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
a1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
a1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.
a1.4 Deleterious Materials	ITP 203	Shale, Percent Max. Clay Lumps, Percent Max. Soft & Unsound Fragments, Percent Max. Other Deleterious, Percent Max. Total Deleterious, Percent Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.



b. Sand Filter Layer Material:

- b1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Sand Filter Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
b1.1 Classification of Material	ASTM D2487	Classification
b1.2 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
b1.3 Hydraulic Conductivity	ASTM D2434	Hydraulic Conductivity

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

c. Protective Warning Layer Material:

- c1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Protective Warning Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
c1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
c1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
c1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

d. Riprap Bedding Layer Material:

- d1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Riprap Bedding Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
d1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
d1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
d1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.
d1.4 Deleterious Materials	ITP 203	Shale, Percent Max. Clay Lumps, Percent Max. Soft & Unsound Fragments, Percent Max. Other Deleterious, Percent Max. Total Deleterious, Percent Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

e. Riprap:

- e1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the riprap material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
e1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
e1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

104.4 Submittals Upon Shipment:

- a. HDPE Pipe:
 a1. Copies of Pipe Manufacturer's QA/QC certificates on tests performed during fabrication.

104.5 Submittals After Construction is Complete:

- a. HDPE Pipe:
 a1. Logs indicating the location of each joint that did not pass visual examination and the work done to correct improper fusion weld.



105. QUALITY ASSURANCE

- 105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Earthwork Contractor of the responsibility of providing and placing materials in compliance with specified requirements.
- 105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Earthwork Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
- 105.3 CQA activities shall be performed as described herein and in Specification P-1801.

PART 2 - PRODUCTS

201. PIPE

- 201.1 Pipe Materials:
- a. Leachate Collection Pipe and Sideslope Riser shall meet the general and material requirements presented in Table 319050-1.
- 201.2 Pipe Requirements:
- a. Gravity leachate collection piping shall be single wall piping.
- 201.3 Fittings:
- a. All fittings shall be prefabricated and manufactured by the same manufacturer as the pipe.

TABLE 319050-1
MATERIAL REQUIREMENTS FOR LEACHATE COLLECTION PIPE

General Requirements for Leachate Collection Pipes & Fittings			
Item	Leachate Collection Pipe		
Service	Leachate Collection		
Location	Leachate Collection Trench		
Material	Perforated High-Density Polyethylene, Thermal Butt Fusion Welded Joints ⁽¹⁾		
Listing	NSF Listed and Approved		
Rating	Maximum Working Temperature:	Ambient	
	Maximum Working Pressure:	Atmospheric	
Material Requirements for Leachate Collection Pipes & Fittings			
Item	ASTM Test Method	Size (in.)	Remarks
Pipe ⁽¹⁾	ASTM F714, Pipe Grade PE4710 Resin	6	SDR 11
Joints	Not Applicable	All	Thermal Butt Fusion Welded
Fittings ⁽²⁾ : 30°, 45°, 60°, and 90° Bends	ASTM D2513 and ASTM D3261	6	SDR 11 (reduced pressure) Injection molded butt fittings from same resins as pipe.
Fittings ⁽²⁾ : Tees, Wyes, and Reducers	Not Applicable	6	SDR 11 (reduced pressure) Mitered fittings fabricated from angular cut sections of pipe.
Cleanout	Not Applicable	6	Lockable Cap
Approved Manufacturers of Leachate Collection Pipes and Fittings			
Manufacturer		Trade Name	Size Range (in.)
Chevron Phillips Chemical Company		Performance Pipe DriscoPlex® 4100	6
KWH Pipe		Sclairpipe	6
JM Eagle		HDPE Water Sewer C906	6
Others as Approved by the Owner		--	--

Notes:

- (1) Solid or perforated pipe shall be provided as specified on the Design Drawings. Perforated pipe shall be perforated in accordance with the details shown on the Design Drawings.
- (2) Fittings are reduced pressure rating fittings.

202. COARSE AGGREGATE BEDDING MATERIAL:

- a. The bedding material for the leachate collection pipe shall be washed gravel or washed crushed coarse aggregate. Crushed slag or Portland cement concrete shall not be used.
- b. The gradation for Coarse Aggregate Bedding Material shall conform to Gradation CA 7 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
- c. The material quality for Coarse Aggregate Bedding Material shall be Class B or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

203. SAND FILTER LAYER MATERIAL:

- a. The "Sand Filter Layer" placed on top of the HDPE geonet and geotextile shall be composed of washed sand imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that is processed to meet the following requirements:
 - a1. The material shall be classified as SP, SM, or SP-SM in the Unified Soil Classification System, ASTM D2487.
 - a2. The material shall conform to Gradations FA 1 or FA 2 in accordance with Paragraph 1003.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a3. The material shall have a permeability of greater than 1×10^{-5} cm/sec when tested in accordance with ASTM D2434.
 - a4. The material shall be free from all organic material and deleterious material.
 - a5. Fine aggregate produced by crushing slag or Portland cement concrete is not acceptable.

204. PROTECTIVE WARNING LAYER MATERIAL:

- a. The "Protective Warning Layer" placed on top of the Sand Filter Layer along the basin floor shall be composed of gravel, crushed gravel, or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that is processed to meet the following requirements:
 - a1. The material shall conform to Gradation CA 6 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a2. The material quality for Protective Warning Layer material shall be Class D or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

205. RIPRAP BEDDING LAYER MATERIAL

- a. The "Riprap Bedding Layer" placed on top of the Sand Filter Layer along the basin side slopes shall be composed of gravel, crushed gravel, or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that meets the following requirements:
 - a1. The material shall conform to Gradation CA 16 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.

- a2. The material quality for Riprap Bedding Layer material shall be Class B or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

206. RIPRAP

- a. Riprap placed along the basin side slopes shall consist of quarried or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that meets the following requirements:
 - a1. Riprap stones shall have 100% of all faces angular or crushed and shall be free from structural defects, laminations, seams, weak cleavage planes, and undesirable effects of weathering. Stone containing shale, unsound sandstone, or any other material which will readily disintegrate under handling and placing or under weathering shall not be used. All riprap material shall be clean and free from deleterious material and impurities, including but not limited to earth, clay, and refuse.
 - a2. Riprap material shall conform to Gradation RR 2 in accordance with Paragraph 1005.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a3. Riprap material shall meet Quality A requirements in accordance with Paragraph 1005.01(b) of the IDOT Standard Specifications for Road and Bridge Construction, except that the bulk specific gravity of the riprap shall not be less than 2.55 per ASTM D6473 (approximate unit weight of 160 pounds per cubic foot).
 - a4. Riprap color shall be gray unless otherwise approved by the Owner.

PART 3 - EXECUTION

301. LEACHATE COLLECTION AND SIDESLOPE RISER PIPE INSTALLATION

- 301.1 The perforated leachate collection pipe and solid wall sideslope riser pipe shall be installed according to the elevations and locations indicated on the Design Drawings.
- 301.2 The maximum vertical variation from the correct profile and section shall not exceed ± 0.1 ft. The slope of each pipeline shall not vary from the specified slopes by more than $\pm 0.1\%$. The Earthwork Contractor shall regrade any area which does not meet the specified tolerances.
- 301.3 The perforated leachate collection pipe shall have two rows of 1/2-inch diameter perforations spaced 6 inches apart along the length of the pipe. The perforations shall face down in the collection and cleanout trenches.
- 301.4 All PE pipes shall be joined by the thermal butt-fusion process described in Article 302. The inside of the pipe shall be ground smooth so that it will not impede the sliding of the pumps.
- 301.5 The Earthwork Contractor shall provide hydraulic jet cleaning of all pipelines following installation. The jet cleaning shall verify that each pipe is intact and unobstructed. Defects in any pipeline identified by the cleaning process shall be repaired by the Earthwork Contractor.

302. WELDING AND TESTING OF HDPE PIPE JOINTS

- 302.1 Joints for HDPE Pipe:
 - a. HDPE pipe shall be joined together by the thermal butt fusion method in accordance with ASTM D2657 Procedure 2. Fittings shall be fabricated to provide a smooth inside surface. The hot plate butt fusion procedure shall be performed using apparatus recommended by the Pipe Manufacturer and which complies with ASTM D2657.

302.2 Bent Strap Test

a. Test Requirements:

- a1. A bent strap test shall be made on each diameter of pipe prior to the start of joint welding procedures. A test joint shall be made and a specimen cut from the joint and destructively tested to confirm fusion joint integrity, operator procedure, and fusion machine settings, including temperature and pressure.
- a2. Additional bent strap tests may be required by the Owner and/or CQA Contractor during the joint welding process if it is found that the joints of unacceptable quality are being made. These tests shall be used to adjust fusion machine settings and/or operator procedures as required. Test joints shall be prepared at no additional cost to the Owner.

b. Test Procedure:

- b1. Using waste pieces of pipe, a joint specimen shall be prepared and then butt fusion welded and allowed to cool to ambient temperature.
- b2. A test strap shall be cut from the specimen:
 - b2.1 The width of the strap shall be 1-1/2 times the pipe wall thickness, but not less than one inch.
 - b2.2 The length of the strap on each side of the fusion weld shall be 15 times the pipe wall thickness, but not less than six inches.
- b3. The cut shall be bent so that the ends of the strap touch. If any separation, cracks or voids are observed, the fusion is unacceptable and indicates poor fusion quality.
- b4. If failure occurs, fusion procedures and/or machine settings shall be changed, and a new trial fusion weld and new bent strap specimen shall be prepared and tested.
- b5. The CQA Contractor shall witness all bent strap tests.
- b6. Field fusion of pipe shall not proceed until a test joint has passed the bent strap test and visual inspection indicates that the fusion beads and "V" groove are the correct size.

303. VISUAL INSPECTION OF HDPE PIPE DURING INSTALLATION

303.1 General:

- a. The Earthwork Contractor shall visually inspect all pipes during installation for:
 - a1. Verification that all perforated pipe has been placed with the perforations facing down.
 - a2. Surface damage.
 - a3. Weld quality.

303.2 Surface Damage:

- a. Surface damage to a pipe that occurs during handling or installation shall be minimized. The maximum acceptable depth of damage is 10 percent of wall thickness of the pipe. If excessive damage occurs, the damaged portions of pipe shall be cut out and replaced. Deep, sharp notches may be filled with extudite and dressed smooth.
- b. Butt fuse on misalignment shall not exceed 10 percent of the pipe wall thicknesses. Misaligned butt fusions shall be cut out and redone.

303.3 Butt-Fusion Joint Weld Quality:

- a. All butt fusion welded joints shall be visually inspected to ensure joint quality. The size and shape of the fusion beads shall be used as an indicator of joint quality. Specifically:
 - a1. The double bead width shall be 2 to 2-1/2 times the height of the bead measured from the pipe surface.
 - a2. Both beads shall be uniform in size and shape around the joint.
 - a3. The depth of the "V" between the two beads shall not be more than half the bead height.
- b. If the "V" groove is too deep a "cold" fusion may have occurred (uneven heating or insufficient heating time, or excessive pressure during heating or during joining). A non-uniform bead shape around the pipe indicates uneven heating.
- c. A joint with cold fusion or a non-uniform bead is a poor quality joint that shall be removed (i.e., cut-out) and remade.
- d. The Earthwork Contractor shall prepare and maintain logs of pipe joints indicating, at a minimum:
 - d1. Locations with corresponding pipe markings.
 - d2. Visual inspection results.
 - d3. For each joint that did not pass visual inspection, the work done to correct the improper fusion weld.

304. INSTALLATION OF GRANULAR AND RIPRAP MATERIALS

304.1 "Granular Materials" in this article include Coarse Aggregate Bedding Material, Sand Filter Layer material, Protective Warning Layer material, and Riprap Bedding Layer material.

304.2 Acceptable Placement Methods:

- a. Acceptable placement methods for Granular Materials include:
 - a1. Using a conveyor truck to place material from outside of the basin.
 - a2. Using a crane to place material from outside of the basin.
 - a3. Transporting material into the basin to the point of dumping using trucks or scrapers.
 - a4. Alternate placement method(s) proposed by the Earthwork Contractor and approved by the Owner.
- b. Requirements for Transportation of Granular and Riprap Materials into Basin:
 - b1. Under no circumstances shall there be direct equipment travel over any geosynthetic material (GCL, geomembrane, geotextile, geonet, etc.).
 - b2. Equipment transporting material into the basin shall use the permanent ramp along the basin's east dike. Structural Fill shall be installed above the existing HDPE geomembrane liner along the ramp surface as detailed on the Design Drawings and as specified in Section 319005 before any equipment uses the ramp to access the basin floor.
 - b3. Only earthmoving equipment with low ground pressure shall be used to transport material inside of the basin. The Earthwork Contractor shall demonstrate that equipment entering the

basin will not exert a ground pressure greater than 8 psi. The ground pressure is influenced by the tread pattern / tire contact area and is not the reading from a tire pressure gauge.

- b4. Equipment operating within the basin shall avoid hard braking on ramps and avoid sharp turns or quick stops that could pinch or tear the geosynthetic materials.
- b5. The Sand Filter Layer, Protective Warning Layer, and Riprap Bedding Layer Materials shall be placed by the "dump and spread" method in which appropriate lightweight equipment with low ground pressure are used to spread the material.
- b6. No travel over piping shall be allowed without sufficient protection of the piping.
- b7. Material placement over geosynthetic materials during periods of warm weather can cause wrinkling in the geosynthetic materials. The wrinkling effect can cause damage to the geosynthetic materials. Placement of Granular Materials shall be halted when the air temperature is greater than 85°F or less than 40°F.
- b8. When Sand Filter Layer, Protective Warning Layer, or Riprap Bedding Layer materials are being placed, a worker shall walk alongside earthmoving equipment spreading the material to spot and remove all rocks, stones, roots, and other debris that may be remaining in the materials that could cause damage to a geosynthetic material.
- b9. Placement of Granular Materials and riprap on the basin's side slopes shall begin at the toe of the slope and proceed up the slope.

304.3 Placement of Coarse Aggregate Bedding Material:

- a. Coarse Aggregate Bedding Material shall be placed under and around the leachate collection and sideslope riser pipes to the thicknesses shown on the Design Drawings.
- b. All piping shall be installed over an initial layer of Coarse Aggregate Bedding Material. After a pipe is installed, Coarse Aggregate Bedding Material shall be placed by hand beneath the haunches and above the pipe and compacted to ensure complete and uniform support of the pipe.

304.4 Placement of Sand Filter Layer Material:

- a. Installation of the Sand Filter Layer shall not begin until Geosynthetics Contractor has finished installing the non-woven geotextile and HDPE geonet components of the LCRS, the CQA Contractor has finished inspecting those geosynthetic components of the LCRS, and the area has been released to the Earthwork Contractor in writing to proceed.
- b. Sand Filter Layer material shall be placed in a single layer to the thickness shown on the Design Drawings without compaction or working of the material that could cause intrusion through the non-woven geotextile into the underlying HDPE geonet.
- c. The Sand Filter Layer shall be fine graded using low ground pressure equipment.

304.5 Placement of Protective Warning Layer Material:

- a. Protective Warning Layer materials shall be placed to the thickness shown on the Design Drawings.
- b. Compaction:
 - b1. Protective Warning Layer materials shall be placed and maintained to a uniform thickness, free of ruts and irregularities.

- b2. The Protective Warning Layer shall be compacted by a minimum of four passes in each direction (perpendicular to each other) by the equipment spreading the material. The upper surface shall then be compacted with a minimum of four passes each way by a vibratory drum roller with a minimum static weight of 13 tons.
- b3. Acceptance of the fill shall be based on ruts less than 1 inch between the last successive passes. Compaction testing is not required.
- c. The Protective Warning Layer shall be fine graded using low ground pressure equipment.

304.6 Placement of Riprap Bedding Layer Material:

- a. Riprap Bedding Layer materials shall be placed to the full thickness shown on the Design Drawings in one operation using methods which will not cause segregation of particle sizes.
- b. Riprap Bedding Layer materials shall not be dropped onto the underlying Sand Filter Layer from a height exceeding 3 feet.
- c. Compaction of the Riprap Bedding Layer is not required; however, the surface shall be reasonably even and free from mounds or windrows.
- d. The Riprap Bedding Layer shall be fine graded using low ground pressure equipment.

304.7 Placement of Riprap:

- a. Riprap shall be placed in general accordance with the methods described in ASTM D6825 in designated areas to the lines, grades, and thickness specified on the Design Drawings. Riprap shall be placed to the full thickness in one operation.
- b. Riprap placement operations – including handling, stockpiling, and transporting – shall be accomplished in such a manner as to produce a reasonably well graded mass of rock with minimum percentage of voids, free from objectionable pockets of small stone and clusters of large stones. The larger stones shall be well distributed and the entire mass of stones in their final positions shall be roughly graded to conform to the gradation specified.
- c. Riprap shall be placed by dragline, clamshell, appropriately-sized excavators, or similar equipment, which shall be operated so as to place each load of material in approximately its final position without reworking and without excessive height drop (i.e., more than 12 inches).
- d. Placing riprap in layers is not permitted.
- e. Placing stones by dumping into chutes or other methods, which cause segregation of various stone sizes, is not permitted.

304.8 Grading Tolerances:

- a. Horizontal and vertical tolerances for the Sand Filter Layer and Protective Warning Layer shall be as specified in Table 319050-2.
- b. Thickness determination of riprap and Riprap Bedding Layer materials will be made at points selected by the CQA Contractor. When the average constructed thickness is less than the thickness specified on the Design Drawings, additional material shall be added to obtain the specified thickness at no additional cost to the Owner.



304.9 Reporting Damage:

- a. If damage occurs (or is suspected to have occurred) to any portion of the LCRS, composite liner system, or existing HDPE geomembrane liner under the composite liner system while placing Granular Materials, the Earthwork Contractor shall report the damage(s) to the Owner immediately so that repairs can be performed without delay.
- b. Repairs to a geosynthetic material shall be made as specified in the Section 319020. The Geosynthetics Contractor shall perform all geosynthetic repair work at no additional cost to the Owner.
- c. Repairs to components of the LCRS shall be repaired as specified herein. The Earthwork Contractor shall perform all LCRS repair work at no additional cost to the Owner.

TABLE 319050-2
ACCEPTABLE DEVIATIONS FROM DESIGN LINES AND GRADES

Type of Installation (Excavation or Fill)	Maximum Acceptable Deviation from Line (feet)	Maximum Acceptable Deviation from Grade ⁽¹⁾ (feet)
Granular Materials		
Top of Sand Filter Layer	±0.3	+0.1 to -0.0
Top of Protective Warning Layer		
Top of Riprap Bedding Layer		

END OF SECTION 319050

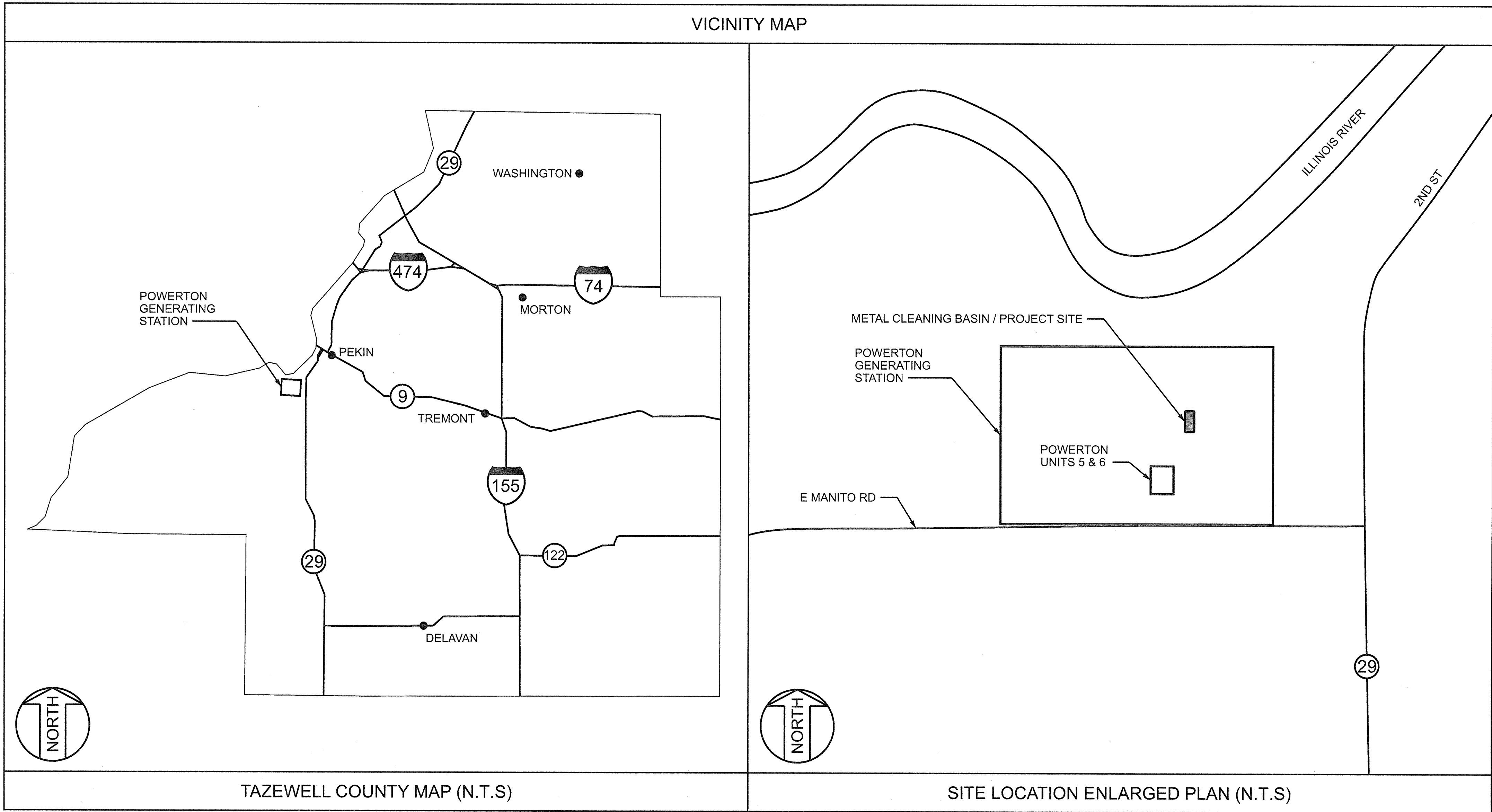


ATTACHMENT 1

DESIGN DRAWINGS

DRAWING NO.	REV.	TITLE
POW-MCB-CSK-001	0C	COVER SHEET
POW-MCB-CSK-002	0C	GENERAL NOTES
POW-MCB-CSK-003	0C	EXISTING CONDITIONS
POW-MCB-CSK-004	0C	EXCAVATION PLAN
POW-MCB-CSK-005	0C	EXCAVATION SECTIONS & DETAILS
POW-MCB-CSK-006	0C	STRUCTURAL FILL GRADING PLAN
POW-MCB-CSK-007	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM PLAN
POW-MCB-CSK-008	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS – SHEET 1
POW-MCB-CSK-009	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS – SHEET 2

MIDWEST GENERATION, LLC
POWERTON GENERATING STATION
METAL CLEANING BASIN RETROFIT PROJECT



PREPARED FOR:
MIDWEST GENERATION, LLC
POWERTON GENERATING STATION
13082 E. MANITO RD.
PEKIN, IL 61554

PREPARED BY:
SARGENT & LUNDY
55 E. MONROE ST.
CHICAGO, IL 60603

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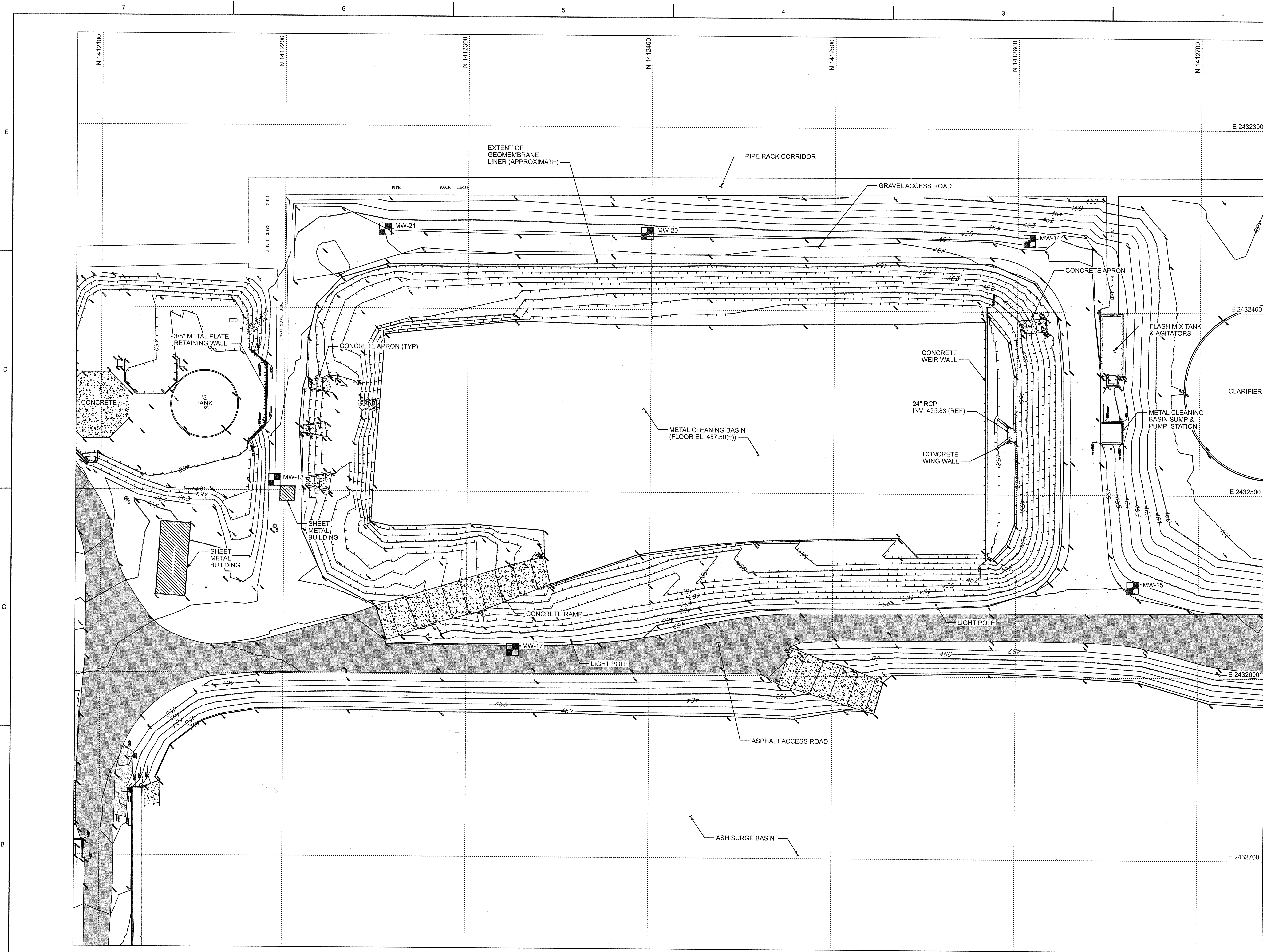
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DWG NO.	DRAWING TITLE
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POW-MCB-CSK-002	GENERAL NOTES
POW-MCB-CSK-003	EXISTING CONDITIONS
POW-MCB-CSK-004	EXCAVATION PLAN
POW-MCB-CSK-005	EXCAVATION SECTIONS & DETAILS
POW-MCB-CSK-006	STRUCTURAL FILL GRADING PLAN
POW-MCB-CSK-007	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM PLAN
POW-MCB-CSK-008	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 1
POW-MCB-CSK-009	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 2

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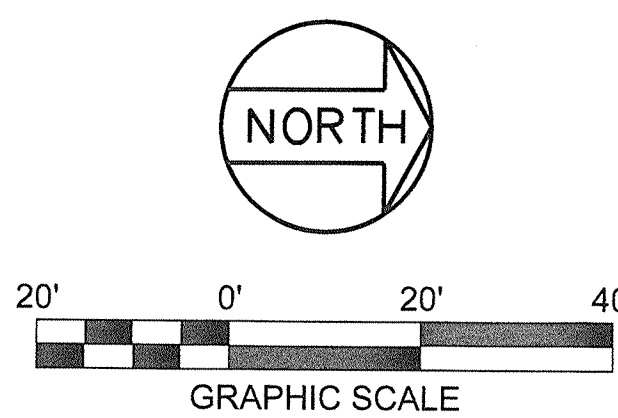
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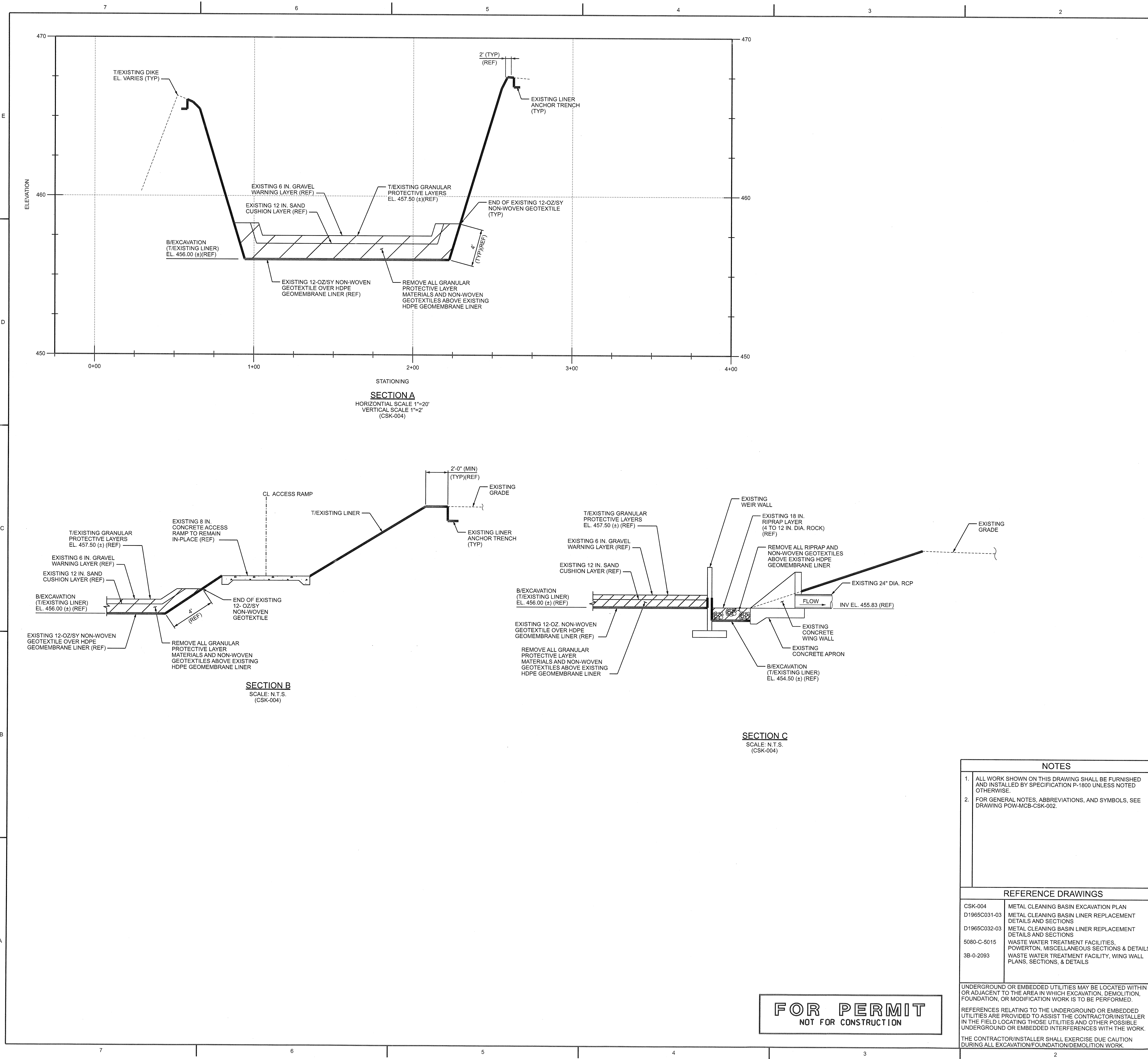
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REFERENCE DRAWINGS	
CSK-004	METAL CLEANING BASIN EXCAVATION PLAN
D1965C031-03	METAL CLEANING BASIN LINER REPLACEMENT DETAILS AND SECTIONS
D1965C032-03	METAL CLEANING BASIN LINER REPLACEMENT DETAILS AND SECTIONS
5080-C-5015	WASTE WATER TREATMENT FACILITIES, POWERTON, MISCELLANEOUS SECTIONS & DETAILS
3B-0-2093	WASTE WATER TREATMENT FACILITY, WING WALL PLANS, SECTIONS, & DETAILS

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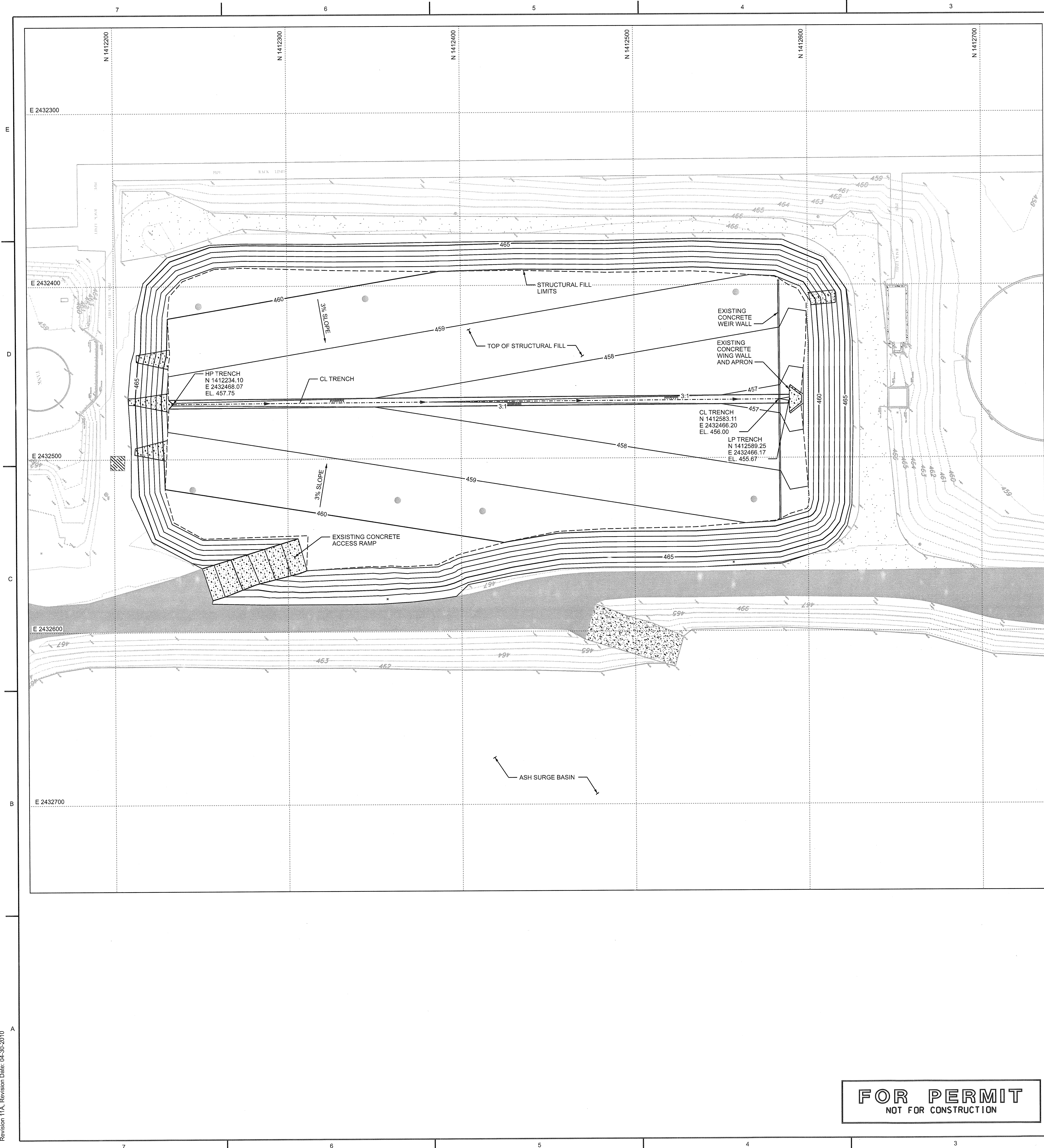
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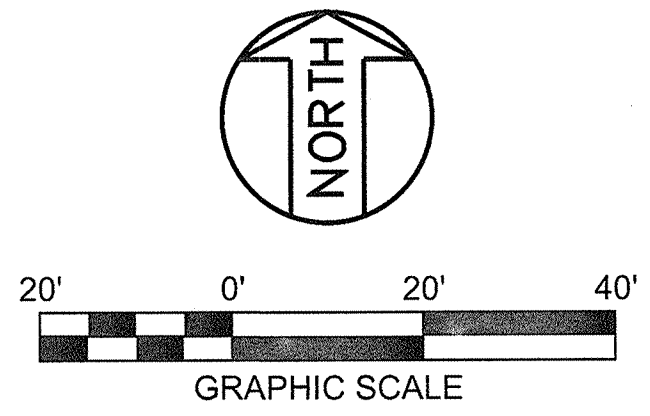
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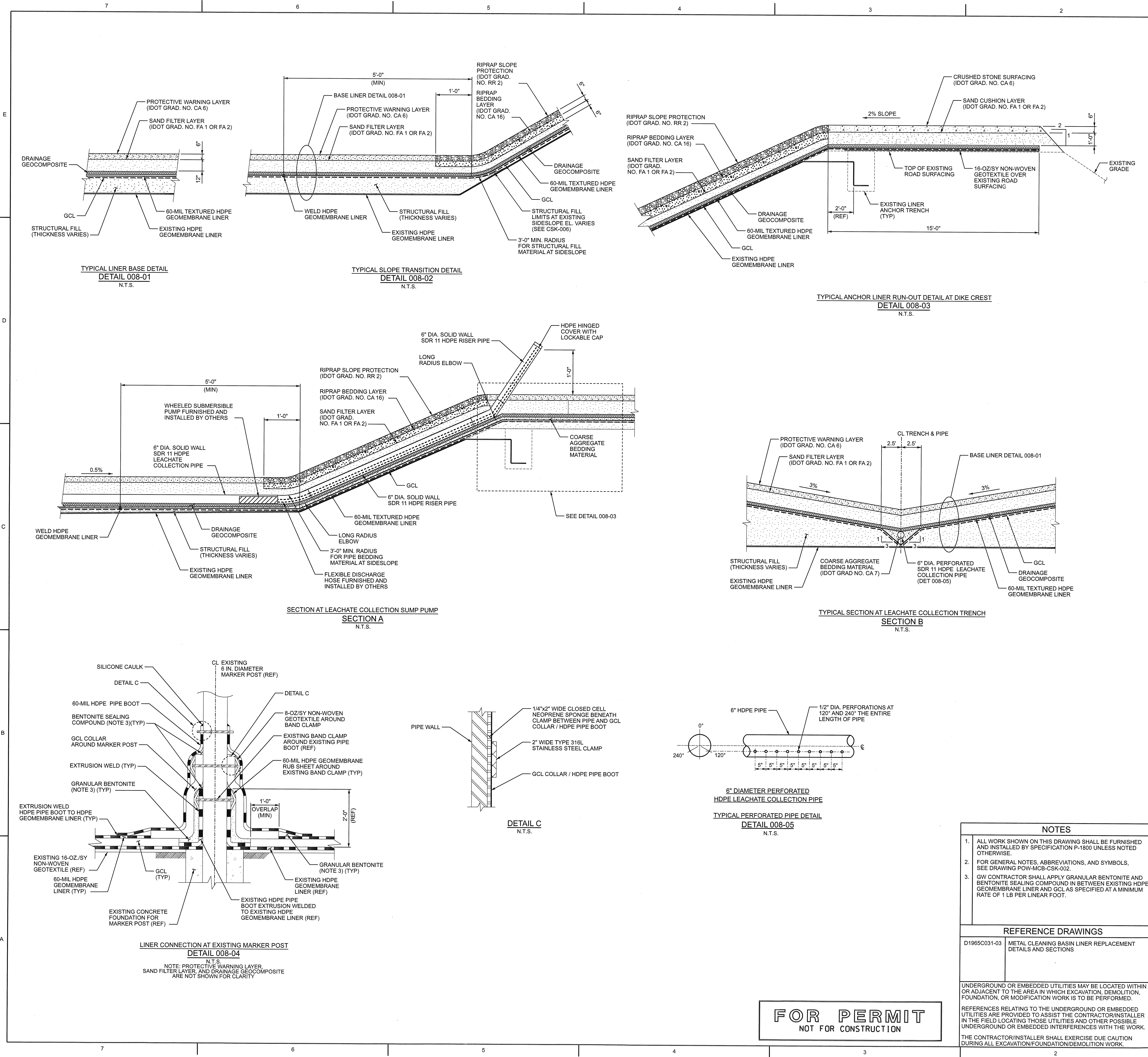
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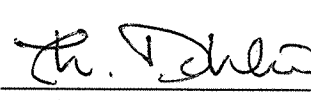
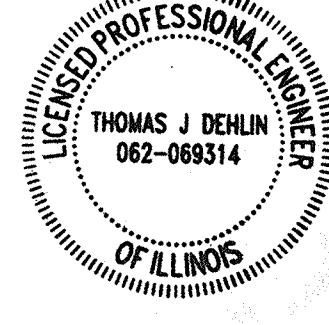
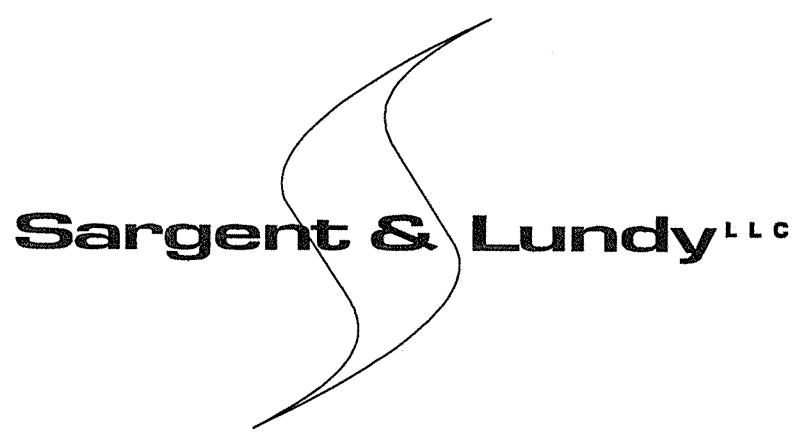
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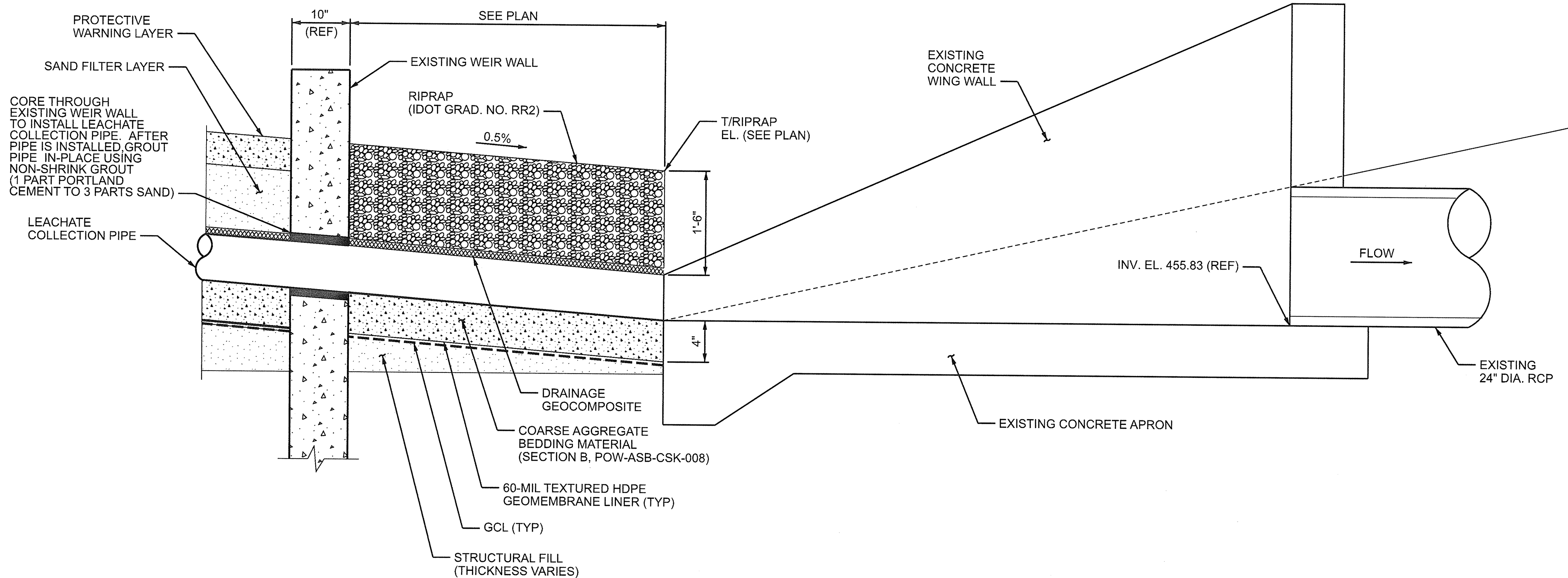
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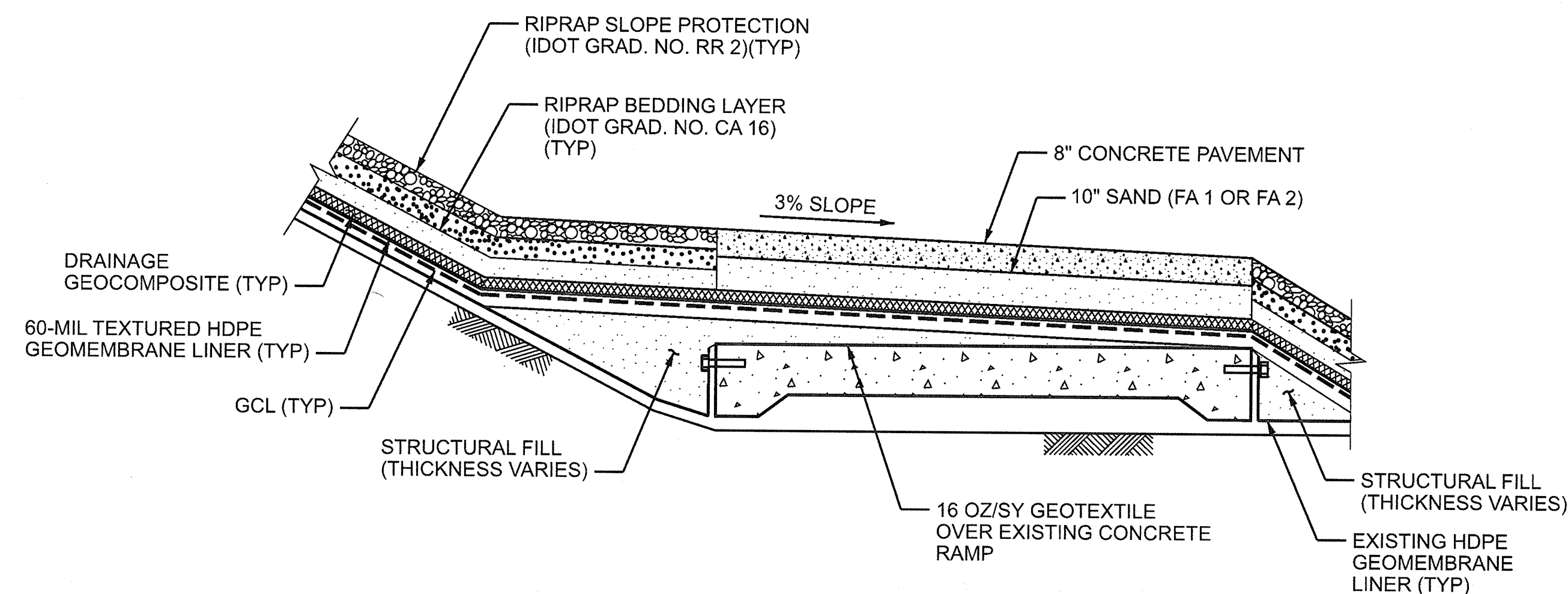


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POW-MCB-CSK-008		0C
SHEET 1 OF 1		

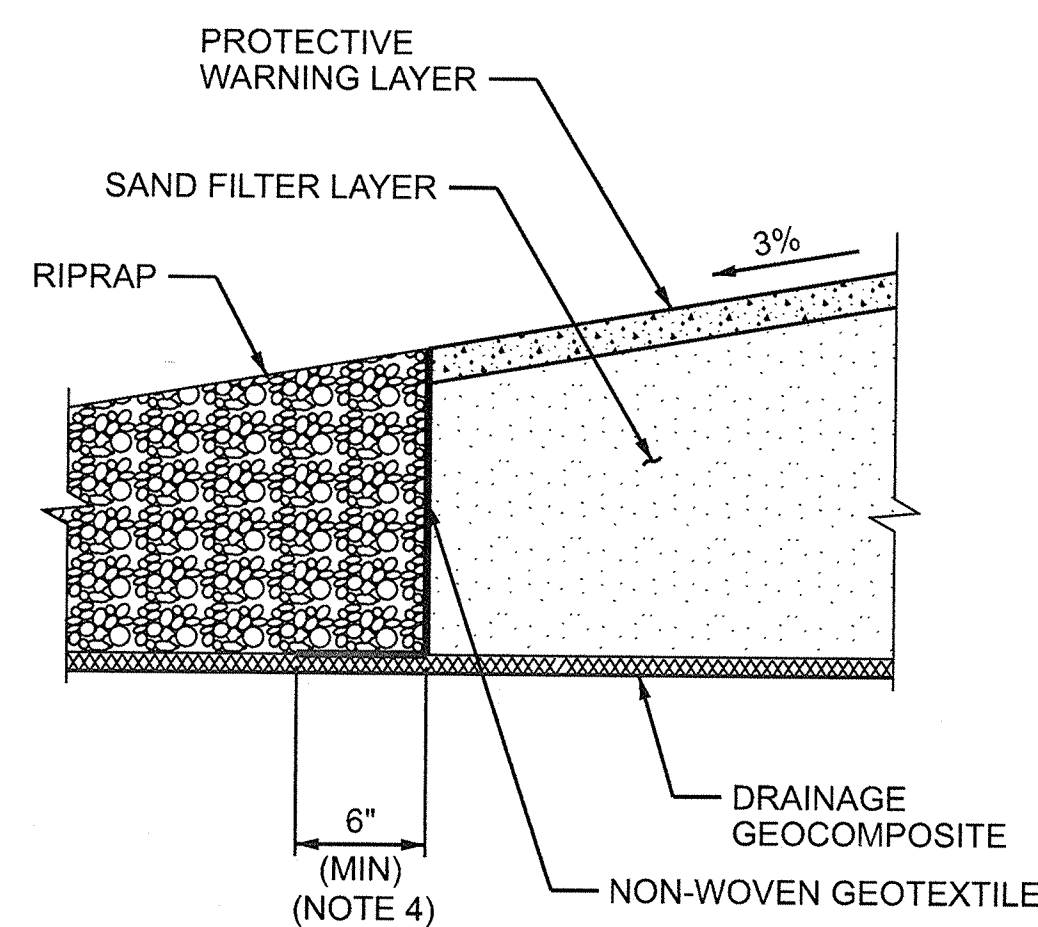
SPIN/015
Form CDC-001-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 1/A, Revision Date: 04-30-2010



SECTION E
N.T.S.



CONCRETE RAMP SECTION
SECTION F
N.T.S.



SECTION G
N.T.S.

FOR PERMIT
NOT FOR CONSTRUCTION

NOTES	
1.	ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION P-1800 UNLESS NOTED OTHERWISE.
2.	FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-MCB-CSK-002.
3.	GW CONTRACTOR SHALL APPLY GRANULAR BENTONITE AND BENTONITE SEALING COMPOUND IN BETWEEN EXISTING HDPE GEOMEMBRANE LINER AND GCL AS SPECIFIED AT A MINIMUM RATE OF 1 LB PER LINEAR FOOT.
REFERENCE DRAWINGS	
D1965C031-03	METAL CLEANING BASIN LINER REPLACEMENT DETAILS AND SECTIONS
3B-0-2093	WASTE WATER TREATMENT FACILITY WING WALL PLANS, SECTIONS & DETAILS
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.	
REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.	
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.	

HOLD INFORMATION				
NO.	DESCRIPTION			
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.				
RELEASE INFORMATION				
REV.	DATE	DESCRIPTION		
0A	03-16-2023	FOR CLIENT COMMENT		
0B	03-24-2023	FOR PUBLIC COMMENT		
0C	07-19-2023	FOR PERMIT		
ISSUE PURPOSE: PERMIT				
SPECIFICATION: P-1800				
PROJECT NO.: 12661-152				
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.				
THOMAS DEHLIN 07-19-2023				
MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.				
CAD FILE NAME: POW-MCB-CSK-009.DGN				
PREPARED BY: J. CHAVEZ				
REVIEWED BY: T. DEHLIN				
APPROVED BY: T. DEHLIN				
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.				
 SARGENT & LUNDY LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780				
PROJECT				
POWERTON GENERATING STATION METAL CLEANING BASIN RETROFIT				
DRAWING TITLE				
COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 2				
DRAWING NUMBER		REVISION		
POW-MCB-CSK-009		0C		
SHEET	1 OF 1			



ATTACHMENT 2

REFERENCE DRAWINGS



ATTACHMENT 2-1

1978 CONSTRUCTION DRAWINGS

DRAWING NO.	TITLE
5080-C-5008	DETAIL PLAN, METAL CLEANING & LIMESTONE RUNOFF BASINS
5080-C-5013	METAL CLEANING BASIN SECTIONS
5080-C-5015	MISCELLANEOUS SECTIONS & DETAILS
3B-0-2093	WING WALL PLANS, SECTIONS & DETAILS

5080.C5008

LAYOUT CONTROL FOR ROADS

NO.	N-S	E-W	RADIUS	TAN
6	N4°07'	E3°07'	150'	0.033
7	N5°45'	E4°07'		
8	N5°36'	E4°36'		
9	N11°00'	E4°36'	100'	1.5'
10	N11°37'	E4°07'	100'	1.5'
11	N12°53'	E4°27'	88'	0.8
12	N16°33'	E2°33'	68'	0.8
13	N12°18'	E2°33'	68'	0.8
14	N12°27'	E2°33'	68'	0.8
15	N7°35'	E10°10'	68'	10.5
16	N7°35'	E10°10'		
17	N9°55'	E10°15'	100'	1.5'
18	N10°20'	E10°25'	100'	1.5'
19	N11°35'	E9°05'	45'	3.7'

REV.	DESCRIPTION
1	APPROVED FOR CONSTRUCTION
2	ADD P.O. RAC
3	ADD P.O. RAC
4	ADD P.O. RAC
5	ADD P.O. RAC
6	ADD P.O. RAC
7	ADD P.O. RAC
8	ADD P.O. RAC
9	ADD P.O. RAC
10	ADD P.O. RAC
11	ADD P.O. RAC
12	ADD P.O. RAC
13	ADD P.O. RAC
14	ADD P.O. RAC
15	ADD P.O. RAC
16	ADD P.O. RAC
17	ADD P.O. RAC
18	ADD P.O. RAC
19	ADD P.O. RAC

- NOTES:
1. FOR GENERAL NOTES SEE DWG. C5001.
 2. FOR LEGEND SEE DWG. C5000-1.
 3. FOR TYPICAL RAMP AND R.C. DETAIL SEE DWG. C5015-1.

APPROVED FOR CONSTRUCTION

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITY
POWERTON

DETAIL PLAN METAL CLEANING
LIMESTONE RUNOFF BASINS

CECO CONTRACT: 802067

DATE: 12/19/78

SCALE: 1"=20'

5080.C5008

ROCKVILLE, MD.

DATE: 12/19/78

SCALE: 1"=20'

5080.C5008

ROCKVILLE, MD.

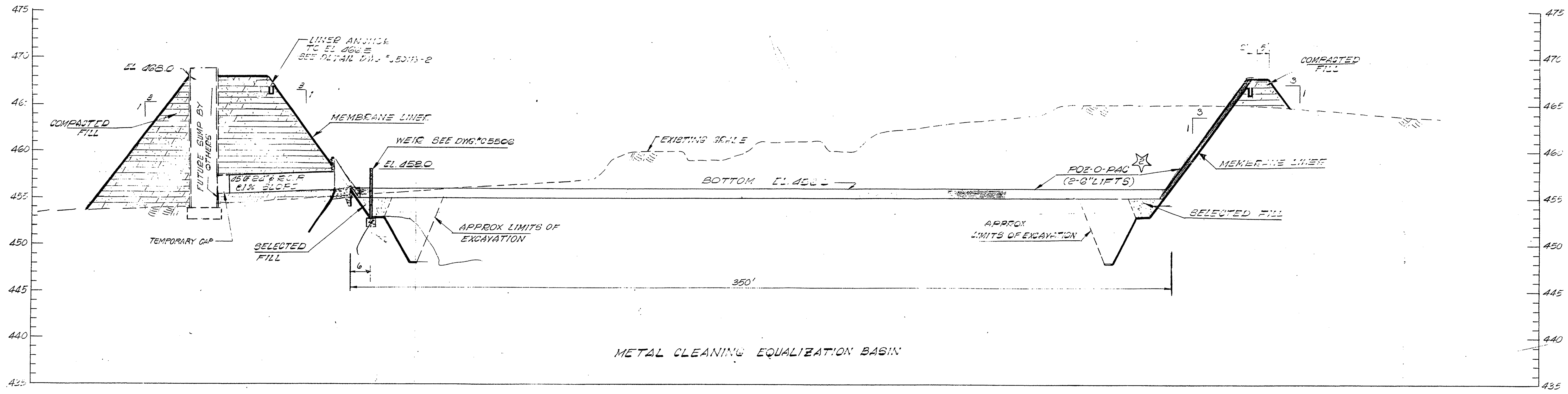
DATE: 12/19/78

SCALE: 1"=20'

5080.C5008

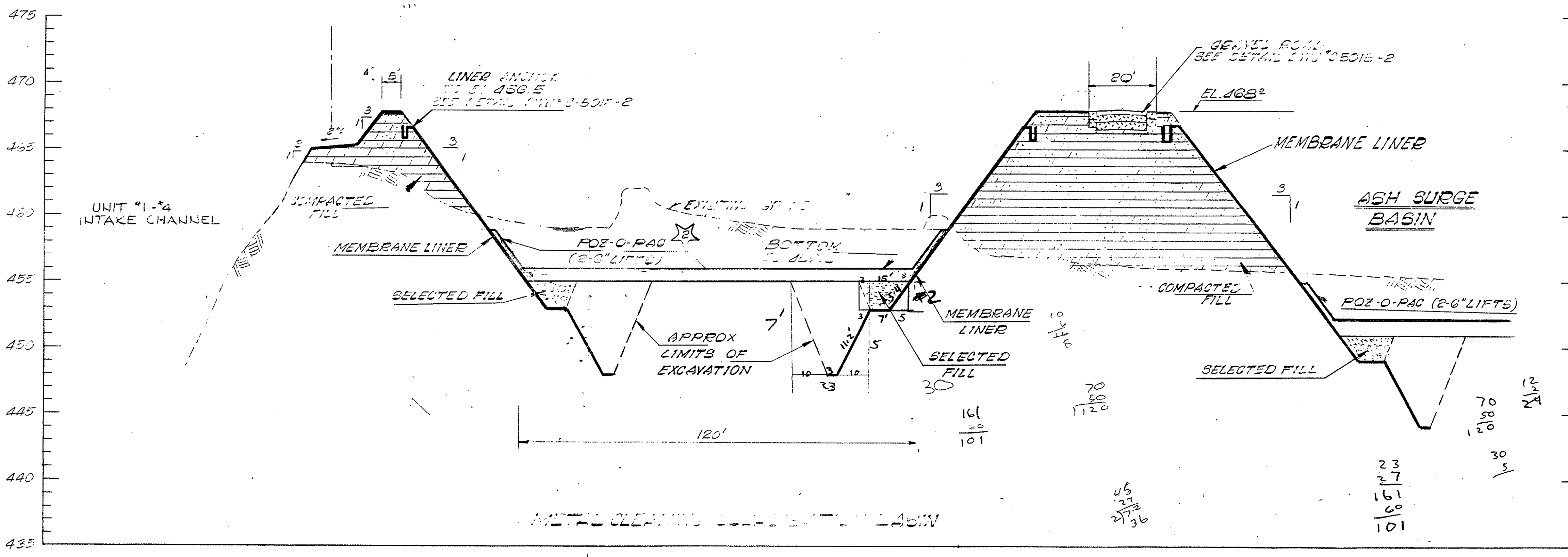
2 5080 C5013

REVISIONS	
REV.	DESCRIPTION
1	APPROVED FOR CONSTRUCTION
2	FOR LEGEND SEE DWG. C-5000
3	CONTRACTOR TO DEMOLISH CONSTRUCTION AREA TO EL 448.0 BY APPROVED METHOD(S) PRIOR TO BASIN CONSTRUCTION.



FOR TYPICAL DETAIL
POZ-O-PAC HYPALON
LINER SEE THIS SHEET

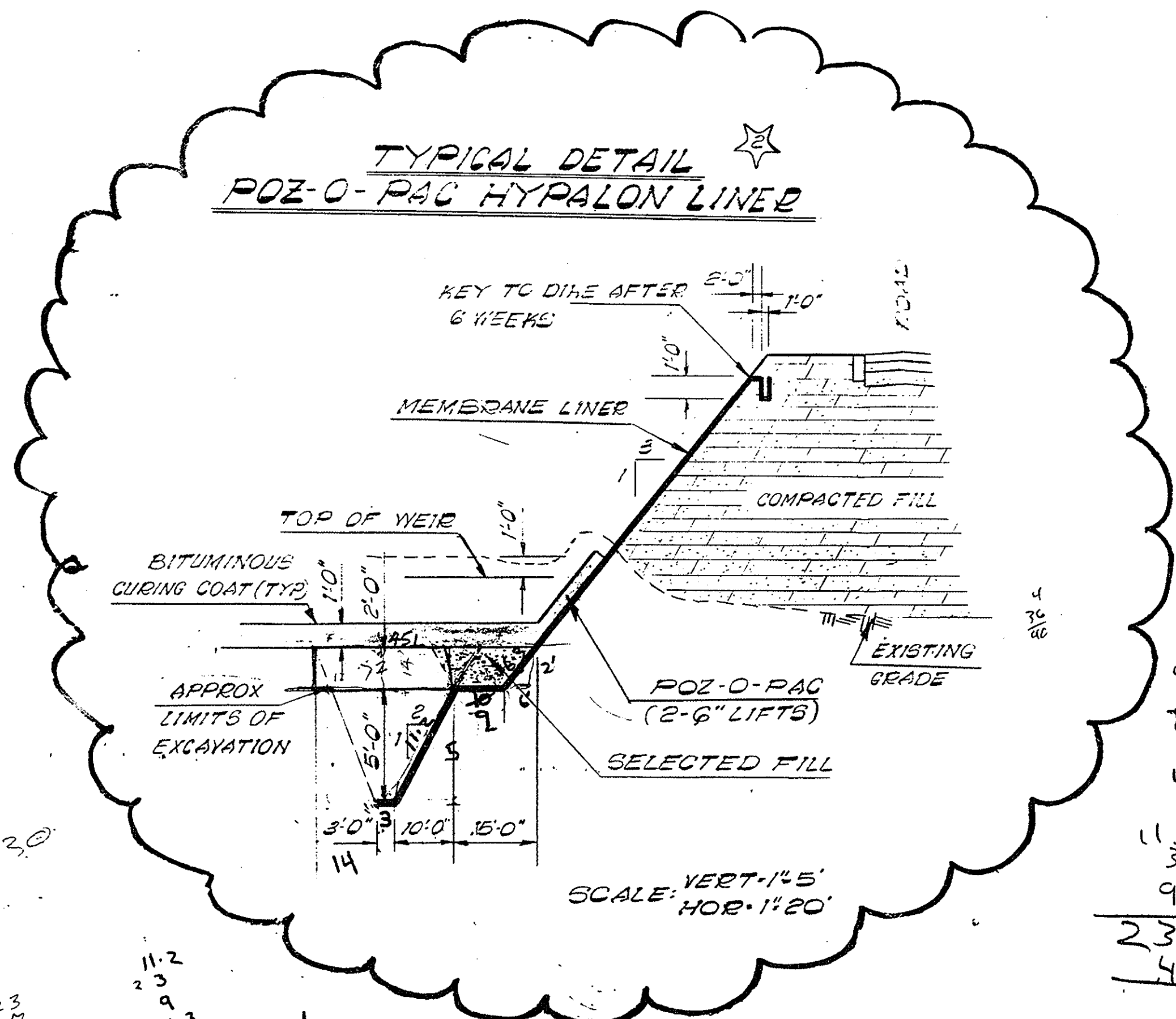
SECTION D



SECTION E

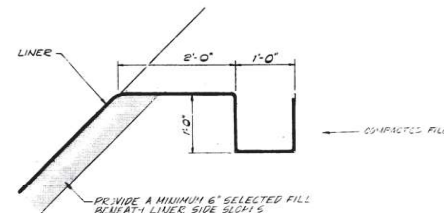
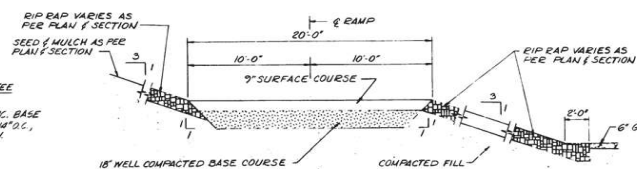
21,730 sq ft

- NOTES:
- FOR GENERAL NOTES SEE DWG. C-5001
 - FOR LEGEND SEE DWG. C-5000
 - CONTRACTOR TO DEMOLISH CONSTRUCTION AREA TO EL 448.0 BY APPROVED METHOD(S) PRIOR TO BASIN CONSTRUCTION.

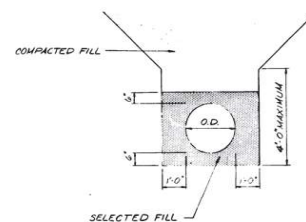
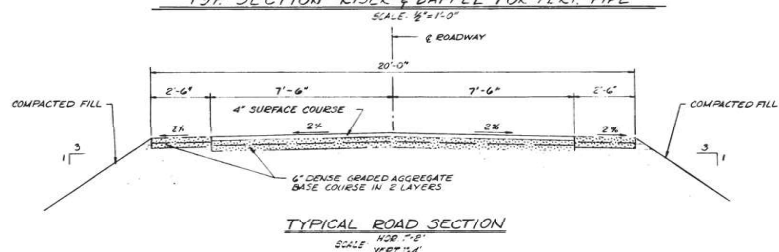


SCALE: HOB 1\"/>

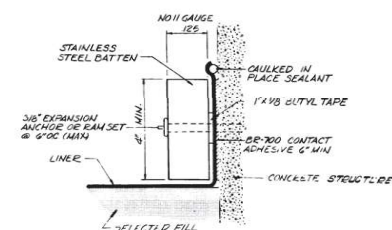
DRAWING STATUS	
APPROVED FOR CONSTRUCTION	
COMMONWEALTH EDISON COMPANY WASTE WATER TREATMENT FACILITIES POWERTON	
METAL CLEANING BASIN SECTIONS	
CEDC CONTRACT 802667	CEDC DWG. NO.
DRAWING NO. 5080 C5013	
SHEET 1 OF 1	



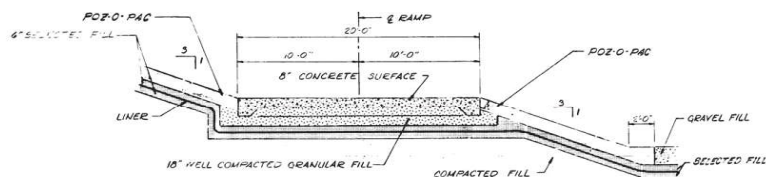
TYPICAL SECTION
GRAVEL RAMP



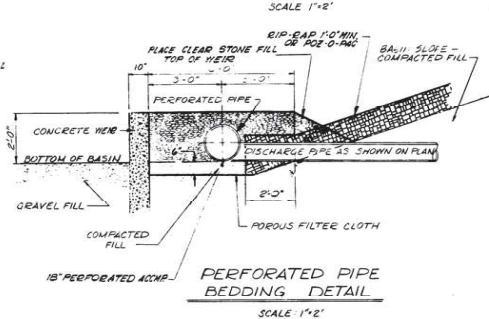
PIPE BEDDING DETAIL



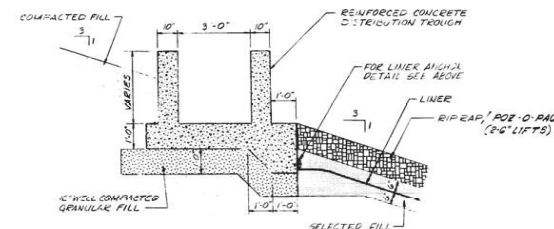
LINER ANCHOR DETAILS
NO SCALE



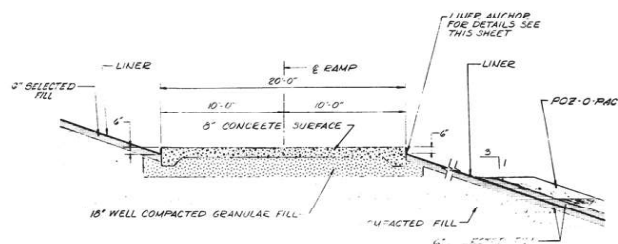
TYPICAL CONCRETE RAMP SECTION
LINER BELOW RAMP



PERFORATED PIPE
BEDDING DETAIL



LINER ANCHORAGE FOR
DISTRIBUTION TROUGH



TYPICAL CONCRETE RAMP SECTION
LINER ON GRADE

NOTES:

- NOTES:
1. FOR GENERAL NOTES SEE DWG. 1-5000
 2. FOR LEGEND SEE DWG. 6-5000-1



Sudhanar A. Venna
5/1/78

APPROVED FOR CONSTRUCTION

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

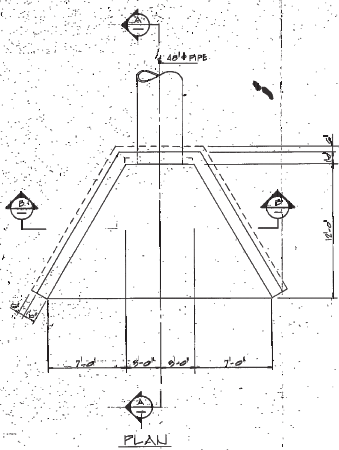
MISCELLANEOUS SECTIONS & DETAILS

CECO CONTRACT: 802667	CECO DWS NO.
-----------------------	--------------

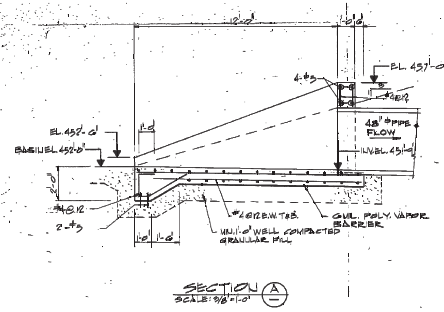
NUS 5080 C 5015

ROCKVILLE, MD.	SCALE: AS SHOWN	SHEET 1 OF 2
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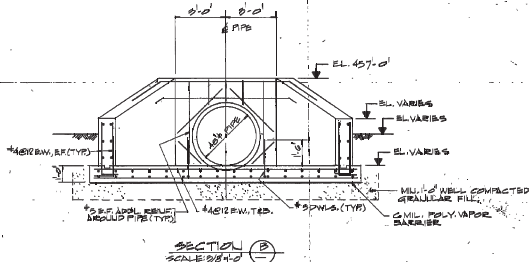
38-0-2093



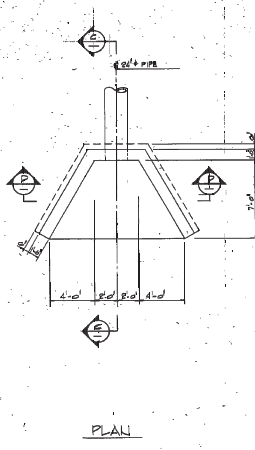
ASH SURGE BASIN WING WALL FOR 48" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5007)



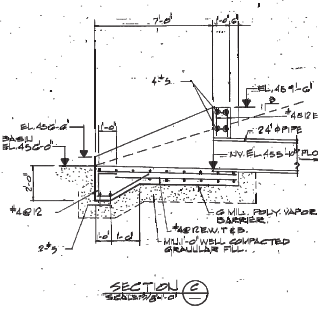
SECTION A
SCALE: 3/8" = 1'-0"



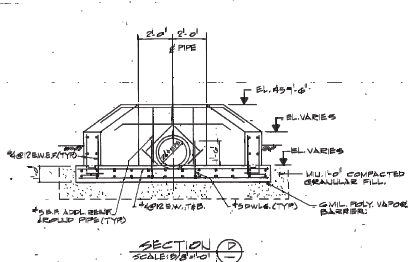
SECTION B
SCALE: 3/8" = 1'-0"



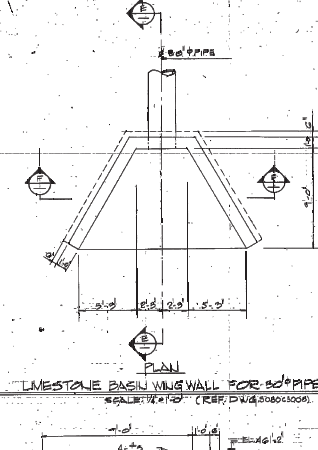
METAL CLEANING BASIN WING WALL FOR 24" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5008)



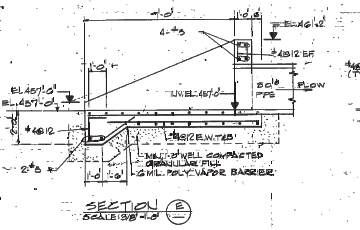
SECTION C
SCALE: 3/8" = 1'-0"



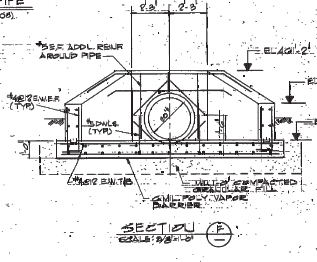
SECTION D
SCALE: 3/8" = 1'-0"



LIMESTONE BASIN WING WALL FOR 30" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5009)

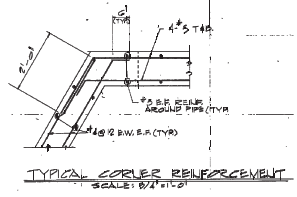


SECTION E
SCALE: 3/8" = 1'-0"



SECTION F
SCALE: 3/8" = 1'-0"

NOTES:
1. FOR GENERAL NOTES SEE DWG. C 5501.



TYPICAL CORNER REINFORCEMENT
SCALE: 3/8" = 1'-0"

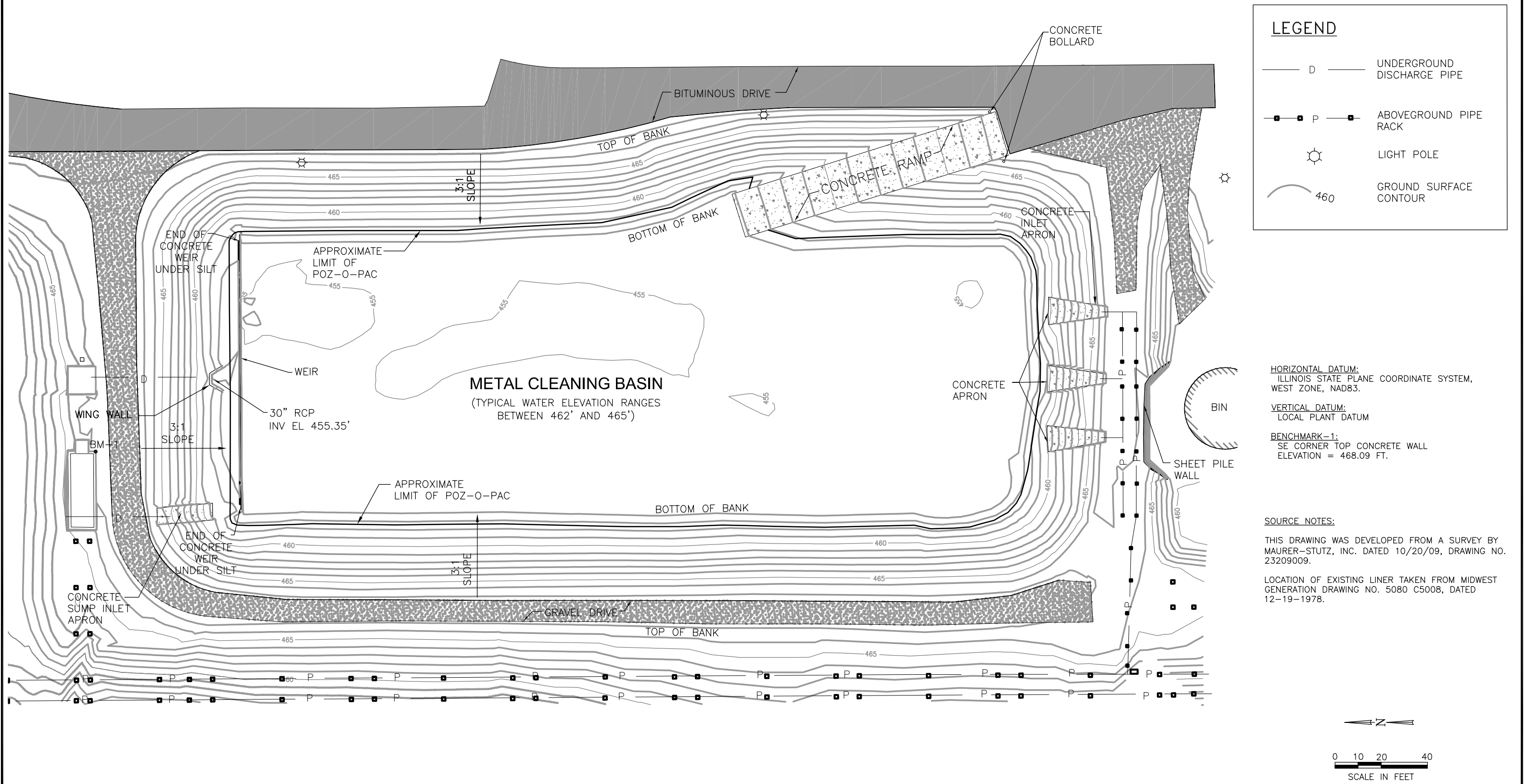
4/19/14 APPROVED FOR CONSTRUCTION	
WASTE WATER TREATMENT FACILITY WING WALL PLANS SECTIONS & DETAILS	
STATION: 3 POWERTON	SCALE: AS SHOWN DATE: 03-26-09
PROVIDED BY: J.L. MEDE ENGINEERING	MIDWEST GENERATION 38-0-2093



ATTACHMENT 2-2

2010 LINER REPLACEMENT DRAWINGS

DRAWING NO.	TITLE
D1965C010-04	PRE-CONSTRUCTION CONDITIONS
D1965C020-03	LINER SUBGRADE PREPARATION
D1965C030-03	WARNING LAYER PLAN
D1965C031-03	DETAILS AND SECTIONS
D1965C032-03	DETAILS AND SECTIONS



LEGEND

— D — UNDERGROUND DISCHARGE PIPE

— P — ABOVEGROUND PIPE RACK

☼ LIGHT POLE

460 GROUND SURFACE CONTOUR

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

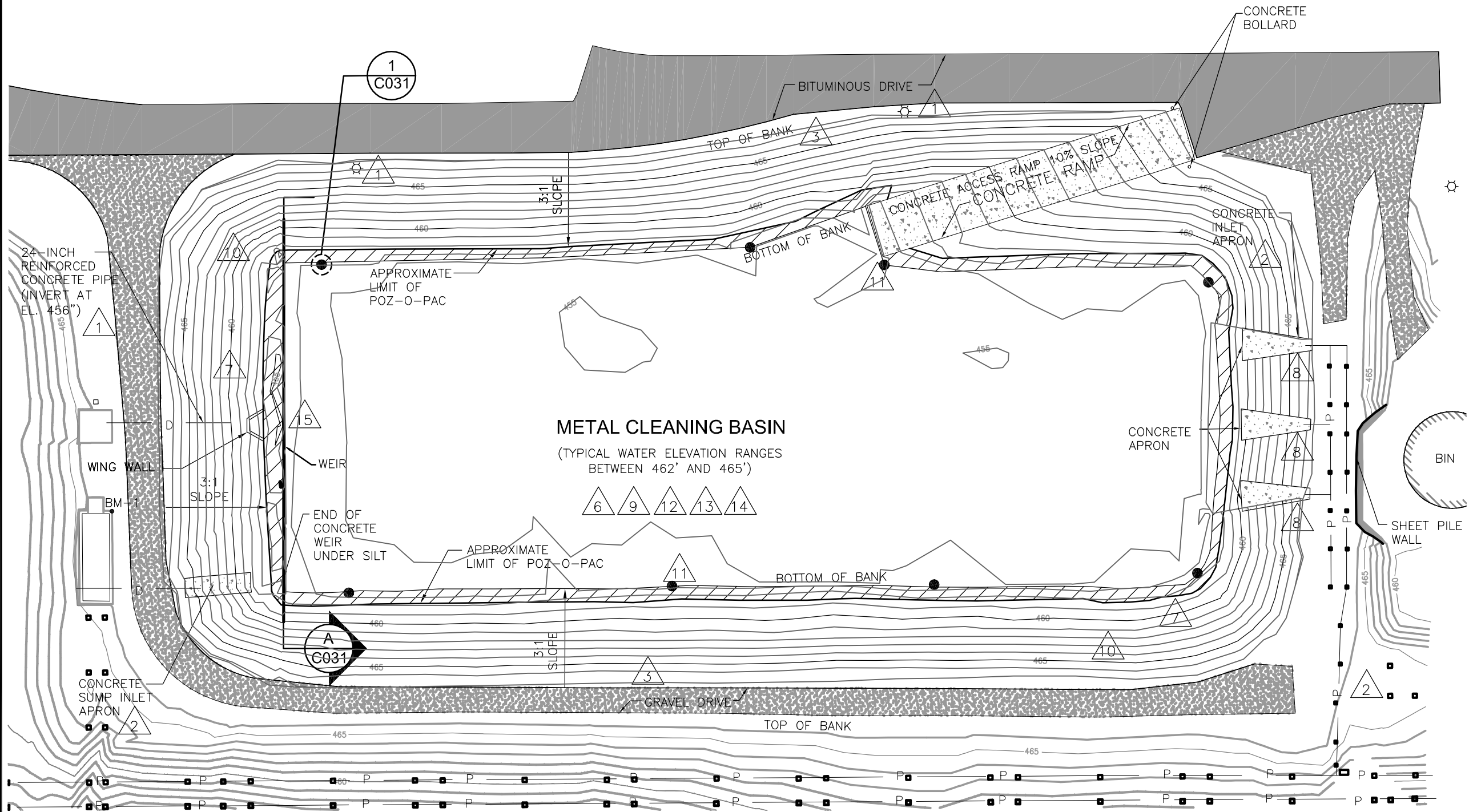
BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO. 23209009.

LOCATION OF EXISTING LINER TAKEN FROM MIDWEST GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978.

6.			 NATURAL RESOURCE TECHNOLOGY	PROJECT NO. 1965/4.0	PRE-CONSTRUCTION CONDITIONS METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS	
5.				DRAWN BY: RLH/KNW 07/17/09		
4. RECORD DOCUMENTATION	06/16/11	HMS		CHECKED BY: RJG 07/17/09		
3. ISSUED FOR CONSTRUCTION	10/22/10	HMS		APPROVED BY: HMS 07/27/09		
2. ADDENDUM 1	10/22/09	HMS		DRAWING NO: D1965C010-04	SHEET NO. C010	
1. ISSUED FOR BID	10/05/09	HMS		REFERENCE: .		
0. ISSUED FOR PERMIT	07/27/09	HMS				
REVISION:	DATE:	APP'D BY:				



LEGEND

- D UNDERGROUND DISCHARGE PIPE
- P ABOVEGROUND PIPE RACK
- LIGHT POLE
- 460 PREPARED SUBGRADE SURFACE CONTOUR
- MARKER POST LOCATION
- POZ-O-PAC REMOVAL AREA

- CONTRACTOR NOTES:
1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
 2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE STRUCTURES AND ABOVE GROUND PIPING.
 3. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
 4. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
 5. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
 6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES TO REMAIN IN PLACE THROUGHOUT PROJECT DURATION.
 7. REMOVE EXISTING 12-INCH POZ-O-PAC LAYER ALONG SIDE SLOPES. POZ-O-PAC LAYER AT BASE OF BASIN TO REMAIN IN PLACE, EXCEPT NORTH OF WEIR. CONTRACTOR SHALL REMOVE AN ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL ALONG THE NORTH BOTTOM OF BANK, AS SHOWN ON SECTION B, SHEET C031.
 8. CONTRACTOR SHALL REMOVE INLET APRONS AND HAUL MATERIAL TO RECYCLING FACILITY.
 9. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
 10. CONTRACTOR SHALL REMOVE "SOFT" SUBGRADE MATERIAL BENEATH EXISTING HYPALON LINER, AS DIRECTED BY OWNER AND/OR ENGINEER. BACKFILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. CUT HYPALON LINER AS NEEDED TO REPAIR THE "SOFT" SUBGRADE AREAS.
 11. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE TOE OF SLOPE AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND DETAIL 1 ON SHEET C031.
 12. SUBGRADE MUST BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
 13. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE OVER THE SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
 14. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE LAYER FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE LAYER SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
 15. CONTRACTOR SHALL EXTEND CONCRETE WEIR UP BY 18" IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND SECTION A ON SHEET C031.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY
MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO.
23209009.

LOCATION OF EXISTING LINER TAKEN FROM MIDWEST
GENERATION DRAWING NO. 5080 C5008, DATED
12-19-1978.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A
SURVEY PROVIDED BY MILLENNIA PROFESSIONAL
SERVICES, MARCH 2011.

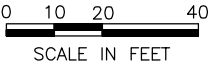
6.		
5.		
4.		
3.	RECORD DOCUMENTATION	06/08/11 HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10 HMS
1.	ISSUED FOR BID	10/05/09 HMS
0.	ISSUED FOR PERMIT	07/27/09 HMS
REVISION:	DATE:	APP'D BY:

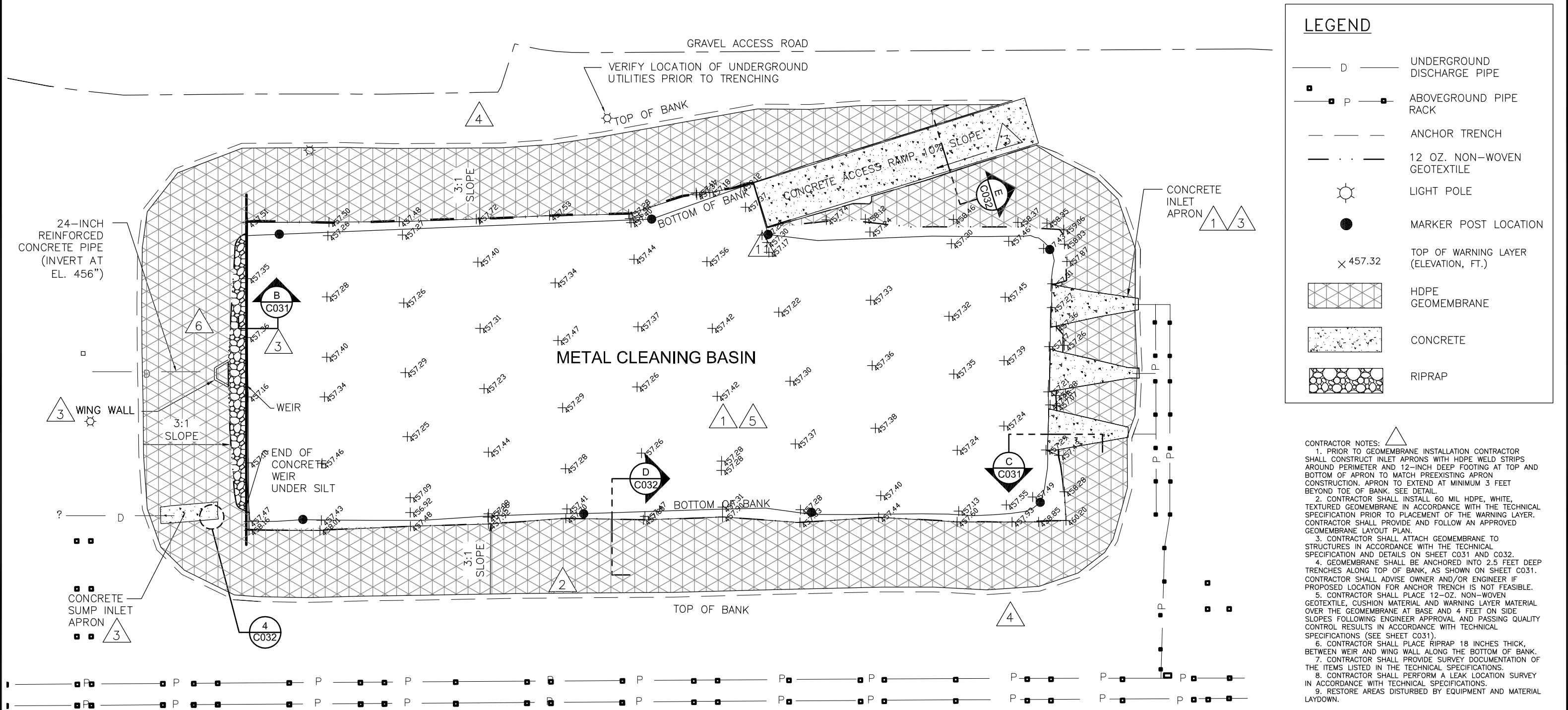


PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/25/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

LINER SUBGRADE PREPARATION
METAL CLEANING BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C020-03	SHEET NO. C020
REFERENCE:	





HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK-1:
SE CORNER TOP CONCRETE WALL
ELEVATION = 468.09 FT.

SOURCE NOTES:

THIS DRAWING WAS DEVELOPED FROM A SURVEY BY
MAURER-STUTZ, INC. DATED 10/20/09, DRAWING NO.
23209009.

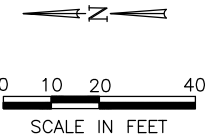
LOCATION OF EXISTING LINER TAKEN FROM MIDWEST
GENERATION DRAWING NO. 5080 C5008, DATED 12-19-1978.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY
PROVIDED BY MILLENNIA PROFESSIONAL SERVICES, MARCH 2011.

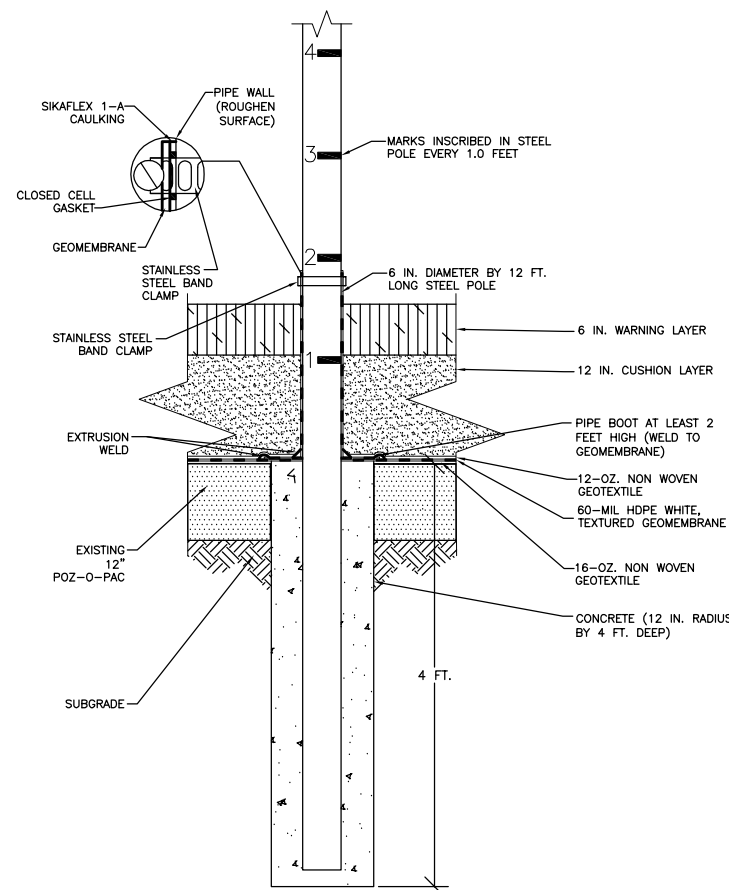
6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:



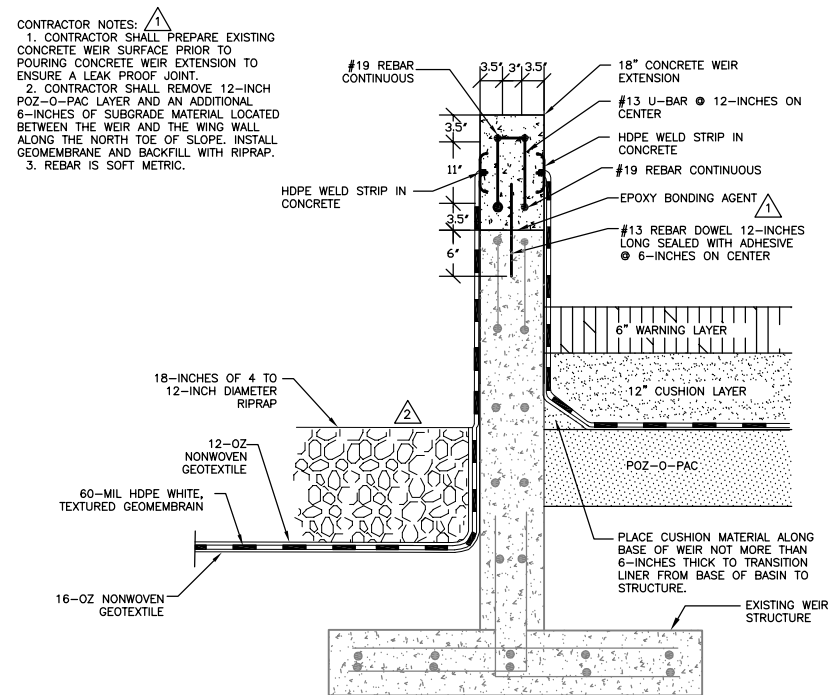
PROJECT NO. 1965/4.0
DRAWN BY: KNW 08/25/09
CHECKED BY: RJG 10/05/09
APPROVED BY: HMS 10/05/09

WARNING LAYER	
METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS	
DRAWING NO: D1965C030-03 REFERENCE: .	SHEET NO. C030

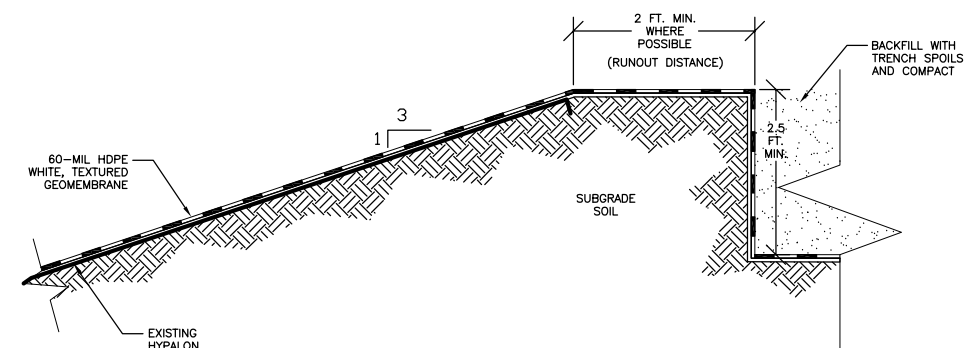




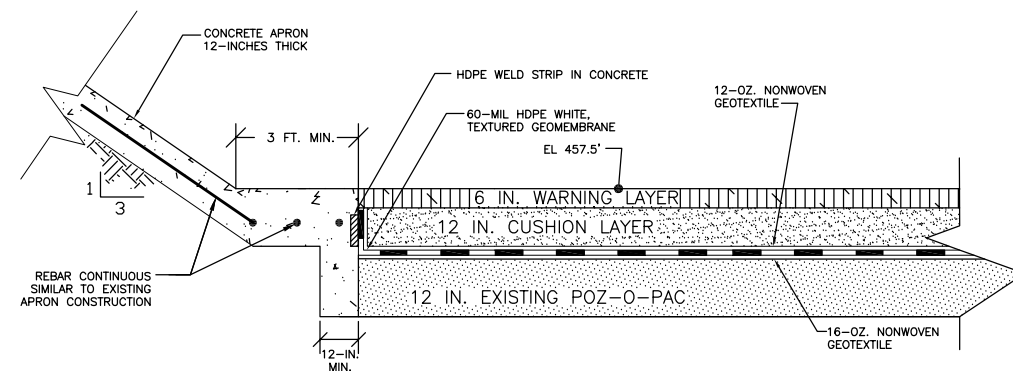
1
C020 MARKER POST DETAIL
NOT TO SCALE



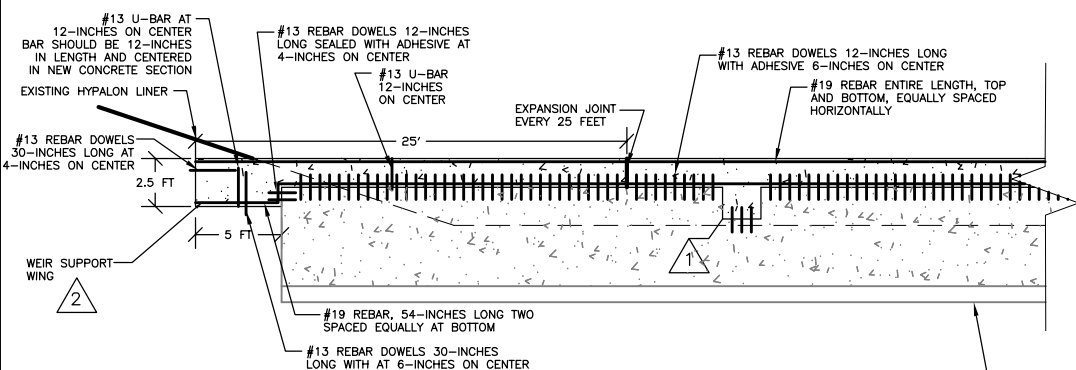
B
CONCRETE WEIR EXTENSION DETAIL
NOT TO SCALE



2
C030 ANCHOR TRENCH SECTION
NOT TO SCALE



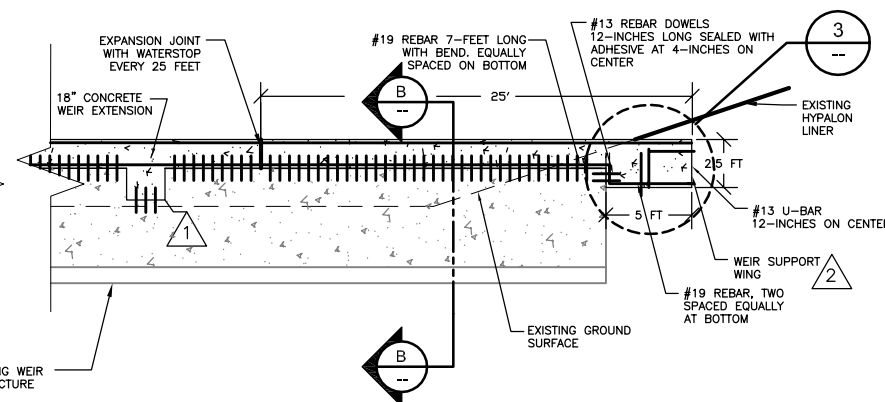
C
C030 CONCRETE INLET APRON SECTION
NOT TO SCALE



CONTRACTOR NOTE: △

1. CONTRACTOR SHALL REMOVE METAL SLIDING GATES AND REPLACE WITH CONCRETE REBAR DOWELS AND ADHESIVE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
2. CONTRACTOR SHALL INSTALL WEIR SUPPORT WINGS AND BACKFILL WITH TRENCH SPOILS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
3. REBAR IS SOFT METRIC.

A
C020 CONCRETE WEIR EXTENSION SECTION
NOT TO SCALE



3
WEIR SUPPORT WING DETAIL
NOT TO SCALE

6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:



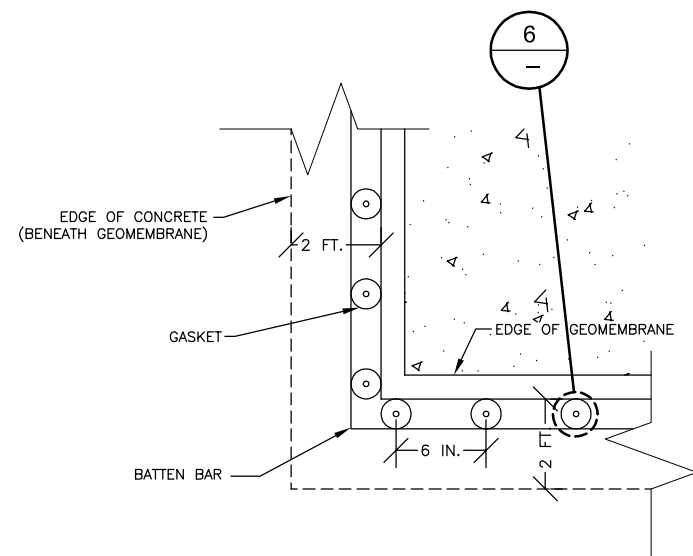
PROJECT NO.	1965/4.0
DRAWN BY:	KNW 08/12/09
CHECKED BY:	RJG 10/05/09
APPROVED BY:	HMS 10/05/09

DETAILS AND SECTIONS

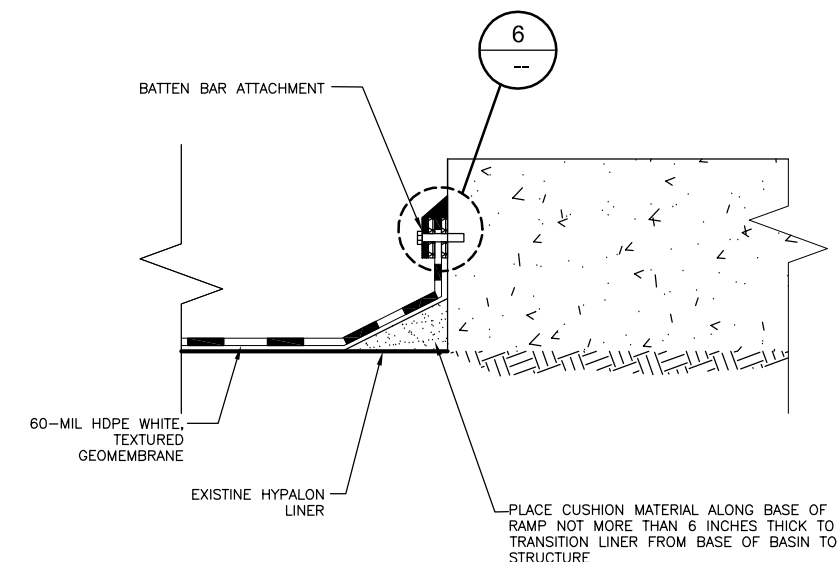
METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS

DRAWING NO: D1965C031-03
REFERENCE:.

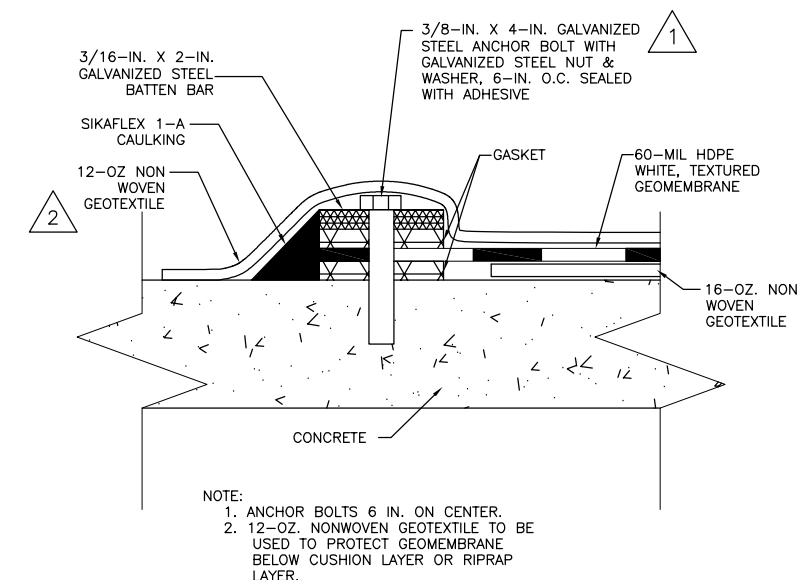
SHEET NO.
C031



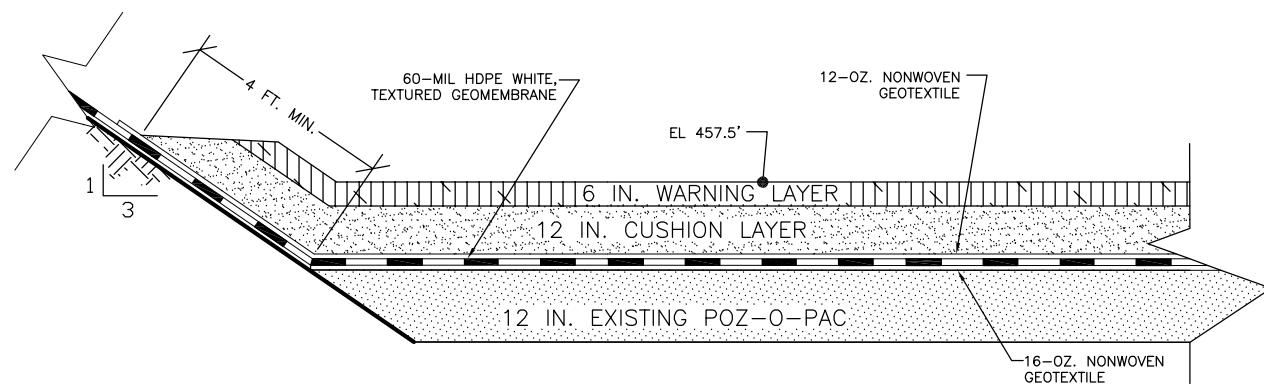
4 SUMP INLET APRON DETAIL
C030 NOT TO SCALE



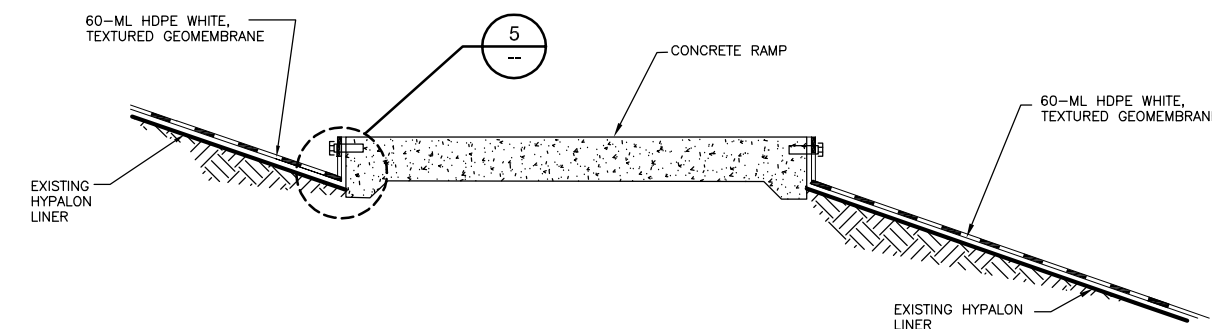
5 CONCRETE RAMP CONNECTION DETAIL
NOT TO SCALE



6 BATTEN BAR ATTACHMENT
NOT TO SCALE



D SLOPE TRANSITION SECTION
C030 NOT TO SCALE



E CONCRETE RAMP SECTION
C030 NOT TO SCALE

6.			
5.			
4.			
3.	RECORD DOCUMENTATION	06/08/11	HMS
2.	ISSUED FOR CONSTRUCTION	10/22/10	HMS
1.	ISSUED FOR BID	10/05/09	HMS
0.	ISSUED FOR PERMIT	07/27/09	HMS
REVISION:		DATE:	APP'D BY:



PROJECT NO.	1965/4.0
DRAWN BY:	KNW 08/25/09
CHECKED BY:	RJG 10/05/09
APPROVED BY:	HMS 10/05/09

DETAILS AND SECTIONS

METAL CLEANING BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS

DRAWING NO: D1965C032-03
REFERENCE: 1965/4/

SHEET NO.
C032



ATTACHMENT 3

2021 STRUCTURAL STABILITY & FACTOR OF SAFETY ASSESSMENT

**STRUCTURAL STABILITY AND FACTOR OF SAFETY ASSESSMENT
METAL CLEANING BASIN
POWERTON STATION
JUNE 2021**

This report has been prepared for the Metal Cleaning Basin (herein referred to as the Basin) at Powerton Station pursuant to Sections 845.450 Structural Stability Assessment and 845.460 Safety Factor Assessment of Title 35 Subtitle G Subchapter I Subchapter j Coal Combustion Waste Surface Impoundments. The purpose of this project is to perform the initial structural stability and factor of safety assessments for the Basin by a licensed professional engineer. Civil & Environmental Consultants, Inc. (CEC) completed this structural stability and factor of safety assessment as described in the following sections.

1.0 REGULATION REQUIREMENTS 845.450 AND 845.460

In accordance with Sections 845.450 and 845.460, owners or operator of a coal combustion residuals (CCR) impoundment are required to conduct initial and annual structural stability assessments to document whether the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded; and to conduct an initial and annual safety factor assessment for each CCR surface impoundment and document whether the calculated factors of safety for each CCR surface impoundment achieve the minimum safety factors specified for the critical cross section of the embankment.

2.0 SITE CONDITIONS

The Basin is located at Powerton Station in Pekin, Illinois situated northeast of the main power building, south of the Wastewater Building and between the Ash Surge Basin and former Cooling Water Intake Canal, See Figure 1. Measuring 450 feet long and 225 feet wide, approximately 2.3 acres in size, the Basin is lined with a 60-mil high-density polyethylene (HDPE) liner. Gravel access roads are located along the north, east, and west sides.

Based on information provided by station personnel, the Basin was constructed in the late 1970s or early 1980s, and has not undergone significant changes in the geometry. The original operation was designed to receive bottom ash and, twice a year, boiler wash via sluicing with wastewater treated in the wastewater treatment plant. Operation of the basin has changed to also receive bottom ash and fly ash by end dumping into the basin. Wastewater is periodically pumped from the Basin, treated to remove elevated metal concentrations, and discharged into the Ash Surge Basin. The Basin is inspected weekly by the environmental specialist including checking water level in the Basin.

3.0 STRUCTURAL STABILITY ASSESSMENT - SECTION 845.540

The following sections describe the structural stability assessment.

3.1 Stable Foundation and Abutments - 845.450(a)(1)

This assessment indicates the soils forming the Basin foundation are stable. Soils data from within the vicinity of the Basin shows up to 28 feet of clay soils overlying approximately 35 to 40 feet of loose to very dense poorly graded sand and silty sand with some gravel. Soil data developed from soil borings completed for this assessment are consistent with the above soil descriptions.

Inspection of the Basin did not show signs of distress due to settlement of the underlying foundation soils. Furthermore both elastic settlement and primary consolidation settlement of the underlying soils would have occurred soon after construction of the basin in the late 1970s or early 1980s, and the secondary consolidation settlement, which would have been expected to be minimal considering the type of soils and associated loading, would also have occurred. Without significant changes in the operation of the Basin that would significantly increase loading on the foundation material, there should be no significant settlement of the foundation soils.

The Basin is partially incised and supported by earthen embankment on the west. This type of basin constructed with earthen berms does not require abutments, and therefore consideration of abutment design, construction, and operation is not required.

3.2 Adequate Slope Protection - 845.450(a)(2)

The Basin is constructed with a 60-mil HDPE liner that provides adequate protection of the interior slopes against surface erosion, wave action, and adverse effects of sudden drawdown.

3.3 Dike Compaction - 845.450(a)(3)

As-built construction documents for the Basin are unavailable. It would be standard practice for the dikes to be mechanically compacted to a density sufficient to withstand the range of loading conditions in the Basin. This is supported by the consideration that the Basin has been in operation since the 1980s, and that the station has no record of observed distress or repair. Furthermore, the initial inspection of the dike did not shows signs of distress that would be indicative of improperly placed and/or loosely compacted soils.

3.4 Downstream Slope Protection - 845.450(a)(4)

Consistent with Section 845.430, the Basin slope protection consists of vegetative cover over the downstream slopes and pertinent surrounding areas. Inspection shows the grassy vegetation is well maintained; protective against surface erosion, wave action, and adverse effect of rapid

drawdown; easily observable and accessible; and free of woody vegetation. At the time of inspection, the vegetation did not exceed 12 inches in height.

3.5 Spillway - 845.450(a)(5)

Section 845.450 specifies a single spillway or a combination of spillways configured as specified in subsection (a)(5)(A) and that the combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in subsection (a)(5)(B). Our inspection shows the Basin was designed and has been operated without an emergency spillway.

Although the Basin has been designed, constructed and operated for more than forty years without an emergency spillway, and the basin is inspected weekly by the environmental specialist with the intent to maintain the water level no higher than the weir elevation, not having an emergency spillway is considered a deficiency in accordance with the Section 845.450(a)(5).

3.6 Structural Integrity Of Hydraulic Structures - 845.450(a)(6)

A hydraulic structure, 24-inch pipe, passes through the dike between the north, incised end of the Basin and the Basin Discharge Sump. At the time of our inspection, the water level in the Basin was over the top of the pipe and a thorough inspection could not be conducted. Evidence showing the structural integrity of the pipe free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris could not be made. At the time of this report, inspection report for the pipe were unavailable.

3.7 Down Stream Slopes Adjacent To Water Bodies - 845.450(a)(7)

The former Cooling Water Intake is downstream of the Basin and a stability analysis was performed for both a low pool and rapid draw down condition. Stability analysis shows that the embankment is designed and constructed to maintain stability during both low pool and rapid draw down conditions.

3.8 Structural Stability Assessment Deficiencies

Structural deficiencies associated with the Basin were identified in the initial structural stability assessment, and the following corrective actions are required:

- 1) The Basin has been designed, constructed, and operated for more than forty years without an emergency spillway. Furthermore the basin is inspected weekly by the environmental specialist, who observes the water level in the pond with the intent to maintain the water level no higher than the weir elevation (approximately 658.0 mean sea level). Although the basin is out of compliance with Section 845.450, the probability of storm water over flowing the basin dike is low.

- 2) The 24-inch diameter pipe between Basin and the Discharge Sump could not be inspected for signs of distress at the time of inspection. Although our inspection did not identify distress that would suggest the existence of a structural deficiency, the 24-inch diameter pipe should be inspected in accordance with 845.450(a)(6).

3.9 Annual Inspection Requirement

In completing the structural stability assessment, the Basin was inspected for signs of distress that would have the potential to disrupt operation and safety. This inspection can suffice for the 2021 inspection.

4.0 **SAFETY FACTOR ASSESSMENT - SECTION 845.460**

In accordance with Section 845.460, the owner or operator of a CCR surface impoundment must conduct initial and annual safety factor assessments for each CCR surface impoundment and document whether the calculated factors of safety for each CCR surface impoundment achieve the minimum safety factors specified for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

4.1 Slope Stability Methodology

Slope stability software Slide2 was used to calculate the minimum factor of safety (FS) at Cross Section A-A. The program uses 2D limit equilibrium methods to determine the minimum FS against slope instability. The auto-refine, non-circular search method with optimization was used utilizing Spencer's method to calculate the FS for each design criteria scenario, as discussed below. For each section analyzed, the program searches for the sliding surface that procures the lowest FS which is defined as the ratio of the shear forces and moment resisting movement along the sliding surface to the forces and moments driving the instability.

Soil data obtained by CEC and supplemented with available soil information provided by the Station was used to develop soil properties for the slope stability analysis. The soil properties were confirmed and modified using the subsurface data obtained by CEC in 2021. The data shows the soil materials in the vicinity of the Basin consists of up to 28 feet of clay soils overlying approximately 35 to 40 feet of loose to very dense, poorly graded sand and silty sand with some gravel.

4.2 Slope Stability Analysis - 845.460

Four cases were analyzed to satisfy the safety factor assessment as per Section 845.460(a)(2) through (a)(4).

4.2.1 Static, Long-Term - 845.460(a)(2)

The static, long-term condition with the maximum surcharge loading on the embankment was evaluated. The static, long-term analysis included a pool elevation at 458 feet mean sea level and a groundwater elevation at 440 feet mean sea level.

4.2.2 Static, Maximum Storage Pool - 845.460(a)(3)

The static, long-term, maximum storage pool condition with the maximum surcharge loading on the embankment was evaluated. The static, long-term analysis included a pool elevation set at the lowest points of the embankment crest, 466 feet mean sea level, and a groundwater elevation at 440 feet mean sea level.

4.2.3 Seismic - 845.460(a)(4)

Seismic analysis was performed by incorporating pseudo static seismic loading scenarios in the long-term global stability analysis calculations. A pseudo-static seismic horizontal load was applied to the long-term maximum storage pool loading condition model.

The seismic factor of safety is defined in the proposed CCR regulations as “the factor of safety (safety factor) determined using analysis under earthquake conditions using the peak ground acceleration (PGA) for a seismic event with a 2% probability of exceedance in 50 years, equivalent to a return period of approximately 2,500 years, based on the U.S. Geological Survey (USGS) seismic hazard maps for seismic events with this return period for the region where the CCR surface impoundment is located”.

4.2.4 Liquefaction - 845.460(a)(5)

For dikes constructed of soils susceptible to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20. Soils with potential for liquefaction typically consist of poorly drained fine-grained soils. Soil borings indicate that the embankment for the Basin was constructed with a well-graded, well-drained sand with silt and gravel material, which is not typically susceptible to liquefaction. Additionally, the geomembrane liner system makes it unlikely the embankment would become saturated or inundated. Because the likelihood of liquefaction and associated shear strength loss of the embankment soils is very low, the liquefaction condition is represented by the static factor of safety analysis and a separate analyses was not performed.

4.3 Factor of Safety Assessment Results

Results of the slope stability analysis for the critical cross section of the Basin are summarized in Table 1, below, and presented in Figures 2, 3, and 4. The results meet the factor of safety requirements presented in 845.460(a)(2) through (4).

Table 1: Safety Factor Results

Loading Condition	Required FS	Calculated FS
Static, Long Term - 845.460(a)(2)	1.50	1.50
Static, Maximum Storage Pool - 845.460(a)(3)	1.40	1.50
Seismic - 845.460(a)(4)	1.00	1.28
Liquefaction - 845.460(a)(5)	1.20	>1.20

5.0 LIMITATIONS AND CERTIFICATION

This Initial Structural Stability and Factor of Safety Assessment was prepared to meet the requirements of Parts 845.450 and 845.460 of draft Title 35 Subtitle G Subchapter I Subchapter j Coal Combustion Waste Surface Impoundments, and was prepared under the direction of Mr. M. Dean Jones, P.E.

By affixing my seal to this, I do hereby certify to the best of my knowledge, information, and belief that the information contained in this report is true and correct. I further certify I am licensed to practice in the State of Illinois and that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

Seal:



Signature: Dean Jones

Name: M. Dean Jones, P.E.

Date of Certification: June 8, 2021

Illinois Professional Engineer No.: 062-051317

Expiration Date: November 30, 2021

FIGURES



NORTH

SERVICE
WATER
BASIN

ASH SURGE BASIN
(ASB)

BYPASS
BASIN

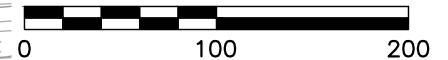
EAST ROOF
AND YARD
RUNOFF BASIN

MAIN
WASTEWATER
BUILDING

METAL CLEANING BASIN
(MCB)

OLD INTAKE CANAL

SCALE IN FEET



REFERENCE

1. TOPOGRAPHIC INFORMATION SOUTH OF SECONDARY ASH SETTLING BASIN AND FAB IS BASED ON AERIAL SURVEY PERFORMED BY AEROMETRIC, INC. DATED JUNE 19, 2008. TOPOGRAPHIC INFORMATION NORTH OF ASH SURGE BASIN IS BASED ON SURVEY BY RIDGELINE CONSULTANTS, PERFORMED IN FEBRUARY AND MARCH, 2016.

LEGEND

- | | | | | | |
|--|-------|---|--|---------|---|
| | B-1 | APPROXIMATE SOIL BORING LOCATION (1978) | | PS-GT-6 | APPROXIMATE SOIL BORING LOCATION (KPRG, 2005) |
| | P-C-9 | APPROXIMATE CPT SOUNDING LOCATION (GEOSYNTEC, 2016) | | MW-13 | APPROXIMATE EXISTING MONITORING WELL LOCATION (PATRICK, 2011) |
| | B-21 | SOIL BORING LOCATION (2021) | | | SLOPE STABILITY CROSS SECTION |



Civil & Environmental Consultants, Inc.

1230 East Diehl Road, Suite 200 - Naperville, IL 60563

630-963-6026 · 877-963-6026

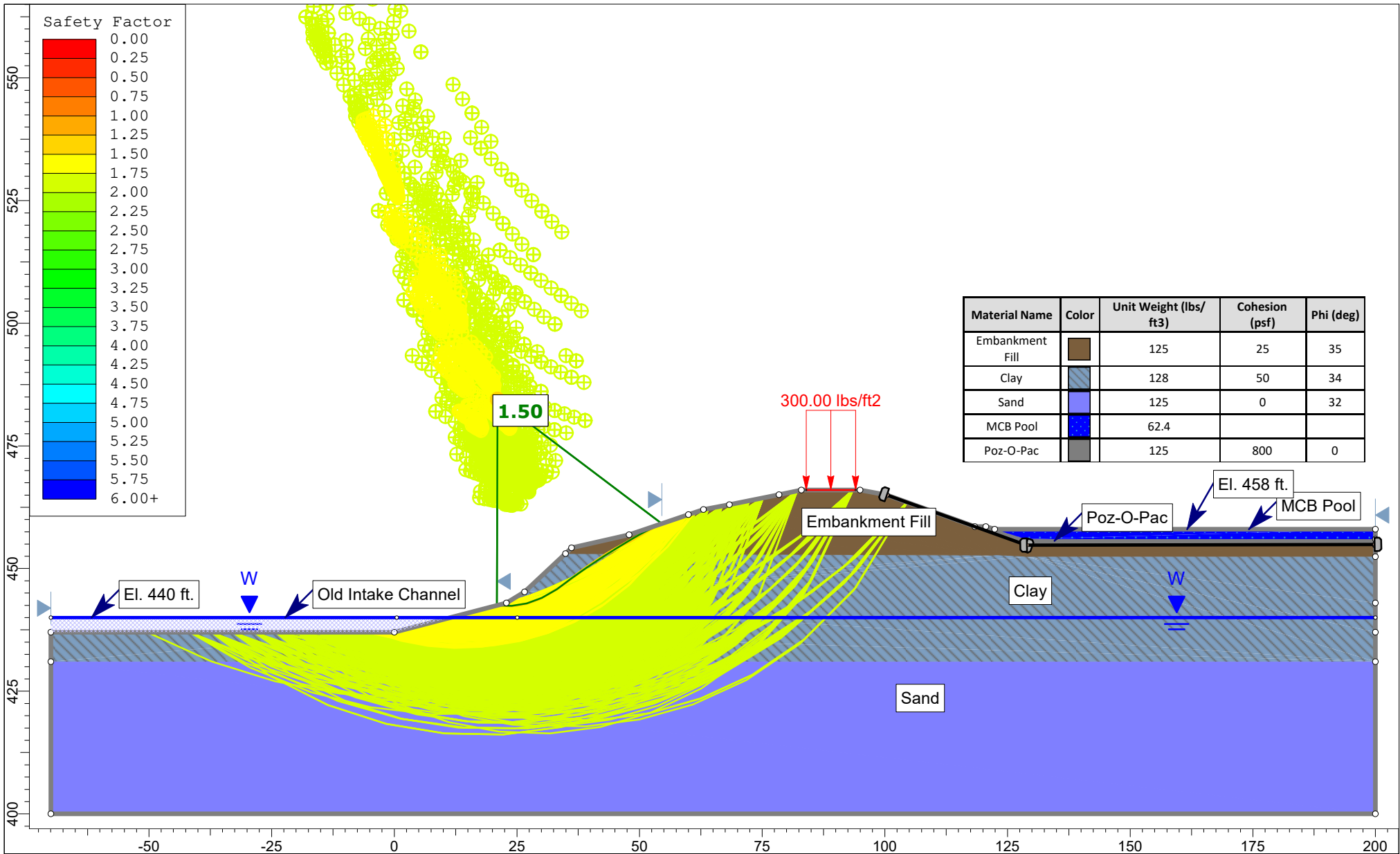
www.cecinc.com

NRG/MIDWEST GENERATION LLC
POWERTON STATION
METAL CLEANING BASIN SLOPE STABILITY
PEKIN, TAZEWELL COUNTY, ILLINOIS

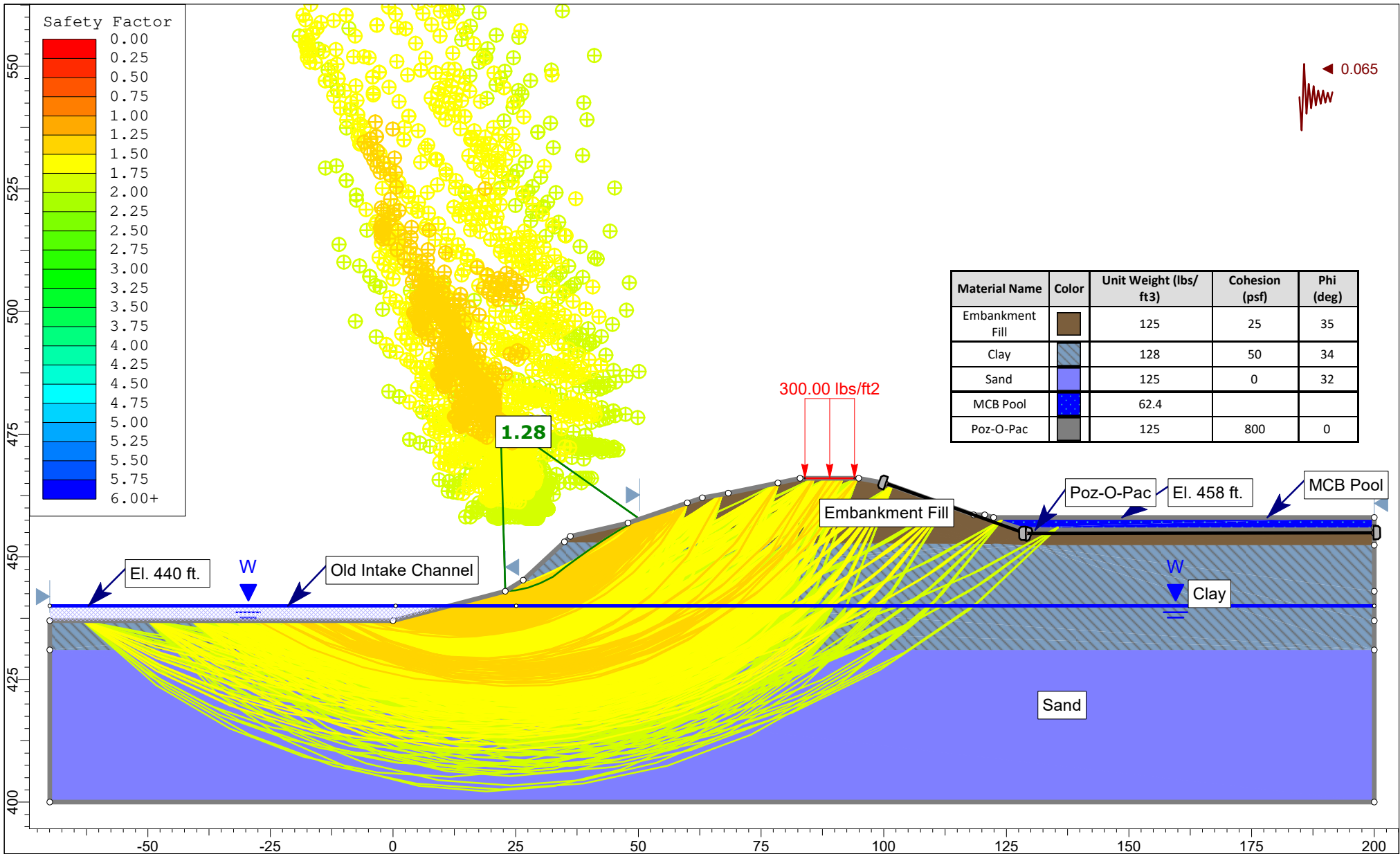
SITE PLAN WITH CROSS-SECTION

DRAWN BY:	CAC	CHECKED BY:	MDB	APPROVED BY:	MDJ	FIGURE NO.:
DATE:	05/13/2021	DWG SCALE:	1"=60'	PROJECT NO:	310-533	

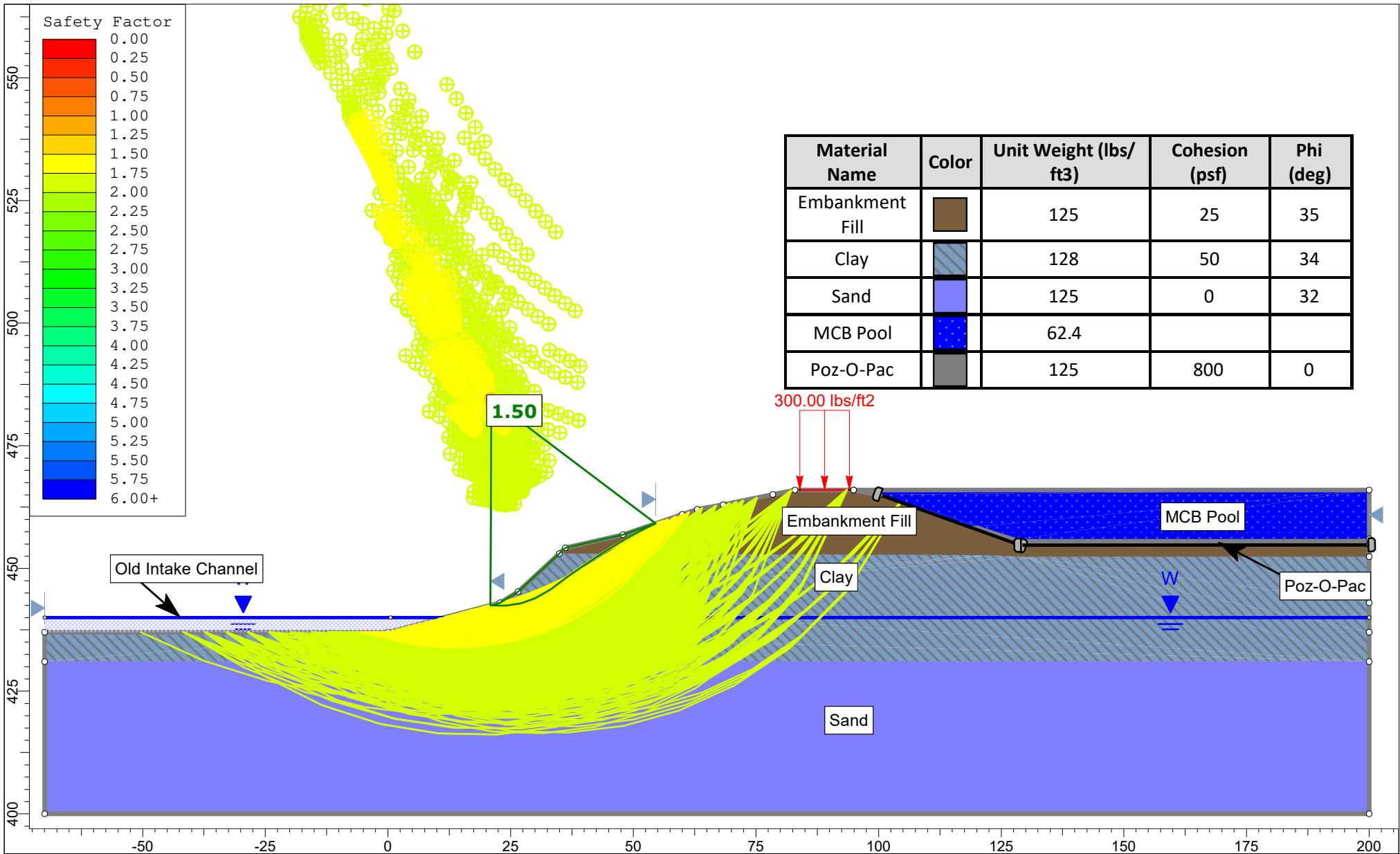
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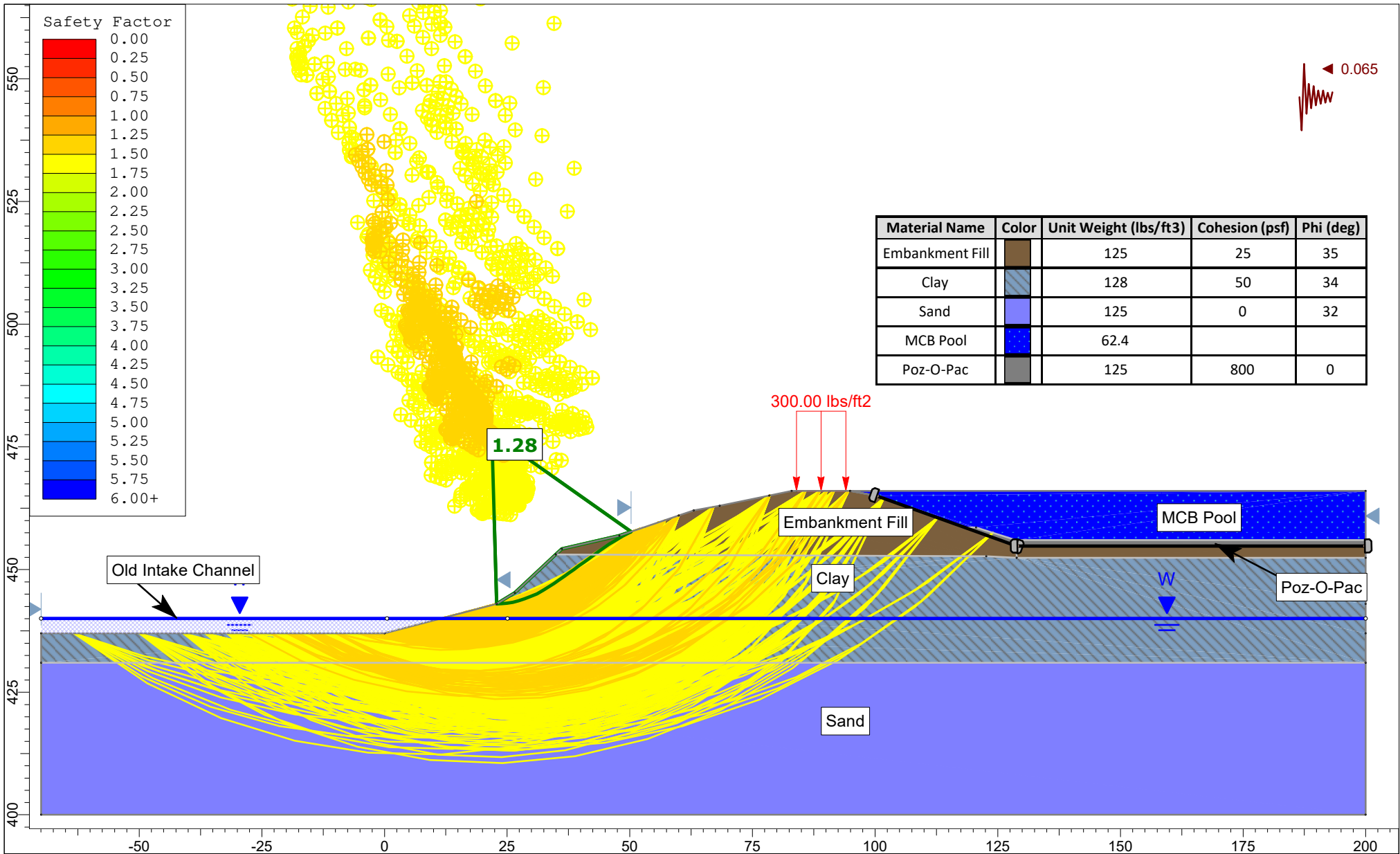
 Civil & Environmental Consultants, Inc. SLIDEINTERPRET 9.009	Project			
	Metal Cleaning Basin Slope Stability Analysis			
	Analysis Spencer		Scale: 1:325	Scenario Figure 2: Long-Term; Maximum Storage - Static
	Drawn By CAC	Checked By: MDJ	Approved By: MDJ	Company Civil & Environmental Consultants, Inc.
	Date 05/06/2021	Date: 05/19/2021	Date: 05/19/2021	File Name 310-533 MCB Slope Stability-long term.slmd



 Civil & Environmental Consultants, Inc.	Project			
	Metal Cleaning Basin Slope Stability Analysis			
	Analysis	Spencer	Scale:	1:325
	Scenario	Figure 3: Long-Term; Maximum Storage - Seismic		
	Drawn By	CAC	Checked By:	MDJ
Date		05/06/2021	Date:	05/19/2021
Approved By:		MDJ	Company	Civil & Environmental Consultants, Inc.
Date:		05/19/2021	File Name	310-533 MCB Slope Stability-long term.slm



 Civil & Environmental Consultants, Inc.		Project			
		Metal Cleaning Basin Slope Stability Analysis			
		Analysis	Spencer	Scale:	1:325
		Scenario	Figure 4: Long-Term; Maximum Surcharge Pool - Static		
		Drawn By	CAC	Checked By:	MDJ
		Approved By:	MDJ		
		Company	Civil & Environmental Consultants, Inc.		
Date		05/06/2021	Date:	05/19/2021	Date:
				05/19/2021	
		File Name	310-533 MCB Slope Stability-long term.slm		



 Civil & Environmental Consultants, Inc.	Project			
	Metal Cleaning Basin Slope Stability Analysis			
	Analysis	Spencer	Scale:	1:325
	Drawn By	CAC	Checked By:	MDJ
	Date	05/06/2021	Date:	05/19/2021
		Approved By:	MDJ	Scenario
		Figure 5: Long-Term; Maximum Surcharge Pool - Seismic		
		Company	Civil & Environmental Consultants, Inc.	
		File Name	310-533 MCB Slope Stability-long term.slm	

ATTACHMENT 5-2
CQA SPECIFICATIONS



Midwest Generation, LLC

POWERTON GENERATING STATION

SPECIFICATION P-1801

**CONSTRUCTION QUALITY ASSURANCE
FOR
METAL CLEANING BASIN RETROFIT**

S&L PROJECT NO.: 12661-152

REVISION 0C

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-19-2023





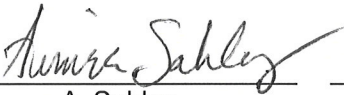
SECTION 000106

ISSUE SUMMARY AND APPROVAL PAGE

<u>Rev.</u>	<u>Purpose of Issue</u>	<u>Date</u>	<u>Sections Affected</u>
0A	Client Comment	03-14-2023	All
0B	Public Comment	03-24-2023	All
0C	Permit	07-19-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications and Bills of Materials, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

<u>Rev.</u>	<u>Prepared By</u>	<u>Reviewed By</u>	<u>Approved By</u>
0A	A. Sahlas	T. Dehlin	--
0B	A. Sahlas	T. Dehlin	--
0C	 A. Sahlas	 T. Dehlin	 T. Dehlin



SECTION 000107
CERTIFICATION PAGE

Sargent & Lundy (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin Date: July 19, 2023

Seal:



Th. Dehlin

7/19/2023

Exp. 11/30/2023



SECTION 000110

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Section 000107	Certification Page
Section 000110	Table of Contents

DIVISION 01 – GENERAL REQUIREMENTS

Section 011100	Summary of Work
Section 014362	Construction Quality Assurance for Fill, Liner, and Leachate Collection Materials

END OF SECTION 000110



SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

- 101.1 Owner: Midwest Generation, LLC (MWG)
- 101.2 Design Engineer: Sargent & Lundy (S&L)
- 101.3 Project Name: Construction Quality Assurance for Metal Cleaning Basin Retrofit
- 101.4 Project Location: Powerton Generating Station
13082 E. Manito Rd.
Pekin, IL 61554

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

- 102.1 The purpose of this project is to retrofit the Metal Cleaning Basin at Midwest Generation, LLC's Powerton Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845.
- 102.2 The Metal Cleaning Basin will be retrofitted by first removing all boiler wash water sediments remaining in the basin; removing the basin's existing gravel warning, sand cushion, and riprap layers; and decontaminating the basin's existing geomembrane liner and appurtenant structures, which will remain in place. Following material removal and decontamination of the basin facilities remaining in-place, a new composite liner system and a new leachate collection and removal system (LCRS) will be installed within the Metal Cleaning Basin over the basin's existing decontaminated and leak-tested geomembrane liner.

103. SCOPE OF WORK

- 103.1 In general, this Specification covers the field and laboratory activities for a Construction Quality Assurance (CQA) Contractor to provide assurance and documentation that the Metal Cleaning Basin at the Powerton Generating Station is retrofitted in accordance with the General Work (GW) Specification (P-1800), the Design Drawings, and permit requirements.
- 103.2 The CQA Work shall include, but not be limited, to the following activities:
- a. Prepare a CQA Plan that provides a detailed description of the activities that will be performed by the CQA Contractor in accordance with the Design Drawings and this Specification.
 - b. Verify and document that all appropriate measures are taken by the GW Contractor to protect the Metal Cleaning Basin's existing geomembrane liner from damage during material removal and liner decontamination activities at the basin.
 - c. Verify and document decontamination of the Metal Cleaning Basin's existing geomembrane liner as specified in Section 014362 following material removal and liner decontamination activities performed by the GW Contractor.



- d. Perform earthwork inspection and testing work specified in Section 014362 to:
 - d1. Verify compliance of materials with the GW Specification and Design Drawings.
 - d2. Perform specified field material and installation tests.
 - d3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.
 - d4. Perform inspections during construction as specified.
- e. Perform geosynthetics inspection and testing work specified in Section 014362 to:
 - e1. Verify compliance of materials with the GW Specification and Design Drawings.
 - e2. Perform field material and installation tests.
 - e3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.
 - e4. Witness field testing and audit field test results as specified.
 - e5. Perform inspections during construction.
- f. Identify non-conforming work.
- g. Meetings, Documentation, and Reports:
 - g1. Participate in project meetings.
 - g2. Prepare CQA records and documents.
 - g3. Prepare CQA reports, including:
 - g3.1 Preparing an Index Report listing all CQA reports prepared throughout the project.
 - g3.2 Preparing and certifying Weekly Summary Reports until the end of the project.
 - g3.3 Preparing and certifying a Final Report at the end of the project.
- 103.3 The CQA Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The CQA Work shall be performed exclusively by the CQA Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of those located on the work site and associated laboratories, including the CQA Contractor's personnel (or that of its subcontractor(s)) performing the CQA Work.
- 103.4 Performance of the CQA Work shall include all the labor, supervision, administration, management, tools, testing equipment, and consumables to execute the CQA Work identified herein.
- 103.5 Inspection and tests specified in this Specification shall be performed by personnel qualified to perform such inspections and tests.



104. RESPONSIBILITY AND AUTHORITY

104.1 The responsibilities and authority are described below for the organizations that will be involved in the design, permitting, and construction activities associated with the project.

a. Permitting Authority – Illinois EPA:

a1. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit application for retrofitting the Metal Cleaning Basin to assure compliance with state regulations and for granting the construction permit for the project.

a2. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm the Metal Cleaning Basin was retrofitted as specified in Project Specifications and the Design Drawings.

b. Owner:

b1. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor.

b2. The Owner will ultimately be responsible for the retrofit construction for the Metal Cleaning Basin and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings. The Owner will accomplish this by retaining a CQA Contractor for the project.

c. Design Engineer:

c1. S&L is the Design Engineer and is responsible for designing the retrofitted features for the Metal Cleaning Basin.

c2. The Design Engineer will assure that the retrofit design meets or exceeds the construction and operational requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.

c3. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.

d. GW Contractor:

d1. The GW Contractor shall be responsible for constructing the facility in accordance with the GW Specification (P-1800) and the Design Drawings and shall implement additional quality control and quality assurance procedures and techniques as necessary during construction.

d2. The GW Contractor will consist of an Earthwork Contractor performing the earthwork and a Geosynthetics Contractor installing the geosynthetic materials for the Metal Cleaning Basin's new composite liner system and new leachate collection and removal system. The GW Contractor may self-perform or subcontract the duties of the Earthwork Contractor and/or Geosynthetics Contractor.



- e. CQA Contractor:
 - e1. The CQA Contractor shall be the company employed by the Owner who is responsible for performing the CQA Work. The CQA Contractor shall be objective, competent, and independent from the GW Contractor whose work is being inspected. The CQA Contractor shall remain independent throughout the duration of the project.
 - e2. The CQA Contractor's team shall include the CQA Officer and two or more CQA Inspectors.
- f. CQA Officer:
 - f1. The CQA Officer shall be a professional engineer licensed in the State of Illinois who shall be responsible for implementation of the CQA Work. The CQA Officer shall be responsible to the Owner.
 - f2. The CQA Officer shall be responsible for the performance of activities specified herein such as auditing, inspecting, sampling, testing, documenting, and for preparing and certifying the Final Report. In addition, the CQA Officer and/or its inspectors shall have the responsibility of daily coordination with CQA Inspectors, the GW Contractor and its subcontractors, and the Owner to discuss daily progress, review completed work, plan for upcoming work, perform visual inspections, review test results, and discuss and assist in resolving any current or potential construction problems.
 - f3. Except as provided by Paragraph 104.1f4, the CQA Officer shall be present to provide supervision and assume responsibility for performing all inspections of the following activities, when applicable:
 - f3.1 Compaction of subgrade materials.
 - f3.2 Installation of the new composite liner system.
 - f4. If the CQA Officer is unable to be present as required by Paragraph 104.1f3, the CQA Officer shall provide the following in writing:
 - f4.1 The reasons for the CQA Officer's absence.
 - f4.2 A designation of a person who must exercise professional judgment in carrying out the duties of the CQA Officer-in-Absentia.
 - f4.3 A signed statement that the CQA Officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-Absentia during the absence of the CQA Officer.
- g. CQA Inspectors:
 - g1. The CQA Inspectors shall be responsible for performing visual examinations and for performing or obtaining field and laboratory tests. The CQA Inspectors shall be under the direct supervision of the CQA Officer.
 - g2. The CQA Inspectors shall be responsible for reporting to the CQA Officer and the Owner's representative the results of any inspections or tests indicating materials or installed work are of unacceptable quality or do not meet specified design requirements.
 - g3. Throughout the project, at least one CQA inspector for earthwork (CQA Earthwork Inspector) and at least one CQA inspector for geosynthetics work (CQA Geosynthetics Inspector), each with specialized knowledge and training, shall be present at the site. However, each inspector only needs to be present at the project site if the GW Contractor



is conducting work associated with their scope of responsibility (e.g., the CQA Geosynthetics Inspector only needs to be present when the Geosynthetics Contractor is performing work).

105. QUALIFICATIONS

105.1 CQA Officer:

- a. The CQA Officer shall be a registered professional engineer in the State of Illinois with at least 10 years of experience in design/construction/permitting/licensing, at least 5 years of which is CQA experience as a certifying engineer on landfills or ponds with geomembrane liner systems.
- b. The CQA Officer shall be qualified by education, technical knowledge, and experience to complete the technical certifications required by this Specification.

105.2 CQA Inspectors:

- a. The CQA Inspectors shall have adequate formal academic training and sufficient practical and technical experience needed to execute and record auditing and inspection activities conducted at the site and perform all required laboratory and field testing. This includes a demonstrated knowledge of the various aspects of the type of work being conducted.
- b. As required, different CQA Inspectors, each with specialized knowledge and experience, shall be employed for different portions of the work.
- c. CQA Earthwork Inspectors:
 - c1. The lead CQA field inspector for earthwork (Lead CQA Earthwork Inspector) shall have at least 5 years of experience as an earthwork inspector.
 - c2. All CQA Earthwork Inspectors shall be knowledgeable in:
 - c2.1 Field practices relating to construction techniques used for the type of earthwork being performed.
 - c2.2 Construction and compaction equipment.
 - c2.3 All codes and regulations concerning material installation.
 - c2.4 Observation procedures for earthwork construction.
 - c2.5 Sampling and earthwork testing procedures.
 - c2.6 Testing equipment.
 - c2.7 Documentation procedures.
 - c2.8 Site safety.
- d. CQA Geosynthetics Inspectors:
 - d1. The lead CQA field inspector for geosynthetics (Lead CQA Geosynthetics Inspector) shall have at least 5 years of CQA experience as a field inspector on projects with a geomembrane lining system including two years as a CQA inspector.



- d2. All CQA Geosynthetics Inspectors shall be knowledgeable in:
 - d2.1 Field practice relating to techniques used for the installation of geosynthetic clay liners (GCLs), high-density polyethylene (HDPE) geomembranes, pipes, HDPE geonets, and non-woven geotextiles.
 - d2.2 Correct procedures for seaming GCL.
 - d2.3 HDPE geomembrane welding equipment and the correct operating procedures for seaming HDPE geomembranes, including but not limited to:
 - d2.3.1 Non-destructive seam testing procedures and failure criteria.
 - d2.3.2 Sampling for destructive testing of samples of seams and laboratory testing procedures.
 - d2.3.3 Laboratory testing equipment.
 - d2.4 Geotextile seaming equipment and the correct procedures for splicing geotextiles and joining HDPE geonets.
 - d2.5 All codes and regulations concerning material installation.
 - d2.6 Documentation procedures for field and laboratory tests.
 - d2.7 Site safety.

106. DEFINITIONS

- 106.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.
- 106.2 The term "Work" means the services furnished to complete the CQA activities specified herein.
- 106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material or equipment that has been accepted by the Owner.

107. PROJECT MEETINGS

- 107.1 Project meetings will be held on a periodic basis during the lifetime of the project. The meetings will include:
 - a. A preconstruction meeting.
 - b. Progress meetings.
 - c. Additional meetings as required to discuss problems or work deficiencies.
- 107.2 Preconstruction Meeting:
 - a. The preconstruction meeting will be organized by the Owner. In addition to the Owner, the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), the Lead CQA Inspectors, and any other interested party designated by the Owner shall attend the preconstruction meeting.
 - b. The preconstruction meeting shall be used to discuss:
 - b1. Site specific safety requirements.



- b2. Requirements of the Design Drawings, GW Specification, and CQA Specification.
 - b3. The CQA Contractor's CQA Plan and the responsibilities of each party.
 - b4. The lines of authority and communication.
 - b5. Procedure for submittal of manufacturer QA/QC documents for audit.
 - b6. Procedures for examination of materials delivered to the site.
 - b7. Location of material storage area(s).
 - b8. Field and laboratory test requirements and sample sizes.
 - b9. Procedures for observance of field tests.
 - b10. Coordination between each contractor and the CQA Inspector to obtain timely field samples and tests.
 - b11. Procedure for handling construction deficiencies, repairs, and retesting.
 - b12. Work area security and safety protocol.
 - b13. Work days and work hours.
 - b14. Coordination with other contractors or trades.
 - b15. Site visits.
- 107.3 Weekly Progress Meetings:
- a. Weekly progress meetings will be scheduled by the Owner. In addition to the Owner, the meetings shall be attended by the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and the Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), and the Lead CQA Inspectors.
 - b. If needed, daily meetings shall be held each day to review the work schedule, work completed, results of tests, and to discuss potential construction problems.
 - c. The Owner or its designee will document each meeting and distribute copies of meeting minutes to all responsible parties.
- 107.4 Additional Meetings:
- a. Additional meetings between one or more contractors, the Lead CQA Inspector(s), and the CQA Officer (or the CQA Officer-in-Absentia) shall be held immediately after a work deficiency is identified or a problem arises. These meetings shall be used to define and resolve the problem.
 - b. Any supervisor/superintendent can request such a meeting through their line of authority.
 - c. Possible solutions to the problem shall be discussed, and an acceptable solution shall be selected. This solution shall be implemented provided it does not conflict with or require a change to the Design Drawings, in which case the solution shall be submitted to the Design Engineer for review.
 - d. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes from the permitted design shall require approval by the Owner and Design Engineer to ensure



that the original design objectives are maintained. All changes shall meet the requirements of the Permitting Authority and may include regulations approved by the Permitting Authority.

- e. The CQA Contractor shall document each special meeting and distribute copies of minutes to all responsible parties.

108. PERFORMANCE AUDITS AND CQA DOCUMENTATION

108.1 As a minimum, the CQA Officer shall conduct the following reviews and performance audits:

- a. Full review and audit of results of preconstruction testing or GW Contractor's material certificates used to qualify earthwork materials for construction use.
- b. Full review and audit of manufacturer certificates that qualify composite liner system and LCRS materials for construction use.
- c. Weekly audit of reports and test data sheets during and after construction of the earthwork until completion of work.
- d. Weekly audit of reports and test data sheets during and after installation of composite liner system materials until completion of the work.
- e. Weekly audit of reports and test data sheets during and after installation of LCRS materials until completion of the work.

108.2 CQA documentation shall be well-documented and include at least the following:

- a. Daily records, which shall include:
 - a1. Inspection data sheets.
 - a2. Data sheets listing the number and types of construction equipment used by the GW Contractor, including applicable construction equipment data.
 - a3. Problem identification reports and corrective action reports. Problem identification reports and corrective action reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be cross-referenced to specific inspection data sheets where the problem was identified and corrected.
- b. Testing records, which shall include:
 - b1. Material shipping and manufacturer QA/QC data sheets.
 - b2. Data sheets describing field samples taken.
 - b3. Laboratory data sheets.
 - b4. Field test data sheets.
 - b5. Notes, charts, drawings, or sketches identifying the location and elevation of field tests, location of failures and repairs or retests, and where samples were obtained.
 - b6. Non-destructive test reports including location of failures, records of repairs, and results of retests.



- c. Photographic records, which shall include:
 - c1. Digital photographs, each with a unique identifying number.
 - c2. Figure indicating the location from which each photograph was taken.
 - c3. Summary list giving the date and time of each photograph.
- 108.3 All records shall, at a minimum, bear the following:
 - a. Unique identifying sheet number.
 - b. The date.
 - c. Project name, project number, and location.
 - d. Descriptive remarks.
 - e. Data sheets for tests.
 - f. Written text descriptions for visual observations
 - g. Signature of the preparer of designated authority.

END OF SECTION 011100



SECTION 014362

QUALITY ASSURANCE FOR FILL, LINER, AND LEACHATE COLLECTION MATERIALS

PART 1 – GENERAL

101. EXTENT

- 101.1 The intent of this section is to define the requirements for Construction Quality Assurance (CQA) activities to ensure that the quality of materials and installation procedures used to retrofit the Metal Cleaning Basin are in accordance with the General Work (GW) Specification P-1800, Design Drawings, permit requirements, and as specified herein.
- 101.2 The Work specified within this Specification is the responsibility of the CQA Contractor and shall include, but not be limited to, the following items:
- a. Attend project meetings and site visits scheduled by the Owner or GW Contractor for coordination between the Owner, GW Contractor, subcontractors, and CQA Contractor.
 - b. Perform pre-construction material certification activities to ensure materials meet or exceed GW Specification requirements that include but are not limited to:
 - b1. Testing for suitability of material prior to use.
 - b2. Perform pre-construction audits of material certifications prior to material use.
 - c. Perform CQA activities during construction to ensure materials meet or exceed GW Specification requirements that include but are not limited to:
 - c1. Perform audits of material certifications.
 - c2. Perform field observations, inspections, and tests and review test results.
 - c3. Perform laboratory tests and review test results.
 - c4. Material sampling.
 - d. Documentation of all observations, findings, and testing, and of conformance of work to the GW Specification to be submitted by the Owner to the Permitting Authority.
 - e. Preparation of an Index Report, Weekly Summary Reports, and a Retrofit Completion Report
 - f. Submit a draft version of the Retrofit Completion Report to the Owner and Design Engineer for their review and comment. Upon resolution of all comments, submit a final version of the Retrofit Completion Report, sealed and certified by the CQA Officer, to the Owner and Design Engineer.
- 101.3 Definitions:
- a. The following definitions of terms shall apply throughout this section:
 - a1. GCL Manufacturer: The manufacturer who is, pursuant to Specification P-1800, responsible for manufacturing and transporting GCL materials to the site.
 - a2. GM/GC Manufacturer: The manufacturer who is, pursuant to Specification P-1800, responsible for manufacturing and transporting geomembrane and drainage geocomposite materials to the site.

- a3. Pipe Manufacturer: The manufacturer who is, pursuant to Specification P-1800, responsible for manufacturing and transporting LCRS pipe materials and fittings to the site.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 CQA Specification P-1801:

- a. Section 011100 – Summary of Work.

102.2 GW Specification P-1800:

- a. Section 319005 – Earthwork.
- b. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
- c. Section 319025 – Geosynthetic Clay Liner (GCL).
- d. Section 319050 – Leachate Collection and Removal System.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

- a. D422 Standard Test Method for Particle-Size Analysis of Soils.
- b. D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- c. D1004 Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- d. D1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- e. D1556 Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
- f. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- g. D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- h. D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
- i. D2434 Standard Test Method for Permeability of Granular Soils (Constant Head).



- j. D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- k. D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).
- l. D4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- m. D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- n. D4643 Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating.
- o. D4716 Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- p. D4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- q. D4959 Standard Test Method for Determination of Water Content of Soil By Direct Heating.
- r. D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
- s. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
- t. D5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- u. D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
- v. D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual-Seamed Geomembranes.
- w. D5887 Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.
- x. D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
- y. D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
- z. D5993 Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners.
- aa. D5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes.
- bb. D6243 Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.
- cc. D6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.

- dd. D6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
 - ee. D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.
 - ff. D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - gg. D7005 Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.
- 103.5 GRI – Geosynthetic Research Institute:
- a. GM6 Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembrane.
- 103.6 ITP – Illinois Test Procedure:
- a. 27 Sieve Analysis of Fine and Coarse Aggregates
104. SUBMITTALS
- 104.1 Submittals with Bid Proposal:
- a. Documentation to substantiate that the CQA Contractor's and its laboratory's Accreditation Certifications are current.
 - b. Detailed resumes on all CQA laboratory and field personnel proposed for the Work, including:
 - b1. A complete description of their qualifications and previous experience in the same type of work.
 - b2. Documentation of certification to perform required testing.
- 104.2 Submittals During the Course of the Work:
- a. Certifications and submittals as specified herein.
 - b. An Index Report, Weekly Summary Reports, and a Retrofit Completion Report as described below shall be prepared.
 - b1. Index Report:
 - b1.1 An Index Report shall be prepared listing all records and reports.
 - b1.2 The Index Report shall be assembled in chronological framework for recording and identifying all reports.
 - b2. Weekly Summary Reports:
 - b2.1 At the end of each week of construction, until construction is complete, a Weekly Summary Report must be prepared by either the CQA Officer or under the supervision of the CQA Officer and submitted to the Owner and the Design Engineer. The CQA Officer must review and approve each Weekly Summary Report.
 - b2.2 The Weekly Summary Report shall contain descriptions of the weather, locations where construction occurred during the previous week, materials used, results of testing, inspection reports, and procedures used to perform inspections.



b3. Retrofit Completion Report:

- b3.1 After the GW Contractor completes retrofit construction activities, the CQA Officer shall prepare a Retrofit Completion Report that demonstrates the Metal Cleaning Basin was retrofitted in conformance with Project Specifications, the Design Drawings, and permit requirements. At a minimum, this report shall include:
 - b3.1.1 All data sheets, testing records, manufacturer data sheets, and reports concerning items that were installed and tested.
 - b3.1.2 Photographs of the liner system and leachate collection system and any other photographs relied upon to document construction activities. All photographs shall include time, date, and location information.
 - b3.1.3 Any designations of CQA officers-in-absentia in accordance with Section 011100, Paragraph 104.1f4.
 - b3.1.4 Certification that the GW Contractor's work is in compliance with Project Specifications, the Design Drawings, and permit requirements.
 - b3.1.5 Certifications that:
 - b.3.1.5.1 Pipe bedding material contains no undesirable objects.
 - b.3.1.5.2 The anchor trench and backfill are constructed to prevent damage to a geosynthetic membrane.
 - b.3.1.5.3 All tears, rips, punctures, and other damage to geosynthetic materials are repaired.
 - b.3.1.5.4 All geomembrane seams are properly constructed and tested in accordance with the manufacturer's specifications.
 - b.3.1.5.5 Proper filter material consisting of uniform granular fill, to avoid clogging, is used in construction.
 - b.3.1.5.6 The filter material, as placed, possesses structural strength adequate to support the maximum loads imposed by the overlying materials and equipment used at the facility.
- b3.2 The first draft version of the Retrofit Completion Report shall be submitted to the Owner and Design Engineer for their review and comment within one week after completion of CQA Work.
- b3.3 Within one week of resolving all comments, the final version of the Retrofit Completion Report shall be sealed and certified by the CQA Officer and submitted to the Owner and Design Engineer.

105. CONSTRUCTION QUALITY ASSURANCE REQUIREMENTS

105.1 Organizations Involved:

- a. The organizations involved in the design, permitting, and construction activities associated with the Metal Cleaning Basin Retrofit project are defined in Section 011100.
- b. The responsibilities and authorities of the organizations and personnel associated with the Metal Cleaning Basin Retrofit project are described in Section 011100.

105.2 Qualifications:

- a. The qualifications of the CQA Contractor personnel are described in Section 011100.

- 105.3 Project Meetings:
- a. The requirements for project meetings and audits are described in Section 011100.
- 105.4 Performance Audits, CQA Documentation, and CQA Reports:
- a. The requirements for performance audits and CQA documentation are described in Section 011100.
 - b. The requirements for CQA reports are described in Paragraph 104.2 of this section.

PART 2 – PRODUCTS

201. PRODUCTS
- 201.1 The requirements for the various products used for retrofitting the Metal Cleaning Basin are specified in their respective technical specification sections in the GW Specification.
- 201.2 All permanent materials to be used in the Metal Cleaning Basin Retrofit project will be supplied by the GW Contractor. The CQA Contractor shall coordinate with the GW Contractor on obtaining material certifications and samples for performing the audits and tests required by this Specification.

PART 3 – EXECUTION

301. GENERAL CQA TESTING AND INSPECTION REQUIREMENTS
- 301.1 Record daily weather conditions.
- 301.2 Field tests shall document the elevation and coordinate location for each test. The locations may be determined by survey, taping, or pacing off distances or hand-held GPS receiver provided the receiver indicates an error of 20 ft or less at the time the coordinates are recorded. All locations should be reported in appropriate significant figures. Locations of seams, damage to geosynthetics, and repairs to geosynthetics shall be obtained through quality survey methodologies.
- 301.3 Material Source Testing: Material source testing activities include visual observations and laboratory and field testing at the material source to control material quality and material preparation prior to transport of the material to the project site.
302. CQA TESTING AND INSPECTION REQUIREMENTS FOR EXISTING LINER DECONTAMINATION ACTIVITIES
- 302.1 Testing During Construction:
- a. CQA activities during removal of material from and decontamination of the Metal Cleaning Basin's existing geomembrane liner shall include visual observations and field testing to verify the liner has been decontaminated in accordance with the Design Drawings.
 - b. Visual Observations:
 - b1. Observe and record method(s) of material removal and decontamination.
 - b2. Verify and document that the GW Contractor is taking necessary precautions to avoid damaging the geomembrane liner. Identify any locations where damage to the existing geomembrane liner has occurred and record the method(s) used to repair such damage.



- b3. Verify and document that the GW Contractor has developed and is implementing fugitive dust controls in accordance with 35 Ill. Adm. Code 845.740(c)(2), which must include:
 - b3.1 A water spray or other commercial dust suppressant to suppress dust in CCR handling areas and haul roads.
 - b3.2 Handling of CCR to minimize airborne particulates and offsite particulate movement during any weather event or condition.
- b4. Verify and document that the GW Contractor has developed and is implementing measures to prevent contamination of surface water, groundwater, soil, and sediments in accordance with 35 Ill. Adm. Code 845.740(c)(4).
 - b4.1 If CCR and CCR-impacted material removed from the Metal Cleaning Basin is temporarily stored, verify and document the material is stored in a lined landfill, CCR surface impoundment, enclosed structure, or CCR storage pile.
 - b4.2 If CCR and/or CCR-impacted material are temporarily stored in a CCR storage pile, verify and document the pile is:
 - b4.2.1 Tarped or constructed with wind barriers to suppress dust and to limit stormwater contact with the pile.
 - b4.2.2 Is periodically wetted and/or has periodic application of dust suppressants.
 - b4.2.3 Has a storage pad or a geomembrane liner that:
 - b4.2.3.1 Has a hydraulic conductivity no greater than 1×10^{-7} cm/sec.
 - b4.2.3.2 Is properly sloped to allow appropriate drainage.
 - b4.2.4 Is tarped over the edge of the storage pad where possible.
 - b4.2.5 Is constructed with fixed and/or mobile berms, where appropriate, to reduce run-on and run-off of stormwater to and from the storage pile, and minimize stormwater-CCR contact.
 - b4.2.6 Is located within the groundwater monitoring system in-place for the Ash Surge Basin, Bypass Basin, and/or Metal Cleaning Basin.
- b5. Verify and document that all material removal and decontamination work is performed in a systematic manner to remove all boiler wash water sediments from the liner surface.
- b6. Verify and document that the GW Contractor is providing adequate temporary ballasting on exposed liner areas to prevent uplift of the geomembrane by wind by the use of sandbags and/or other means which will not damage the geomembrane.
- b7. For areas of geomembrane that are damaged, verify and document that the GW Contractor addresses and repairs the damaged areas as specified on the Design Drawings.
- b8. Verify and document that the GW Contractor repairs all locations of the geomembrane from which samples are obtained for verification of decontamination.
- c. Laboratory and Field Tests:
 - c1. Perform an electrical leak location survey over decontaminated liner areas as specified on the Design Drawings.



- c2. Collect samples of the existing geomembrane liner for verification of decontamination by laboratory testing as specified on the Design Drawings.
- c3. Perform laboratory testing of existing geomembrane liner samples as specified on the Design Drawings.
- d. Test Acceptance Criteria:
 - d1. Laboratory and field test acceptance criteria shall be as specified on the Design Drawings.
 - d2. If the results from any of the laboratory and field tests do meet the respective pass/fail thresholds, then the CQA Officer shall reject all existing geomembrane liner areas corresponding to the failed test(s) as decontaminated.
- 303. CQA TESTING AND INSPECTION REQUIREMENTS FOR STRUCTURAL FILL MATERIAL
- 303.1 Initial Material Certification:
 - a. Prior to shipment of any Structural Fill material, the CQA Contractor shall assemble, document the receipt of, and audit the material supplier's test results and certifications that the properties of the material meet GW Specification requirements.
- 303.2 Inspections and Testing During Construction:
 - a. CQA activities during placement of Structural Fill shall include visual observations and laboratory and field testing to ensure that Structural Fill is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-1 and the following paragraphs.
 - b. Visual Observation of the Material Source for Structural Fill Material During Construction:
 - b1. Inspect materials to ensure that they are uniform.
 - b2. Visually inspect the material in accordance with ASTM D2488.
 - b3. Inspect to ensure that only suitable material is transported to the site, observe segregation operations if unsuitable materials are present, and observe (if necessary) the removal of organic soils, roots, stumps, and stones.
 - b4. Observe changes in color or texture that can be indicative of a change in material type or moisture content.
 - b5. Observe moisture conditioning activities to ensure that any required substantial changes in moisture content are made at the source.
 - c. Visual Observation of Fill Placement:
 - c1. Record the placement method(s) the GW Contractor is utilizing for installing the Structural Fill.
 - c2. In instances where the GW Contractor is transporting material into the basin, the CQA Contractor shall:

- c2.1 Verify no equipment (wheeled or tracked) is traversing the Metal Cleaning Basin area when less than 10 inches of earthen material are above the basin's existing geomembrane liner.
- c2.2 Document the receipt of and audit the GW Contractor's demonstration(s) that equipment entering the basin will not exert a ground pressure greater than 8 psi.
- c2.3 Verify equipment operating within the basin does not hard brake on the ramp, make sharp turns, nor make quick stops that could pinch or tear the Metal Cleaning Basin's existing geomembrane liner.
- c3. Record type and size of compaction equipment in use:
 - c3.1 For rubber-tired rollers, record the tire inflation pressure, spacing of tires, and empty and ballasted wheel loads.
 - c3.2 For hand tampers, record make, model number, size, and compactive effort.
 - c3.3 Observe and record compactive effort, uniformity of compaction, and scarification and connection between compacted lifts. Record number of passes of a roller by type, size, and weight of roller.
 - c3.4 For proofrolling, record the type, size, and weight of compaction equipment or other vehicles used for proofrolling.
- c4. Observe removal of roots, rocks, rubbish, or out-of-specification soil from the borrow material.
- c5. Observe and record changes in soil characteristics necessitating a change in construction procedures.
- c6. Observe fill placement and procedures for proper lift thickness.
- c7. Observe procedures to be followed to adjust the soil moisture content to obtain uniform moisture content.
- c8. Observe and record final finishing procedures.
- c9. Observe and record that final grade is consistent with the design grade specified on the Design Drawings.
- d. Laboratory and Field Tests:
 - d1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-1.
- e. Test Acceptance Criteria:
 - e1. Acceptance criteria shall be as specified in GW Specification Section 319005.

304. CQA TESTING AND INSPECTION REQUIREMENTS FOR GEOSYNTHETIC CLAY
LINER COMPONENT OF COMPOSITE LINER SYSTEM

304.1 Initial Material Certification:

- a. Prior to shipment of any geosynthetic clay liner (GCL) materials, the CQA Contractor shall assemble, document the receipt of, and audit the GCL Manufacturer's submittals listed below for conformance with the GW Specification.
 - a1. Certificates describing the origin and identification of the raw materials.
 - a2. Copy of the GCL Manufacturer's QA/QC certificates on tests performed on the material and a summary of results of the tests.
 - a3. Certification and guarantee by the GCL Manufacturer that the properties of the manufactured material meet GW Specification requirements.
 - a4. Certification that the GCL was continuously inspected during the manufacturing process for, as a minimum, the following:
 - a4.1 Lack of uniformity.
 - a4.2 Damage.
 - a4.3 Imperfections.
 - a4.4 Holes.
 - a4.5 Tears.
 - a4.6 Thin spots.
 - a4.7 Foreign materials.
- b. GCL Panel Layout:
 - b1. Document receipt of the GCL Manufacturer's proposed GCL panel layout.

304.2 Transportation, Handling, and Storage:

- a. Documentation of Delivery:
 - a1. Document arrival of rolls of GCL.
 - a2. Document that each roll is labeled and that each label identifies the following information:
 - a2.1 Name of GCL Manufacturer.
 - a2.2 Product identification (brand name, product code).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 GCL thickness.
 - a2.7 Roll identification number.

- a2.8 Roll dimensions (i.e., length and width) and weight.
- a2.9 Panel number, which shall be referenced to the proposed GCL panel layout drawing prepared by the GCL Manufacturer.
- a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
- a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
- b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.
 - b6. Report all damage to the Owner.
- c. Handling:
 - c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.
 - c2. Inspect the handling of materials by installing personnel to ensure that care is used.
- d. Storage:
 - d1. Inspect the storage facility.
 - d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth and free of rocks, holes, and debris.
 - d3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 304.3 Preconstruction Testing:
 - a. Prior to material shipment to the site, the GCL Manufacturer shall submit to the CQA Contractor representative samples of the GCL materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the GCL materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing of the received GCL samples in accordance with Table 014362-3. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-3.
 - b. Test acceptance criteria shall be as specified in GW Specification Section 319025. If the results from any of the tests in Table 014362-3 do not meet the respective pass/fail

thresholds, then the CQA Officer shall reject all GCL material for which the failed test(s) represent(s) for use in the project.

304.4 Inspections During Construction:

- a. CQA activities during placement of the GCL component of the Metal Cleaning Basin's new composite liner system shall include visual observations and field testing to ensure that the GCL is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-3 and the following paragraphs.
- b. Weather Conditions for Placement:
 - b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure that they are appropriate for GCL placement. The GW Specification describes acceptable weather conditions.
 - b2. If the weather becomes unacceptable for installation of GCL, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.
- c. GCL Placement:
 - c1. Supporting Surface:
 - c1.1 Prior to placement of the GCL, visually inspect the Structural Fill surface to ensure that it meets the requirements of the GW Specification. Confirm that it is compacted and is free from clods of soil, rocks larger than specified, roots, sudden or sharp changes in grade, and standing water. Field observations shall be performed in accordance with the requirements specified in Table 014362-4.
 - c1.2 Provide documentation of daily inspection of the Structural Fill surface for the area of GCL to be placed that day.
 - c2. Panel Deployment, Seams, and Repairs:
 - c2.1 As each panel is unrolled, visually inspect the GCL to ensure there are no flaws or damage. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the GCL for repair.
 - c2.2 Document that the location of the seams meet the general requirements for seaming contained in GW Specification Section 319025.
 - c2.3 At the time of placement, make measurements to confirm that required overlap of adjacent GCL panels has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the GCL is being placed in a relaxed (nonstressed) state.
 - c2.4 Document any liner damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Any damage shall be documented on a drawing and marked on the GCL for repair.
 - c2.5 Document improper GCL panel placement and, as a result, inadequate coverage with the available materials or an excess number of field seams.
 - c2.6 Document inadequate sheet overlap resulting in poor quality seams.

c2.7 Document unseamed or cut panels.

c2.8 Document repair of damage. Documentation shall include location, type, and method of repair.

305. CQA TESTING AND INSPECTION REQUIREMENTS FOR GEOMEMBRANE COMPONENT OF COMPOSITE LINER SYSTEM

305.1 Initial Material Certification and Inspection of Installation Plans:

a. Prior to shipment of any geomembrane materials, the CQA Contractor shall assemble, document the receipt of, and audit the GM/GC Manufacturer submittals listed below for conformance with the GW Specification.

a1. Geomembrane Resin:

a1.1 Certificate that the resin meets GW Specification requirements.

a1.2 Certificate of the origin of the resin and that all resin is from the same supplier (including resin supplier's name, identification brand name, and number).

a1.3 Copies of the GM/GC Manufacturer's and resin supplier's QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index, and percent carbon black.

a2. Geomembrane Sheeting:

a2.1 Certification that the properties of the manufactured sheeting meet GW Specification requirements and are guaranteed by the GM/GC Manufacturer.

a2.2 Statement certifying that no reclaimed polymer has been added to the resin. Note: Polymer recycled during the manufacturing process may be permitted provided that it does not exceed 10% by weight.

a2.3 Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).

a2.4 Copies of all of the GM/GC Manufacturer's QA/QC certificates for the geomembrane sheeting. The certificates shall include test results.

a3. Extrudate Resins or Rod for Seaming Geomembrane:

a3.1 Certification from the GM/GC Manufacturer that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.

b. Review of GW Contractor's Installation Plans:

b1. Geomembrane Field Installation Quality Assurance Plan:

b1.1 Document receipt of the GW Contractor's QA plan for installing geomembrane.

b1.2 Review the plan for compliance with the GW Specification and document where the plan is not in compliance.

b2. Geomembrane Panel Layout:

b2.1 Document receipt of the GW Contractor's panel layout for geomembrane.

- 305.2 Transportation, Handling, and Storage:
- a. Documentation of Delivery:
 - a1. Document arrival of rolls of geomembrane.
 - a2. Document that each roll is labeled and that each label identifies the following information:
 - a2.1 Name of GM/GC Manufacturer.
 - a2.2 Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier's name, resin production plant, resin brand name type, and production date of the resin).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 Geomembrane thickness and type.
 - a2.7 Roll identification number.
 - a2.8 Roll dimensions (i.e., length and width) and weight.
 - a2.9 Panel number, which shall be referenced to the proposed HDPE geomembrane liner panel layout drawing prepared by the GM/GC Manufacturer.
 - a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
 - a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
 - b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.
 - b6. Report all damage to the Owner.
 - c. Handling:
 - c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.



- c2. Inspect the handling of materials by installing personnel to ensure that care is used.
- d. Storage:
 - d1. Inspect the storage facility.
 - d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.
 - d3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 305.3 Preconstruction Testing:
 - a. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the geomembrane materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing in accordance with Table 014362-6. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-6.
 - b. Test acceptance criteria shall be as specified in GW Specification Section 319020. If the results from any of the tests in Table 014362-6 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all geomembrane material from the resin batch corresponding to the failed test(s) for use in the project.
- 305.4 Inspections and Testing During Construction:
 - a. CQA activities during placement of the geomembrane component of the Metal Cleaning Basin's new composite liner system shall include visual observations and field testing to ensure that the geomembrane is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-6 and the following paragraphs.
 - b. Weather Conditions for Placement:
 - b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure that they are acceptable for geomembrane placement and seaming. The GW Specification describes acceptable weather conditions.
 - b2. If the weather becomes unacceptable for installation of the geomembrane liner, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.
 - c. Geomembrane Placement:
 - c1. Prior to placement of the geomembrane liner, the GCL component of the composite liner system in the area to be lined shall have been installed, seamed, and inspected and all necessary repairs made in accordance with GW Specification Section 319025.
 - c2. Observe and document that the GW Contractor's geomembrane placement plan is being followed. Note where the plan is not being followed and document the GW Contractor's reasons for not following the plan. As each panel is placed, visually inspect the geomembrane for tears, punctures, and thin spots. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the geomembrane for repair.



- c3. Document that the location of the seams meet the general requirements for seaming specified in GW Specification Section 319020.
- c4. At the time of placement, make measurements to confirm that required overlap of adjacent geomembrane sheets has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the geomembrane is being placed in a relaxed (nonstressed) state.
- c5. Document any liner damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the geomembrane for repair and on a drawing.
- c6. Document improper liner placement (e.g., if the GW Contractor's geomembrane placement plan is not followed) and, as a result, inadequate coverage with the available materials or an excess number of field seams.
- c7. Document inadequate sheet overlap resulting in poor quality seams.
- c8. Document nonwelded or cut panels.
- c9. Document repair of damage. Documentation shall include location, type, and method of repair.
- d. Geomembrane Seaming and Seam Repair:
 - d1. Trial Welds Prior to Beginning Seaming:
 - d1.1 Observe that trial welds are being made at the frequency specified in GW Specification Section 319020.
 - d1.2 Observe fabrication of test strips and note that test strips are fabricated correctly.
 - d1.3 Specify where samples are to be cut from the test strips and witness all destructive tests.
 - d1.4 Observe documentation of results of the destructive tests by the GW Contractor.
 - d1.5 Audit documentation of each trial weld received from the GW Contractor.
 - d2. Seaming and Seam Repair. Activities that shall be documented during field seaming operations include:
 - d2.1 Observe that the geomembrane is free from dirt, dust, and moisture.
 - d2.2 Observe that the seaming materials and seam welding equipment are as specified.
 - d2.3 Observe that a firm surface is available for seaming.
 - d2.4 Observe that geomembrane overlap and panel adjustment are correct prior to seaming.
 - d2.5 For extrusion welding, observe that the geomembrane is pre-beveled and the geomembrane is properly abraded and that the panels are temporarily bonded.
 - d2.6 Observe that grind marks are covered with extrudite.
 - d2.7 Observe weather conditions (e.g., temperature, precipitation, wind) to ensure that they are acceptable for seaming.

- d2.8 Record measurements of temperatures, pressures, and speeds of seaming to ensure that they are as specified. Gages and dials on seaming equipment shall be checked and readings recorded.
- d2.9 Observe that the geomembrane is not damaged by equipment or personnel during the seaming process.
- d2.10 Observe that no solvents or adhesives are used.
- e. Anchorage at Existing Penetrations and Concrete Structures:
 - e1. Where shown on the Design Drawings, CQA Geosynthetics Inspectors shall ensure that the seals around existing penetrations and the anchorage to existing concrete structures are of sufficient strength and are impermeable.
 - e2. Specific inspections that shall be made on all seals and anchors include:
 - e2.1 Observations and tests to ensure that the sealing systems (i.e., pipe boots) have been installed as specified (are leak free) and in the proper location(s).
 - e2.2 Observations to ensure that all objects that are placed adjacent to the geomembrane (i.e., batten bars) are smooth and free of objects or conditions that may damage the geomembrane.
 - e2.3 Observations to ensure that all seals and anchors are complete:
 - e2.3.1 Batten bars of the specified material, width, and thickness and prepunched at the specified spacing.
 - e2.3.2 Anchor bolts of the specified size and material.
 - e2.3.3 Anchor bolts spaced as specified.
 - e2.4 Observations to confirm that all geomembrane liner penetrations and connections are installed as specified. Liner penetrations shall be verified for appropriate clamp and caulking use, for appropriate material, for good seaming, and for good housekeeping practices. No sharp bends on concrete surfaces shall be allowed.
- f. Geomembrane Production Seam Testing:
 - f1. Non-Destructive Field Testing. Activities to be observed and documented include the following:
 - f1.1 Observe that 100 percent of the seam lengths are tested using non-destructive procedures.
 - f1.2 Observe that testing is performed as seaming progresses.
 - f1.3 Observe that the correct procedures are used for testing each type of seam.
 - f1.4 Observe all non-destructive test procedures.
 - f1.5 For air pressure testing, observe that the equipment, procedures, and air pressure meet specified requirements. Observe that all testing is properly documented.
 - f1.6 For vacuum box testing, observe that testing is being performed correctly.
 - f1.7 For inaccessible seams, observe that a procedure acceptable to the Owner is used to test the seams.



- f1.8 Observe that all leaks are marked, recorded as to location, and repaired.
- f1.9 Observe that repairs are made in accordance with approved techniques.
- f1.10 Observe that all repairs are re-tested and that no leakage is present.
- f1.11 Review leakage data for possible patterns. Make suggestions to the GW Contractor if data shows a consistent pattern of failure of a particular machine or crew.
- f1.12 Audit documentation of testing prepared by the GW Contractor to make sure that the location of leaks is identified on the drawings.
- f2. Destructive Testing:
 - f2.1 Destructive seam testing shall be performed at the frequencies specified in GW Specification Section 319020.
 - f2.2 The CQA Geosynthetics Inspector shall specify the location where each sample shall be taken and record data for each sample.
 - f2.3 The CQA Geosynthetics Inspector shall designate any additional test locations that may be necessary. These locations may be based on the suspicion of contamination by dirt or moisture, change in seaming materials, increase in failed nondestructive tests, and other causes that could result in unacceptable seams.
 - f2.4 Laboratory testing shall be performed in accordance with GW Specification Section 319020. Predetermined pass/fail values are specified in that section. Verbal laboratory test results shall be given to the Geosynthetics Contractor within 24 hours of receipt of the test samples. Written results shall follow within one week.
 - f2.5 Audit and document the results of laboratory testing on seam samples. Note any sample that does not pass and identify the location on the geomembrane liner for repair in the field and on the drawings.
- f3. Repair of Failed Seams:
 - f3.1 For field seams that fail, the seam can either be reconstructed between the failed and any previous passed seam location, or the installer can go on either side of the failed seam location (10-foot minimum), take another sample, and test it. If that sample passes, reconstruct the seam between the two locations. If it fails, the process shall be continued. In all cases, acceptable seams must be bounded by two passed test locations. The CQA Geosynthetics Inspector shall document the procedure used and results of tests.
 - f3.2 Document that repairs are made. Documentation shall include location, type, and method of repair.
- 306. CQA TESTING AND INSPECTION REQUIREMENTS FOR DRAINAGE GEOCOMPOSITE OF LEACHATE COLLECTION AND REMOVAL SYSTEM
 - 306.1 Initial Material Certification:
 - a. Prior to shipment of any drainage geocomposite materials, the CQA Contractor shall assemble, document the receipt of, and audit the GM/GC Manufacturer submittals listed below for conformance with the GW Specification.
 - a1. Copies of the raw material producers' certificates describing the origin and identification of the raw materials.



- a2. Copies of the raw material producers' QC certificates.
 - a3. Statement certifying that the manufactured drainage geocomposite is free of per- and polyfluoroalkyl substances (PFAS).
 - a4. Copies of the GM/GC Manufacturer's QC certificates on tests performed on the geonet core, the geotextile cap and carrier, and the finished drainage geocomposite as specified in Specification P-1800 Section 319020 and a summary of the test results.
 - a5. Certification that the properties of the manufactured drainage geocomposite material meets GW Specification requirements and are guaranteed by the GM/GC Manufacturer.
- 306.2 Transportation, Handling, and Storage:
- a. Documentation of Delivery:
 - a1. Document arrival of rolls of drainage geocomposite.
 - a2. Document that each roll is marked with the following information:
 - a2.1 Name of GM/GC Manufacturer.
 - a2.2 Product identification (e.g., brand name, product code).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 Drainage geocomposite thickness and type.
 - a2.7 Roll identification number.
 - a2.8 Roll dimensions (length and width) and weight.
 - a2.9 Panel number.
 - a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
 - a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
 - b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.



b6. Report all damage to the Owner.

c. Handling:

c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.

c2. Inspect the handling of materials by installing personnel to ensure that care is used.

d. Storage:

d1. Inspect the storage facility.

d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.

d3. Document unsafe or improper storage conditions, and report conditions to the Owner.

306.3 Preconstruction Testing:

a. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the drainage geocomposite materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the drainage geocomposite materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing in accordance with Table 014362-7. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-7.

b. Test acceptance criteria shall be as specified in GW Specification Section 319020. If the results from any of the tests in Table 014362-7 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all drainage geocomposite materials for which the failed test(s) represent(s) for use in the project.

306.4 Inspections During Construction:

a. CQA activities during placement of the drainage geocomposite component of the Metal Cleaning Basin's new LCRS shall include visual observations and field testing to ensure that the drainage geocomposite is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-7 and the following paragraphs.

b. Weather Conditions for Placement:

b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure they are acceptable for placement. The GW Specification describes correct weather conditions.

b2. If the weather becomes unacceptable for installation of the drainage geocomposite, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.

c. Drainage Geocomposite Placement:

c1. Prior to placement of the drainage geocomposite, the HDPE geomembrane component of the composite liner system in the area to be lined shall have been installed, seamed, and inspected and all necessary repairs made in accordance with GW Specification Section 319020.



- c2. Inspect all materials as they are unrolled to ensure that there are no flaws or damage.
 - c3. Observe and document that drainage geocomposite coverage is as specified on the Design Drawings, that joining of the geonet cores is as specified in GW Specification Section 319020, and that sewing of the geotextile caps is as specified in GW Specification Section 319020.
 - c4. Make measurements to ensure that the specified material overlap is achieved.
 - c5. Observe and document that all materials are free from wrinkles and folds.
 - c6. Observe and document that the material is not damaged during the installation process.
 - c7. Document any material damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the drainage geocomposite for repair and on a drawing.
 - c8. Document repair of damage. Documentation shall include location, type, and method of repair.
307. CQA TESTING AND INSPECTION REQUIREMENTS FOR COARSE AGGREGATE BEDDING, SAND FILTER LAYER, PROTECTIVE WARNING LAYER, RIPRAP BEDDING LAYER, AND RIPRAP MATERIALS
- 307.1 Initial Material Certification:
- a. Prior to shipment of any Coarse Aggregate Bedding, Sand Filter Layer, Protective Warning Layer, Riprap Bedding Layer, or riprap materials, the CQA Contractor shall assemble, document the receipt of, and audit the material suppliers' test results and certifications that the properties of the materials meet GW Specification requirements.
- 307.2 Inspections and Testing During Construction:
- a. CQA activities during the placement of Coarse Aggregate Bedding, Sand Filter Layer, Protective Warning Layer, Riprap Bedding Layer, and riprap materials shall include visual observations and laboratory and field testing to ensure that the materials are installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-2 and the following paragraphs.
 - b. Visual Observations of Material Placement:
 - b1. Upon delivery of the material to the site, inspect the material to ensure that it has not been contaminated during transportation and handling. Observe and document rejection of contaminated materials and replacement of suitable materials.
 - b2. Record the placement method(s) the GW Contractor is utilizing for installing the material.
 - b3. In instances where the GW Contractor is transporting material into the basin, then the CQA Contractor shall:
 - b3.1 Verify no equipment (wheeled or tracked) is traversing the Metal Cleaning Basin area when less than 10 inches of earthen material are above geosynthetic materials (i.e., drainage geocomposite, geomembrane liner, GCL).
 - b3.2 Document the receipt of and audit the GW Contractor's demonstration(s) that equipment entering the basin will not exert a ground pressure greater than 8 psi.

- b3.3 Verify equipment operating within the basin does not hard brake on the ramp, make sharp turns, nor make quick stops that could pinch or tear geosynthetic materials.
- b4. Observe placement procedures to provide proper thickness.
- b5. Observe placement procedures to prevent segregation and degradation of material.
- b6. Observe placement procedures to:
 - b6.1 Ensure pipes and underlying geosynthetic materials are not damaged during the installation process (Note: Side slope cover installation must be observed at all times to assure appropriate placement technique and equipment are used and to detect any damage to geosynthetic materials).
 - b6.2 Ensure that placement of the Coarse Aggregate Bedding material did not damage or displace the leachate collection pipe.
- c. With the use of the GW Contractor's surveyor, make thickness measurements not more than 50 feet on a grid pattern to ensure that the thickness and coverage of each material is in compliance with the Design Drawings.
- d. Audit surveys of each completed layer to ensure that specified slopes and elevations specified on the Design Drawings are obtained.
- e. Laboratory and Field Tests:
 - e1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-2.
- f. Test Acceptance Criteria:
 - f1. Acceptance criteria shall be as specified in GW Specification Section 319050.
- 308. CQA TESTING AND INSPECTION REQUIREMENTS FOR LEACHATE COLLECTION PIPING AND SIDESLOPE RISERS
- 308.1 Initial Material Certification:
 - a. Prior to shipment of any HDPE piping, the CQA Contractor shall assemble, document the receipt of, and audit the Pipe Manufacturer's submittals listed below for conformance with the GW Specification:
 - a1. Certification that the manufactured pipe meets the requirements of the GW Specification.
 - a2. Statement that no reclaimed polymer has been added to the resin.
 - a3. Copies of the Pipe Manufacturer's QA/QC certificates on tests performed during fabrication.
- 308.2 Transportation, Handling, and Storage:
 - a. Documentation of Delivery and Inspection of HDPE Pipe:
 - a1. Document the arrival of pipe.
 - a2. Check the Quality Control certificates and marking on each pipe to verify that the pipe received meets the GW Specification requirements.
 - a3. Document that each length of pipe is marked with the following information:

- a3.1 Name of Pipe Manufacturer.
- a3.2 Pipe type (ASTM designation).
- a3.3 Pipe size (diameter).
- a3.4 Standard Dimension Ratio (SDR).
- a4. Document that all fittings are fabricated and manufactured by the same manufacturer.
- a5. Measure and document the spacing and diameter of perforations for perforated pipe and that perforations are predrilled prior to shipment.
- a6. Recommended rejection of pipe that does not have the required documentation; that is of the incorrect size, type, or strength; or that is incorrectly fabricated. Ensure that rejected pipes are removed from the site.
- b. Handling:
 - b1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.
 - b2. Inspect the handling of materials by installing personnel to ensure that care is used.
- c. Storage:
 - c1. Inspect the storage facility.
 - c2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.
 - c3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 308.3 Preconstruction Testing:
 - a. Observe and document that the pipes are of the specified size and strength and are constructed of the specified material.
 - b. Observe and document that pipe perforations for perforated pipe are as specified.
 - c. Observe and document that the material is not damaged during the installation process and that underlying geosynthetic materials are not damaged.
- 308.4 Inspections and Testing During Construction:
 - a. Inspection activities that shall be performed during pipe placement and joining include:
 - a1. Location:
 - a1.1 Observations and measurements to ensure that the specified pipe sizes are placed at the specified locations.
 - a1.2 Observations to ensure that perforated pipe is placed correctly.
 - a1.3 Measurements to ensure that the horizontal and vertical position and slope are within tolerances required by the GW Specification.
 - a1.4 Document the as-built locations of all pipes.



- a2. Pipe Joining:
 - a2.1 Observations to ensure that the pipe is joined by using the hot plate thermal butt fusion method as required by the GW Specification and that the equipment used for welding is as recommended by the Pipe Manufacturer.
 - a2.2 Observations to ensure that the joining method described in the GW Specification is followed.
- a3. Joint Quality Control:
 - a3.1 Observations and documentation that the test joints required by the GW Specification are made.
 - a3.2 Observations and documentation that the quality of the test joints meet the GW Specification.
- a4. Miscellaneous:
 - a4.1 Observations to ensure that cleanouts are installed as specified.
 - a4.2 Observations to ensure that the placement of the Coarse Aggregate Bedding material under, around, and over the pipe is as specified on the Design Drawings.
 - a4.3 Observations to ensure that the pipe network is not damaged during backfilling.
- a5. Cleaning:
 - a5.1 Observe that all the pipes are cleaned by jet cleaning after installation is complete and document that all pipes are intact and not obstructed.
 - a5.2 Document the location of defective or clogged pipe.
 - a5.3 Document repair by the GW Contractor and re-cleaning.
- a6. Testing:
 - a6.1 Observe and document that visual observations on pipe joints have been performed and the results of observations documented.
 - a6.2 Document the location of failed joints.
 - a6.3 Document the repair and retesting of failed joints by the GW Contractor and the results of testing.
- 309. CQA TESTING AND INSPECTION REQUIREMENTS FOR CREST ANCHOR TRENCH
 - 309.1 Inspections and Testing During Construction:
 - a. CQA activities during excavation, formation, and backfilling of crest anchor trenches for the retrofitted Metal Cleaning Basin's geosynthetic materials shall include visual observations and field testing to ensure that, where specified on the Design Drawings, crest anchor trenches are constructed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-5 and the following paragraphs.



- b. Measurements:
 - b1. Perform measurements of the crest anchor trench to ensure that the trench width, depth, and location are as specified on the Design Drawings.
- c. Observations:
 - c1. Observe that the trench corners are rounded as specified.
 - c2. Observe that good housekeeping practices are followed in the trenching operation by not allowing soil to fall back into the trench or down the slope and not allowing water to pond in the trench.
 - c3. Observe that the trench is backfilled as soon as possible after the geosynthetic materials being anchored are installed and compacted in a manner that does not damage the geosynthetic materials.

310. SAMPLING PATTERN

- 310.1 The CQA Officer shall establish a completely random sampling pattern for determining the choice of sampling points for field tests. Each block of work shall be subdivided into a sampling grid with at least 10 times as many grids as samples or tests to be taken or as directed by the Owner. The grid shall have a numeric identification system devised to distinguish each set of tests for a specific area from all other sets of tests. Each lift shall have a separate grid.
- 310.2 Sampling points shall be chosen by a random number generator or other acceptable method to obtain uniform coverage. Tests shall be numbered beginning with test number one (1) and no numbers shall be skipped. In areas where a test of any type fails to meet specification criteria and a retest is performed, the retest shall have the same test number as the original test except that an "R" shall follow the test designation.

311. VERIFICATION AND CALIBRATION

311.1 Verification of Selected Field Tests:

- a. The following tests shall be verified at the following frequency:

Test Requiring Verification

Frequency of Verification Test

Nuclear In-Place Density and Nuclear In-Place Moisture Content, ASTM D6938

Note 1

"Quick" Moisture Content Test Using Microwave, (ASTM D4643) or Gas Stove, Frying Pan, or Infrared Oven, (ASTM D4959), etc.

One standard oven-dry moisture content (ASTM D2216) test per 20 quick tests.

Lift Thickness Measured Using a Shaft or Shovel

One lift thickness verified by measurement every two acre-lifts.

Notes:

1 – A standard block test as required by ASTM D6938 shall be performed at the start of each day on each Nuclear apparatus that will be used that day. At the start of earthwork construction, a series of five Nuclear tests and five sand cone or rubber balloon tests shall be performed in the borrow area, or area to be excavated, on a compacted test strip to calibrate the Nuclear apparatus. During construction, one of the last Nuclear readings performed at the end of each day shall be verified using a sand cone (ASTM D1556) or

rubber balloon (ASTM D2167) density and moisture content test for each apparatus used that day. The average wet density and moisture content for each apparatus shall be computed for every ten tests. If variations greater than those permitted by the ASTMs occur, corrections shall be applied to all future tests for the apparatus until the next set of 10 tests is performed.

311.2 Calibration:

- a. Procedures for calibration of field and laboratory testing equipment shall be submitted by the CQA Contractor prior to the start of testing. These procedures shall meet ASTM requirements.

312. CORRECTIVE ACTION PROCEDURES

312.1 Failure of Material Quality Tests:

- a. The GW Contractor and the Owner shall be notified immediately if gradation or Atterberg limits tests do not meet GW Specification acceptance criteria. Failure to meet acceptance criteria of one or more of these groups of tests may indicate problems with the quality of soil materials. The GW Contractor shall cease all construction activities until the source of the problem or "out-of-specification" materials are identified. Construction shall not begin again until materials and installation procedures meeting GW Specification acceptance criteria are identified for use.

312.2 Failure of Field Density or Moisture Content Tests:

- a. If the results of field density or moisture content tests fail to meet GW Specification acceptance criteria, those tests shall be re-run after recompaction. Judgment shall be used to select re-test locations suspected of having lower than specified density or moisture content. If the results of the re-test meet GW Specification requirements, the compaction can be considered acceptable. If the results of the re-tests show out-of-specification densities or moisture contents, the CQA Officer shall immediately inform the Owner of the extent of the defective area. The defective area shall be removed and reconstructed or recompacted by the GW Contractor.



TABLE 014362-1
CQA FOR STRUCTURAL FILL MATERIAL

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	In-Situ Moisture Content	Laboratory Moisture Content	ASTM D2216	One per 500 cubic yards, and for each moisture density curve sample.
2	Moisture Density Curve	Proctor	ASTM D1557	One per 500 cubic yards, and for all changes in material.
3	Soil Index Properties	Atterberg Limits	ASTM D4318	One per 500 cubic yards, and for each moisture density curve sample.
4	Soil Index Properties	Grain Size	ASTM D422	One per 500 cubic yards, and for each moisture density curve sample.
5	Soil Classification	Unified Soil Classification System	ASTM D2487	One per 500 cubic yards, and for each moisture density curve sample.
6	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938 ⁽¹⁾ , ASTM D2167, or ASTM D1556	Four per lift. One per 500 cubic yards.
7	Field Moisture Content	Nuclear Density Gauge or Direct Heat Method	ASTM D6938 ⁽¹⁾ or ASTM D4959	At each field density test location.
8	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per acre per lift.
9	Surface Lines and Grades	Surveying		One per 50-foot grid and at grade breaks (i.e., toe and top of slopes).

Notes:

(1) ASTM D6938 Procedure B (backscatter) shall be used to measure the as-compacted density of Structural Fill material.



TABLE 014362-2

CQA FOR COARSE AGGREGATE BEDDING, SAND FILTER LAYER, PROTECTIVE WARNING LAYER, RIPRAP BEDDING, AND RIPRAP MATERIALS

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
Coarse Aggregate Bedding, Protective Warning Layer, Road Surfacing, Riprap Bedding, and Riprap Materials				
1	Soil Index Properties	Grain Size	ITP 27	One per 500 cubic yards.
2	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per lift. One per 250 linear feet of road for material to be used as road surfacing.
3	Certification of Final Thickness and Grade	Surveying		One per 50-foot grid spacing.
Sand Filter Layer Material				
1	Hydraulic Conductivity	Hydraulic Conductivity	ASTM D2434	One per 500 cubic yards.
2	Soil Index Properties	Grain Size	ITP 27	One per 500 cubic yards.
3	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per lift. One per 250 linear feet of road for material to be used as road subgrade.
4	Certification of Final Thickness and Grade	Surveying		One per 50-foot grid spacing.



TABLE 014362-3
CQA FOR GEOSYNTHETIC CLAY LINER

No.	Characteristic to be Monitored	Test	
		Test Method Reference	Minimum Test Frequency
1	Swell Potential	ASTM D5890	One test prior to material delivery for each type of material, and one test per material per 20,000 SF
2	Fluid Loss Properties	ASTM D5891	
3	Moisture Content	ASTM D4643	
4	Nonwoven Cap and Nonwoven Carrier Mass / Area	ASTM D5261	
5	Bentonite Mass / Area	ASTM D5993	
6	Hydraulic Conductivity	ASTM 5084	
7	Index Flux	ASTM D5887	
8	Tensile Strength	ASTM D6768	
9	Peel Strength	ASTM D6496	
10	Hydrated Internal Shear Strength	ASTM D6243	



TABLE 014362-4
CQA FOR AREAS TO RECEIVE GEOSYNTHETIC MATERIALS

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Certification of Surface Elevation Prior to Geomembrane	Surveying		One per 50-foot grid and at grade breaks (toe and top of slopes).
2	Subgrade Firm and Unyielding	Observe and Document Proofroll		Continuous on Structural Fill surface.
3	Subgrade Free of Deleterious Conditions	Observe and document exposed subgrade is free from • Irregularities • Protrusions • Loose soil or soft spots • Abrupt changes in grade • Debris • Clods • Stones • Roots • Organic material • Moisture seeps, puddling, or ponding • Frozen material		Continuous



TABLE 014362-5
CQA FOR ANCHOR TRENCHES

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Trench Geometry	Measurement		2 locations per trench 1 location per 100 ft of trench
2	Trench Condition	Observe and Document • Trench free of sloughed material • Trench free from ponded water • Absence of loose material below geosynthetics		Continuous
3	Trench Backfill	Observe and document prompt backfill of trenches		Continuous
4	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938, ASTM D2167, or ASTM D1556	Two per lift One per 200 ft of trench per lift



TABLE 014362-6
CQA FOR HDPE GEOMEMBRANE

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Receipt of Delivery	Observe and document: • Name of GM/GC Manufacturer • Product identification • Date of manufacture of the geomembrane • Roll identification number • Geomembrane thickness and type • Physical dimensions (length, width) • Manufacturing lot number • Panel number and weight • Order number	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections, Blisters, Excessive Folding	Visual	Each Roll
3	Geomembrane Properties	Thickness	ASTM D5994	5 per roll of geomembrane delivered at locations evenly distributed throughout roll
		Density	ASTM D1505 / D792	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tensile properties (strength and elongation at yield and at break)	ASTM D6693	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tear resistance	ASTM D1004	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Puncture resistance	ASTM D4833	Per resin batch, but not less than once per 20,000 SF of geomembrane



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
		Carbon black content	ASTM D4218	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Carbon black dispersion	ASTM D5596	Per resin batch, but not less than once per 20,000 SF of geomembrane
4	Weather and Site Conditions at Time of HDPE Geomembrane Deployment and Seaming	Observe and document weather and site conditions		Continuous
5	Panel Deployment	Observe and document: • Relaxed deployment • Damage prevention • Wrinkles minimized • Temporary anchorage • Protected from damage • Proper overlap • Seam location	Visual	Continuous
6	Trial Welds	Observe and document Geosynthetics Contractor staff performing and testing trial welds		• Prior to each seaming period. • Every 4 hours of continuous seaming. • Whenever personnel or equipment are changed. • When climatic conditions result in wide changes in geomembrane temperature. • When requested by the CQA Geosynthetics Inspector(s) for any seaming crew or piece of welding equipment if problems are suspected.



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
7	Preparation for Seaming	Observe and document: • HDPE geomembrane is clean • Minimum wrinkles and fish mouths • Fish mouths cut as necessary to lay flat • Film surface for seaming	Visual	Continuous
8	Seaming	Observe and document: • Materials • Equipment • Staff • Acceptable procedures • Weather • Pressure • Speed • Damage • Absence of solvents	Visual	Continuous
9	Non-Destructive Seam Tests	Observe and document: • Equipment • Methods • Pressures • Leaks marked • Repairs made • Repairs retested	Double-Wedge Fusion Welds: ASTM D5820 and GRI GM6	100 percent of seam lengths shall be tested.
			Extrusion Welds: ASTM D5641	
			Inaccessible Seams: Electric Wire Testing	



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
10	Destructive Seam Samples and Testing	Observe and document • Removal of all destructive test samples • Repair of sampled areas • Testing of repairs Label all samples Ship all samples to CQA Contractor's testing laboratory	Shear strength and peel adhesion	• One test per every 500 linear feet of seam length if the seam is welded with a fusion weld. • One test per every 400 linear feet of seam length if the seam is welded with an extrusion weld. • One test for each seaming machine



TABLE 014362-7
CQA FOR DRAINAGE GEOCOMPOSITE

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Receipt of Delivery	Observe and document: • Name of GM/GC Manufacturer • Product identification • Roll identification number • Product thickness or composition • Manufacturing batch code or lot code • Date of manufacture • Order number • Roll dimensions (i.e., length, width, and total weight)	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections,	Visual	Each Roll
3	Drainage Geocomposite Properties	Flow rate per width	ASTM D4716	Once per 20,000 SF of drainage geocomposite
		Ply Adhesion	ASTM D7005	Once per 20,000 SF of drainage geocomposite
4	Weather and Site Conditions at Time of Deployment and Seaming	Observe and document weather and site conditions.		Continuous



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
5	Panel Deployment	Observe and document: • No debris or rocks below geotextile or geonet • Anchorage • Cutting • Damage prevention • Proper overlap and seaming	Visual	Continuous
6	Seaming	Observe and document: • Seam orientation • Seaming method • Thread material • Stitching type • Stitch length • Sweep for broken needles	Visual	Continuous
7	Repair Areas	Identify areas to be patched Document patching method and location	Visual	Continuous

END OF SECTION 014362

**ATTACHMENT 7-1
LOCATION RESTRICTIONS COMPLIANCE
DEMONSTRATION**



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

**PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTION
METAL CLEANING BASIN
POWERTON GENERATING STATION
MARCH 2022**

This location restriction determination has been prepared in accordance with 35 Ill. Adm. Code Subpart C, Section 845.300 for the Metal Cleaning Basin (MCB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, Illinois to document compliance with location restrictions related to placement above the uppermost aquifer.

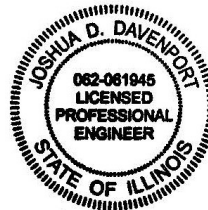
1. Placement Location Restriction Determination

The base of the MCB is approximately elevation 457.5 ft amsl and the upper limit groundwater elevation is 450.14 ft amsl. The MCB is separated from the upper limit of the uppermost aquifer by a minimum of five (5) feet. Therefore, the location of the MCB is in compliance with the requirements outlined in 845.300.

2. Professional Engineer's Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of environmental engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Joshua D. Davenport, P.E.
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License Expires: 11/30/2023



**WETLANDS LOCATION RESTRICTION
METAL CLEANING BASIN
POWERTON GENERATING STATION
MARCH 2022**

This location restriction determination has been prepared in accordance with 35 Ill. Adm. Code Subpart C, Section 845.310 for the Metal Cleaning Basin (MCB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, IL, to document compliance with location restrictions related to wetlands.

1. Placement Location Restriction Determination

In accordance with 845.310, an existing CCR surface impoundment must not be located in wetlands, unless it can be demonstrated that the CCR unit meets the requirements of paragraphs 845.310(a)(1) through 845.310(a)(5). The identification of wetlands near the MCB was determined using the National Wetlands Inventory (NWI) presented by the U.S. Fish and Wildlife Service. The NWI identified the MCB is not located in mapped wetlands. Therefore, the location of the MCB complies with 845.310.

2. Professional Engineer's Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of environmental engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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3. Reference

U.S. Fish and Wildlife Service, 2022. "National Wetlands Inventory," <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>, accessed March 9, 2022.



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

**FAULT AREAS LOCATION RESTRICTION
METAL CLEANING BASIN
POWERTON GENERATING STATION
MARCH 2022**

This location restriction determination has been prepared in accordance with 35 Ill. Adm. Code Subpart C, Section 845.320 for the Metal Cleaning Basin (MCB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, Illinois to document compliance with location restrictions related to fault areas.

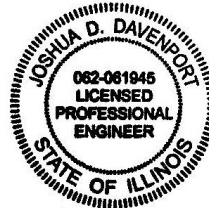
1. Fault Areas Location Restriction Determination

The MCB is not located within 200 feet (60 meters) of a mapped Holocene-aged fault, as mapped by the United States Geological Survey (USGS) Quaternary Fault Database. Therefore, the location of the MCB complies with the requirements outlined in §845.320.

2. Professional Engineer's Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of environmental engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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3. References

U.S. Geological Survey and Illinois State Geological Survey, Quaternary Fault and Fold Database for the United States, accessed March 9, 2022, at <https://www.usgs.gov/natural-hazards/earthquake-hazards/faults>.

**SEISMIC IMPACT ZONES LOCATION RESTRICTION
METAL CLEANING BASIN
POWERTON GENERATING STATION
MARCH 2022**

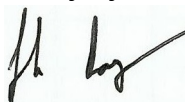
This location restriction determination has been prepared in accordance with 35 Ill. Adm. Code Subpart C, Section 845.320 for the Metal Cleaning Basin (MCB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, Illinois to document compliance with location restrictions related to seismic impact zones.

1. Seismic Impact Zones Location Restriction Determination

The U.S. Geological Survey (USGS) National Seismic Hazard Tool website was used to provide the peak ground acceleration based on a 2% probability in 50 years, with a land designation of ‘a site on rock’ with a ground acceleration of 760 m/s in the upper 30 meters. The peak ground acceleration was determined to be 0.0651 g in 50 years, which is less than 0.10 g in 50 years. Therefore, the MCB complies with the location requirement in 845.330 and is not located in a seismic impact zone.

2. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of environmental engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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3. References

U.S. Geological Survey, 2018. Earthquake Hazards Program, “National Seismic Hazard Tool,” <https://www.earthquake.usgs.gov/hazards/interactive/>, accessed March 9, 2022.



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

**UNSTABLE AREAS AND FLOODPLAINS LOCATION RESTRICTIONS
METAL CLEANING BASIN
POWERTON GENERATING STATION
MARCH 2022**

This location restriction determination has been prepared in accordance with 35 Ill. Adm. Code Subpart C, Section 845.340 for the Metal Cleaning Basin (MCB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, Illinois, to document compliance with location restrictions related to unstable areas and floodplains.

1. Unstable Areas Location Restriction Determination

The MCB is not located in unstable areas. Therefore, the location of the MCB complies with the requirements outlined in 845.340.

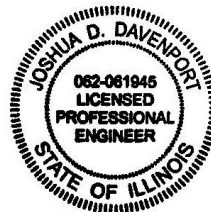
2. Floodplains Location Restriction Determination

The MCB is not located in a floodplain with a 1% chance or greater of occurring according to the National Flood Hazard Layer FIRMette Map No. 17179C0175E as mapped by the Federal Emergency Management Agency. The 1% flood elevation listed on FIRMette Map No. 17179C0175E is 457 ft above mean sea level (amsl) and the embankment crest of the MCB is between 467 to 468 ft amsl. Therefore, the location of the MCB complies with Section 845.340.

3. Limitations and Certification

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of environmental engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

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4. Reference

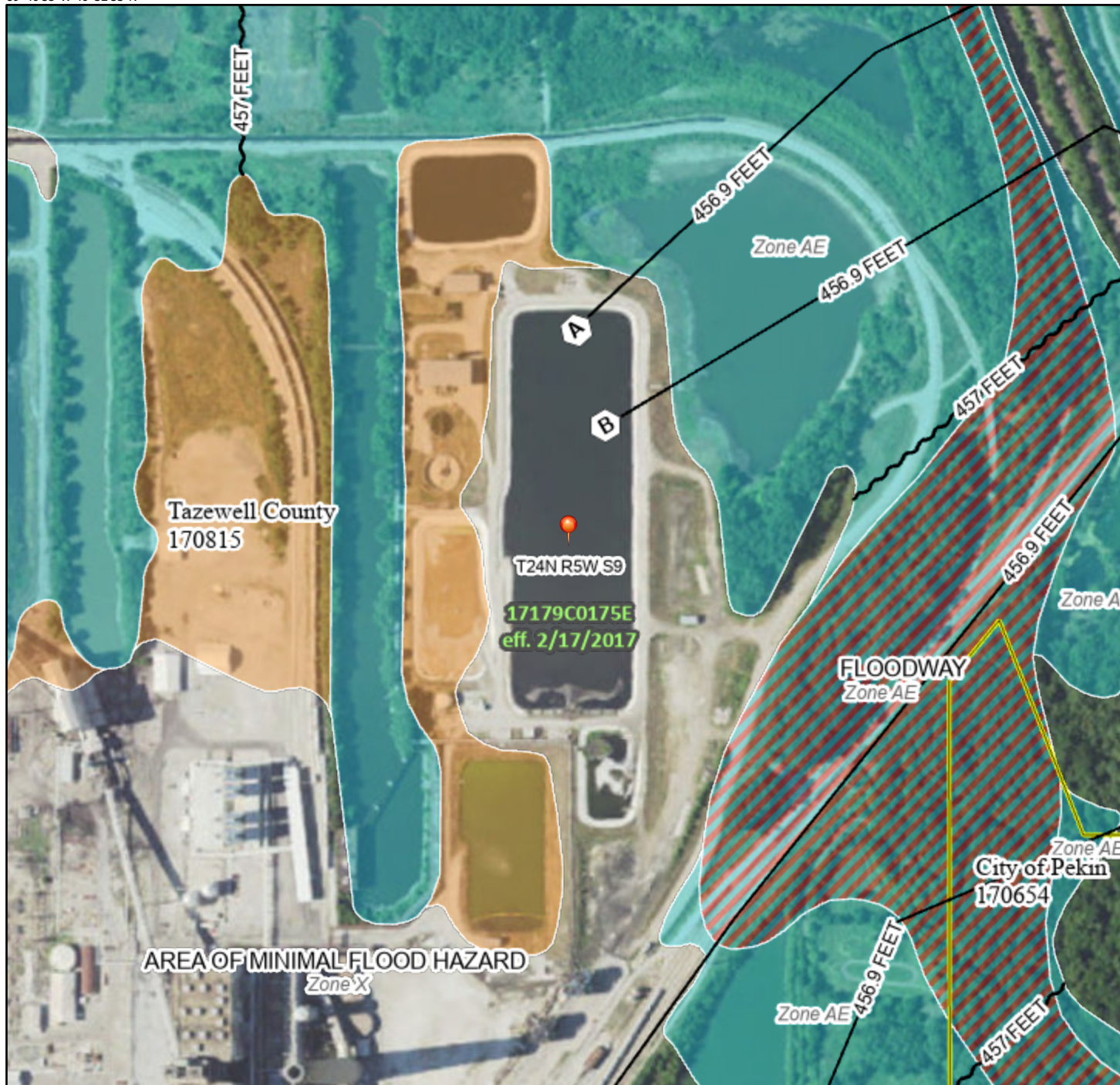
Federal Emergency Management Agency (FEMA), 2020, *National Flood Hazard Layer FIRMette 17179C0175E*, 25 March 2022. <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>.

ATTACHMENT 7-2
FLOODPLAIN LOCATION DETERMINATION

National Flood Hazard Layer FIRMette



89°40'55"W 40°32'53"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		Coastal Transect
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
OTHER FEATURES		Hydrographic Feature
		Digital Data Available
MAP PANELS		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

89°40'17"W 40°32'26"N

ATTACHMENT 7-3
LINER DESIGN CERTIFICATION



Midwest Generation, LLC

Powerton Generating Station

Alternative Composite Liner Design Certification for Retrofitted Metal Cleaning Basin

Revision 0

July 19, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(c)

1.1 PURPOSE

The Metal Cleaning Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing coal combustion residual (CCR) surface impoundment that is being retrofitted with a new composite liner system and a new leachate collection and removal system (LCRS). As a CCR surface impoundment, the Metal Cleaning Basin is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which is codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and is referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.410(c), this document demonstrates and provides certification that the design of the new composite liner system for the retrofitted Metal Cleaning Basin complies with the requirements of 35 Ill. Adm. Code 845.410 for an alternative composite liner.

1.2 SCOPE

The following excerpts from the Illinois CCR Rule are applicable to the design of an alternative composite liner system for a retrofitted CCR surface impoundment:

- § 845.410(a): New CCR surface impoundments...must be designed, constructed, operated, and maintained with either a composite liner or an alternative composite liner that meets the requirements of Section 845.400(b) or (c).
- § 845.400(c)(1): An alternative composite liner must consist of two components: the upper component consisting of, at a minimum, a 30-mil geomembrane liner, and a lower component, that is not a geomembrane, with a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. The geomembrane liner components consisting of high-density polyethylene (HDPE) must be at least 60 mil. If the lower component of the alternative liner is compacted soil, the geomembrane liner must be installed in direct and uniform contact with the compacted soil.
- § 845.400(c)(2): The liquid flow rate through the lower component of the alternative composite liner must be no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec. The hydraulic conductivity for the two feet of compacted soil used in the comparison must be no greater than 1×10^{-7} cm/sec. The hydraulic conductivity of any alternative to the two feet of compacted soil must be determined using recognized and generally accepted methods.

- § 845.400(c)(3): The liquid flow rate comparison must be made using the following equation, which is derived from Darcy's Law for gravity flow through porous media.

$$Q/A = q = k ((h/t)+1)$$

where:

Q = flow rate (cubic centimeters/second)

A = surface area of the liner (squared centimeters)

q = flow rate per unit area (cubic centimeters / second / square centimeter)

k = hydraulic conductivity of the liner (centimeters / second)

h = hydraulic head above the liner (centimeters); and

t = thickness of the liner (centimeters)

2.0 DEMONSTRATION

The alternative composite liner design for the retrofitted Metal Cleaning Basin at the Powerton Generating Station is compliant with the referenced regulations as demonstrated in the following sections.

2.1 UPPER COMPONENT

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.400(c)(1)

The upper component of the alternative composite liner design for the retrofitted Metal Cleaning Basin consists of a 60-mil HDPE geomembrane. This complies with 35 Ill. Adm. Code 845.400(c)(1).

2.2 LOWER COMPONENT

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.400(c)(2) & 845.400(c)(3)

The lower component of the alternative composite liner design for the retrofitted Metal Cleaning Basin consists of a geosynthetic clay liner (GCL). To demonstrate the specified GCL complies with 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3), the maximum liquid flow rate allowed by the project construction specifications is compared to the liquid flow rate through two feet of soil with a hydraulic conductivity of 1×10^{-7} cm/sec. Table 1 presents this flow rate comparison. As shown in the table, the maximum allowable hydraulic conductivity specified for the GCL is 1×10^{-9} cm/sec. The GCL's hydraulic conductivity will be determined by ASTM D5887, which is a recognized and generally accepted method for determining the hydraulic conductivity of a GCL.

Per Table 1, the design liquid flow rate through the GCL specified for the lower component of the alternative composite liner for the retrofitted Metal Cleaning Basin is less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec. This complies with 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3).

**Table 1 – Liquid Flow Rate Comparison Between Compacted Soil Liner & GCL
 for Retrofitted Metal Cleaning Basin**

Parameter	Symbol	Compacted Soil Liner	GCL
Crest Elevation	EL_{crest}	467.00 feet	
Minimum Elevation of Composite Liner System	EL_{floor}	455.67 feet	
Hydraulic Head on Liner (Omitting Geomembrane Thickness)	$h = EL_{crest} - EL_{floor}$	11.33 feet	
Thickness of Liner Lower Component	t	2 feet	7 mm = 0.023 feet
Hydraulic Gradient Through Liner	$i = h / t$	5.67	492.61
Maximum Hydraulic Conductivity of Liner	k	1.0×10^{-7} cm/sec	1.0×10^{-9} cm/sec
Liquid Flow Rate Through Liner (per Unit Area)	$q = k \times (i + 1)$	6.67×10^{-7} cm ³ /sec/cm ²	5.93×10^{-7} cm ³ /sec/cm ²

3.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(c)

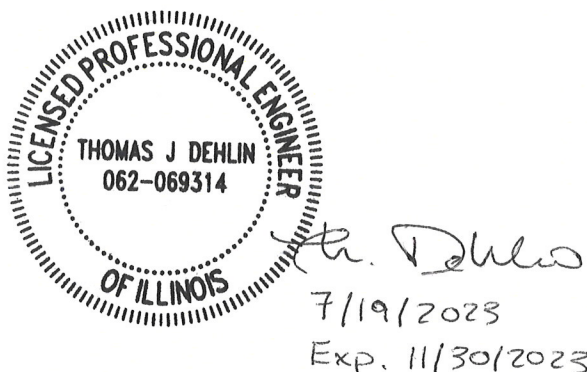
I hereby certify that:

- Per the preceding demonstration and pursuant to 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3), the design liquid flow rate through the lower component of the alternative composite liner for the retrofitted Metal Cleaning Basin is no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec.
- The design of the alternative composite liner for the retrofitted Metal Cleaning Basin complies with the requirements of 35 Ill. Adm. Code 845.410.
- This pre-construction composite liner design certification was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 19, 2023

Seal:



4.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed July 18, 2023.

**ATTACHMENT 7-4
LEACHATE COLLECTION SYSTEM DESIGN
CERTIFICATION**



Midwest Generation, LLC

Powerton Generating Station

Leachate Collection System Design Certification for Retrofitted Metal Cleaning Basin

Revision 0

July 19, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(b)

1.1 PURPOSE

The Metal Cleaning Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing surface impoundment that is being retrofitted with a new composite liner system and a new leachate collection and removal system (LCRS). The Metal Cleaning Basin is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which is codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and is referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.420(b), this document demonstrates and provides certification that the design of the new leachate collection and removal system for the retrofitted Metal Cleaning Basin complies with the requirements of 35 Ill. Adm. Code 845.420.

1.2 APPLICABLE ILLINOIS CCR RULE REGULATIONS

The following excerpts from the Illinois CCR Rule are applicable to the design of an LCRS for a retrofitted CCR surface impoundment:

- § 845.420: A new CCR surface impoundment must be designed, constructed, operated and maintained with a leachate collection and removal system. The leachate collection and removal system must be designed, constructed, operated, and maintained to collect and remove leachate from the leachate collection system of the CCR surface impoundment during its active life and post-closure care period.
- § 845.420(a): The leachate collection and removal system must:
 - 1) Be placed above the liner required by Section 845.410;
 - 2) Have placed above it a filter layer that has a hydraulic conductivity of at least 1×10^{-5} cm/sec;
 - 3) Have a bottom slope of three percent or more towards the collection pipes;
 - 4) Be constructed of:
 - A) Granular drainage materials with a hydraulic conductivity of 1×10^{-1} cm/sec or more and a thickness of 24 inches or more above the crown of the collection pipe; or
 - B) Synthetic drainage materials with a transmissivity of 6×10^{-4} m²/sec or more;
 - 5) Be constructed of materials that are chemically resistant to CCR and any non-CCR waste managed in the CCR surface impoundment and the leachate expected to be generated, and of sufficient strength and thickness to prevent collapse under the

- pressures exerted by overlying waste and any waste cover materials and equipment used at the CCR surface impoundment;
- 6) Be designed, constructed, and operated with collection pipes at the base of the granular material to prevent clogging with fines during the active life and post-closure care period:
 - 7) Have collection pipes
 - A) Designed such that leachate is collected at a sump and is pumped or flows out of the CCR surface impoundment;
 - B) With slopes that allow flow from all points within the CCR surface impoundment to the sump or drain outlet; and
 - C) Large enough to conduct periodic cleaning;
 - 8) Have a protective layer or other means of deflecting the force of CCR pumped into the CCR surface impoundment;
 - 9) Be designed and operated to minimize clogging during the active life and post-closure care period; and
 - 10) At a minimum, the leachate collection and removal system must be operated to remove free liquids from the CCR surface impoundment at the time of closure during post closure care.

2.0 DEMONSTRATION

The LCRS design for the retrofitted Metal Cleaning Basin at the Powerton Generating Station is compliant with the referenced regulations as demonstrated in the following sections.

2.1 LOCATION ABOVE NEW COMPOSITE LINER SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(1)

The LCRS will be placed above the retrofitted Metal Cleaning Basin's new composite liner system – a 60-mil high-density polyethylene (HDPE) geomembrane over a geosynthetic clay liner (GCL) – as required by 35 Ill. Adm. Code 845.420(a)(1).

2.2 FILTER LAYER

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(2)

A filter layer having a hydraulic conductivity of at least 1×10^{-5} cm/sec will be placed above the LCRS as required by 35 Ill. Adm. Code 845.420(a)(2). This filter layer will consist of sand, except north of the weir wall where riprap will be installed near the basin's existing drain outlet.

2.3 BOTTOM SLOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(3)

Natural soil fill material will be placed along the floor of the Metal Cleaning Basin to establish three percent slopes down towards a leachate collection pipe located in the middle of the basin. The LCRS will also be installed along the inside faces of the Metal Cleaning Basin's existing dikes, which have interior sideslopes of approximately 3-horizontal:1-vertical, or 33 percent. This complies with 35 Ill. Adm. Code 845.420(a)(3).

2.4 DRAINAGE MATERIAL

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(4)

The LCRS will be constructed of a drainage geocomposite with a transmissivity of at least 6×10^{-4} m²/sec. The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core. This complies with 35 Ill. Adm. Code 845.420(a)(4).

2.5 CHEMICAL RESISTANCE, STRENGTH, & THICKNESS

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(5)

The HDPE components (collection pipe, drainage geocomposite) and natural soil components (protective warning layer, sand filter layer, and coarse aggregate bedding layer) of the LCRS are chemically resistant to the CCR and non-CCR waste that will be managed in the retrofitted Metal Cleaning Basin. The LCRS components have also been designed to have sufficient strength and thickness to prevent collapse under the pressures exerted by the overlying waste, a potential final cover system for the waste, and Station equipment used to perform routine maintenance at the CCR surface impoundment. This complies with 35 Ill. Adm. Code 845.420(a)(5).

2.6 CLOGGING PREVENTION FOR COLLECTION PIPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(6)

The perforated leachate collection pipe will be surrounded by coarse aggregate bedding material. The perforations in the leachate collection pipe and the gradation of the coarse aggregate bedding material are designed to prevent fines from clogging the pipe during the active life and post-closure care period of the retrofitted Metal Cleaning Basin. This complies with 35 Ill. Adm. Code 845.420(a)(6).

2.7 COLLECTION PIPE DESIGN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(7)

A 6-in.-diameter, perforated leachate collection pipe will be installed in a north-south spanning trench in the middle of the retrofitted Metal Cleaning Basin to collect leachate from the drainage geocomposite component of the LCRS. The leachate collection pipe will be sloped towards the basin's existing drain outlet, a 24-inch-diameter reinforced concrete pipe, to convey leachate out of the basin. The slopes of the retrofitted Metal Cleaning Basin's LCRS will ensure flow from all points within the retrofitted Metal Cleaning Basin is directed to the leachate collection pipe and ultimately conveyed to the existing drain outlet. A wye branch in the leachate collection pipe will also be installed and lead to a non-perforated riser pipe in the northeastern quadrant of the basin, where a wheeled, submersible pump will be installed. The Station will use this pump to dewater the Metal Cleaning Basin during periodic cleanings, at the time of closure, and as needed during the post-closure care period. Finally, the 6-in. diameter of the leachate collection pipe is large enough to conduct periodic cleaning. This complies with 35 Ill. Adm. Code 845.420(a)(7).

2.8 PROTECTIVE LAYER

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(8)

Along the retrofitted Metal Cleaning Basin's floor, a protective warning layer consisting of 6 inches of densely graded aggregate will be installed over the sand filter layer to deflect the force of CCR flowing into the CCR surface impoundment. This layer will also provide a working surface for operators removing CCR from the basin during routine cleanings and will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's sideslopes, the protective warning layer will consist of riprap on a gravel bedding layer to protect the sand filter layer from erosion. North of the weir wall near the basin's existing drain outlet, the protective warning layer will consist of riprap. This complies with 35 Ill. Adm. Code 845.420(a)(8).

2.9 CLOGGING PREVENTION FOR DRAINAGE GEOCOMPOSITE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(9)

The upper non-woven geotextile component of the drainage geocomposite will prevent CCR and non-CCR sediments from intruding into, clogging, and impeding the flow of leachate through the HDPE geonet core during the active life and post-closure care period of the retrofitted Metal Cleaning Basin. Moreover, the sand filter layer installed above the LCRS will also preclude CCR and non-CCR sediments from clogging the LCRS. This complies with 35 Ill. Adm. Code 845.420(a)(9).

2.10 OPERATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(10)

At a minimum, the LCRS will be operated to remove free liquids from the retrofitted Metal Cleaning Basin when the basin is closed and during the basin's post-closure care period.

3.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(b)

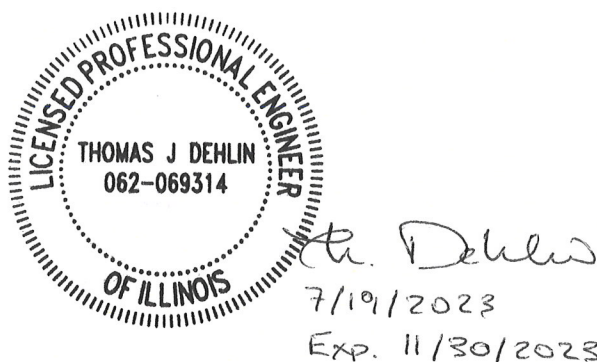
I hereby certify that:

- The design of the leachate collection system for the retrofitted Metal Cleaning Basin complies with the requirements of 35 Ill. Adm. Code 845.420.
- This pre-construction leachate collection system design certification was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 19, 2023

Seal:



4.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed June 30, 2023.

ATTACHMENT 7-5
CCR FUGITIVE DUST CONTROL PLAN

CCR COMPLIANCE FUGITIVE DUST CONTROL PLAN

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

PREPARED BY:

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

October 19, 2021

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APPENDICES

Appendix A - Site Diagram/Potential Fugitive Dust Sources

Appendix B – Example Assessment Record

Appendix C – Example Plan Review and Amendment Record

Appendix D – Example Citizen Complaint Log

1.0 INTRODUCTION

On April 15, 2021, the Illinois Environmental Protection Agency adopted a new Part 845 of its waste disposal regulations creating statewide standards for the disposal of coal combustion residuals (CCR) in surface impoundments, created by the generation of electricity by coal-fired power plants. Part 845 specifically requires that “the owner or operator of a CCR surface impoundment, or any lateral expansion of a CCR surface impoundment, must adopt measures that will effectively minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR surface impoundments, roads, and other CCR management and material handling activities”. As a result, each regulated facility must develop a CCR fugitive dust control plan that complies with 35 Ill. Adm. Code 845.500(b).

This site specific Fugitive Dust Control Plan (Plan) has been developed to comply with the requirements specified in Section 845.500. In general, the Plan identifies the potential CCR fugitive dust sources and describes the control measures that will be implemented to minimize CCR fugitive dust emissions. The Plan also includes a procedure for the periodic assessment of the Plan’s effectiveness, documentation of any Plan amendments deemed necessary to assure continued compliance, a record of any citizen complaints received pertaining to CCR fugitive dust emissions, and an outline of the required reporting and recordkeeping requirements in 35 Ill. Adm. Code 845.500.

2.0 SITE INFORMATION

2.1 Owner/Operator and Address:

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

2.2 Owner Representative/Responsible Person Contact Information:

Mr. Dale Green
Plant Manager
309-346-2165

2.3 Location and Description of Facility Operations

The 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 which occupies approximately 1,440 acres and provides cooling water to the facility.

The general vicinity is a primarily mixed industrial and agricultural area with limited commercial and residential developments.

3.0 POTENTIAL FUGITIVE DUST SOURCES

Potential fugitive dust sources associated with the bottom ash and slag and fly ash systems have been identified at the facility; however, some of these are regulated by the facility's operating permit and are adequately addressed within the required fugitive dust operating program. The potential CCR fugitive dust sources generally include exterior ash distribution systems, temporary ash storage locations, ash bulk loading/unloading operations and ash truck transportation routes. Fugitive dust could potentially be generated from these sources as a result of equipment malfunctions, wind erosion, housekeeping issues and/or the nature of the operation. Specifically, these identified sources were further evaluated to determine the probability of CCR fugitive dust being generated and to determine the level of emission controls that are warranted to mitigate fugitive dust emissions. The findings of the evaluation are individually discussed in the following sections.

3.1 Bottom Ash and Slag Distribution System

Collected bottom ash and slag in the boilers is transported as a liquid mixture through an enclosed piping system to the dewatering bins. Some of this piping is located inside a building; however, a portion is situated above ground and in the outside environment. Although not an anticipated occurrence, a breach in the exterior piping could result in the accidental release of bottom ash and slag and potential fugitive dust emissions if the material were to accumulate and dry out.

3.2 Dewatering Bins

The dewatering bins are designed to remove water from the bottom ash and slag. Bottom ash and slag that is relatively wet is drop loaded through the bins into open top trucks for removal off-site for beneficial reuse purposes. The water removed from the dewatering bins is pumped to the Ash Surge Basin and the Ash Bypass Basin where settling occurs prior to discharge of the water from the facility. As of right now, the Metals Cleaning Basin has no water. The loading operation has the potential for fugitive dust emissions if bottom ash and slag is not properly loaded and is allowed to accumulate and dry out on the ground surface beneath the dewatering bins.

3.3 Ash Surge Basin, Bypass Basin, and Metal Cleaning Basin

Extracted water from the dewatering bins is pumped through enclosed pipes to the Ash Surge Basin or the Ash Bypass Basin. Occasionally, CCR material is placed in the Metal Cleaning Basin. After settling occurs, water from the Ash Surge Basin, Ash Bypass Basin, and the Metal Cleaning Basin is ultimately discharged

through a final settling basin and then through a regulated NPDES outfall. These basins are normally filled with water; however, dredging occasionally may be required to remove the settled material from each basin. When this requirement occurs, the basins are dewatered and the dredged material is allowed to dry within each basin. When the material is suitable for transport, it is loaded into open top trucks, covered if necessary, and sent off site to a mine reclamation site. Potential fugitive dust emissions could occur if dry bottom ash and slag residual is exposed or loaded during excessive windy and dry weather conditions.

3.4 Former Ash Basin

This basin was formerly used for the routine disposal of bottom ash and slag; however, this procedure ceased in the 1970s. The bottom ash and slag is completely submerged within the basin. Water level fluctuations in the basin are attributable to precipitation and other weather-related conditions. In rare emergency operational situations, overflow from the Ash Surge Basin to the Former Ash Basin could occur by gravity through the spillway. This discharge is not expected to contain significant quantities of CCR and is allowed through the existing NPDES permit. It is noted that a new railroad spur was constructed through the middle of the Former Ash Basin.

3.5 Concrete Storage Pad

This partially below-grade concrete structure is used for the temporary storage of residual bottom ash and slag generated at the dewatering bins and as a result of other routine ash-related maintenance activities. The staged bottom ash and slag is allowed to partially dry within the structure until it is suitable for off-site removal. The material is placed in temporary storage, loaded into open top trucks, covered and sent off site to a mine reclamation site. Dry material that is exposed during excessively windy and dry weather conditions has the potential for becoming fugitive dust emissions.

3.6 Fly Ash Equipment

Collected fly ash in the precipitator hoppers is initially transported in a closed vacuum piping system to a cyclone and bag filter where it is mechanically separated from the air stream within an enclosed building. Fly ash is then sent within an enclosed building to the fly ash silos. At the silos, the fly ash is drop loaded into trucks through a telescopic pipe contained within a drop chute. The loading of fly ash occurs within a partially enclosed structure. After the trucks containing fly ash have been loaded and the truck's rear gate is water sprayed to remove dust, they proceed to a nearby platform to allow the truck driver to secure

the truck and to broom sweep or water spray any residual fly ash remaining on the truck. This entire process is covered by the fugitive dust operating program for the facility.

3.7 Ash Transport Roadways

Both gravel covered and asphalt paved roads within the facility are used by trucks hauling bottom ash, slag, and fly ash to the mine reclamation site as well as by other vehicles entering and exiting the facility. Fugitive CCR dust emissions could occur during transit if CCR material is not properly cleaned from the trucks or if there is a release of CCR material from the vehicle due to a malfunction or accident.

These potential fugitive dust sources are identified on the Site Diagram included in Appendix A.

4.0 DESCRIPTION OF CONTROL MEASURES

4.1 Purpose

The purpose of developing appropriate control measures is to minimize and reduce the emissions of CCR fugitive dust from the identified potential emission sources. The control measures and work practices implemented at the facility are described in the following sections.

4.2 Bottom Ash and Slag Distribution System

Bottom ash and slag is in a liquid mixture within a closed system until the point of discharge at the dewatering bins. A significant portion of the piping system is contained within a building, which eliminates dust emissions to the outside environment. An assessment of the exterior distribution system will be performed on a quarterly basis to verify the integrity of the system or when a breach in the system is detected. If a leak is noted, resulting in the release of bottom ash and slag, the affected area will be restored to original conditions and repair of the pipe will be performed as soon as feasible. The CCR will be sent off site to a mine reclamation site.

4.3 Dewatering Bins

The bottom ash and slag is drop loaded from the dewatering bins in a wet state and into trucks positioned beneath the bins. The bottom ash and slag has sufficient moisture to preclude this material from becoming airborne during loading. An assessment of the dewatering bin loading operation will be performed on a quarterly basis to verify if there has been an equipment malfunction resulting in an accumulation of released material. Should there be a malfunction in the dewatering equipment that results in a spill of the material, repair of any malfunctioning equipment and clean up and transfer of the material to the concrete storage pit will be performed as soon as feasible.

4.4 Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin

During normal operations, the Ash Surge Basin and Ash Bypass Basin are filled with water thereby suppressing any potential fugitive dust emissions. The Metal Cleaning Basin has recently been emptied and cleaned thereby suppressing any potential fugitive dust emissions. Infrequently, the basins will need to be dewatered and the sediment removed for proper off-site disposition. While the bottom ash and slag residue is drying, there is the potential for this material to

become airborne especially during excessively dry and windy conditions. Loading of this material under these adverse conditions also has the potential for generating fugitive dust. Dewatered basins will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag, the height of the staged material will be minimized and the material piles will be either sprayed with water or covered. Loading activities also will be limited during such occasions.

4.5 Former Ash Basin

The Former Ash Basin was used for the disposal of bottom ash and slag in the past; however, this procedure is no longer occurring. The previously deposited material is completely submerged within the basin with the typical water level at approximately 10-15 feet below grade, thereby, making the bottom ash and slag not readily susceptible to wind erosion and generation of potential fugitive dust emissions.

4.6 Concrete Storage Pad

The concrete pad only periodically contains bottom ash and slag and other CCR-related materials generated from routine plant maintenance activities. Typically these materials are in a wet state but are allowed to partially dry to facilitate removal. When sufficiently dry, the material is promptly removed off site. The concrete pad will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag and other CCR-related materials, the height of the staged material will be minimized and the material piles will be either sprayed with water or covered.

4.7 Fly Ash Equipment

Fly ash from the mechanical separators is sent to the silos within an enclosed structure. The fly ash is drop loaded into an opening within the tarp covering the truck trailer through a telescopic pipe contained within a drop chute. This loading mechanism minimizes the potential for fly ash to become airborne during the loading process. The loading of trucks also occurs within a partial enclosure. At the completion of loading but prior to leaving the enclosure, the rear of each truck trailer is sprayed with water. The truck is then broom swept or water sprayed at the truck stand to remove any accumulated fly ash. Accumulated CCR is promptly transferred to the concrete storage pad.

This process is covered by the facility's fugitive dust operating program. Under the program, the facility must maintain control measures, including enclosures, covers and dust collection devices. Additionally, the facility is required to conduct weekly inspections of the process to confirm compliance. A record of the inspections is maintained at the facility.

4.8 Ash Transport Roadways

Truck drivers are instructed on the proper procedure for cleaning trucks and a vehicle speed limit is enforced at the facility. Ash material that may not have been adequately removed from the trucks has the potential to become airborne and ultimately be deposited on haul roads. To minimize fugitive dust emissions, these roads will be assessed on a quarterly basis and any observed accumulated ash material will be promptly cleaned up and collected for off-site removal.

5.0 PLAN ASSESSMENTS/AMENDMENTS

To assure that the work practices being implemented adequately control the dust from the identified potential fugitive dust emission sources at the facility, routine assessments and record keeping are performed. These procedures include the following:

5.1 Fugitive CCR Dust Assessments

Pursuant to 845.500(b)(3), assessments of the potential fugitive dust emission sources identified within this Plan will be conducted to assess the effectiveness of this Plan. The assessment will include observation of ash removal from basins, temporary storage and transport activities at the facility to confirm the adequacy of the control measures. The assessments will be conducted on a quarterly basis by an individual designated by the contact identified in Section 2.2 of this Plan. Observations made during each assessment are recorded on a form similar to the one included in Appendix B, however, the station may create their own form.

If the results of the assessment determine that ash-related equipment has malfunctioned or the integrity of the equipment has been compromised, the necessary repairs or replacement will be performed as soon as feasible. If the assessment finds that this Plan does not effectively minimize the CCR from becoming airborne, this Plan will be amended to include additional control measures.

5.2 Plan Amendments

This Fugitive Dust Plan will be reviewed whenever there is a change in conditions that would substantially affect the written Plan currently in place. A record of the reviews and any modifications or amendments made to the Plan currently in place will be kept on a form similar to the one included in Appendix C, however, the station may create their own form. The amended Plan will be reviewed by a Registered Professional Engineer and, if deemed acceptable, will be recertified.

5.3 Citizen Complaints

Any written or verbal complaints received from a citizen involving alleged CCR fugitive dust emission events at the facility will be recorded by an individual designated by the contact identified in Section 2.2 of this Plan. The complaints will be recorded on a form similar to the one included in Appendix D, however, the station may create their own form. Upon receipt of the complaint, an investigation of the alleged source of the fugitive dust emissions will be

performed and the results of that investigation recorded on the form. If the fugitive dust emission event is confirmed, any necessary repairs or changes in operation required to mitigate the fugitive dust emissions will be implemented as soon as practicable. Quarterly reports will be submitted to the IEPA no later than 14 days from the end of the quarter of all complaints received during that quarter, including the information required by 845.500(b)(2)(A).

6.0 CCR FUGITIVE DUST PLAN REPORTING/RECORDKEEPING REQUIREMENTS

This section outlines the Plan reports that must be prepared, submitted, and records that must be maintained to meet the requirements specified in 35 Ill. Adm. Code Section 845.500. These requirements include the following:

- Place the Plan in the facility's operating record and publicly accessible internet site. If the Plan is amended, replace the initial Plan with the amended Plan. Only the most recent amended Plan will be maintained in the facility's operating record and internet site.
- Prepare an annual CCR Fugitive Dust Control Report and submit to the IEPA as part of the annual consolidated report required by 845.550. The annual report will include:
 - A description of the actions taken to control CCR fugitive dust,
 - A record of all citizen complaints, and
 - A summary of any corrective measures taken.
 - Placement of this report in the operating record and publicly accessible internet site.
- Provide notification to the IEPA and, if applicable, the Tribal authority when the Plan and reports are placed in the facility's operating record and publicly accessible internet site.
- Submit quarterly reports to IEPA within 14 days from the end of the quarter of all complaints received in that quarter. The quarterly reports will include:
 - The date of the complaint,
 - The date of the incident,
 - The name and contact information of the complainant, and
 - All actions taken to assess and resolve the complaint.

7.0 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned Registered Professional Engineer is familiar with the requirements of 845.500 and has visited and examined the facility or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this CCR Fugitive Dust Control Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of 845.500, and that this Plan is adequate for the facility. This certification was prepared as required by 845.500(b)(7).

Engineer: Joshua D. Davenport

Signature: _____

Date: 10/19/21

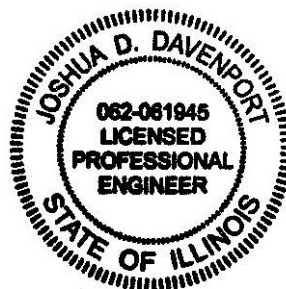
Company: KPRG and Associates, Inc.

Registration State: Wisconsin

Registration Number: 062.061945

License Expiration Date: November 30, 2021

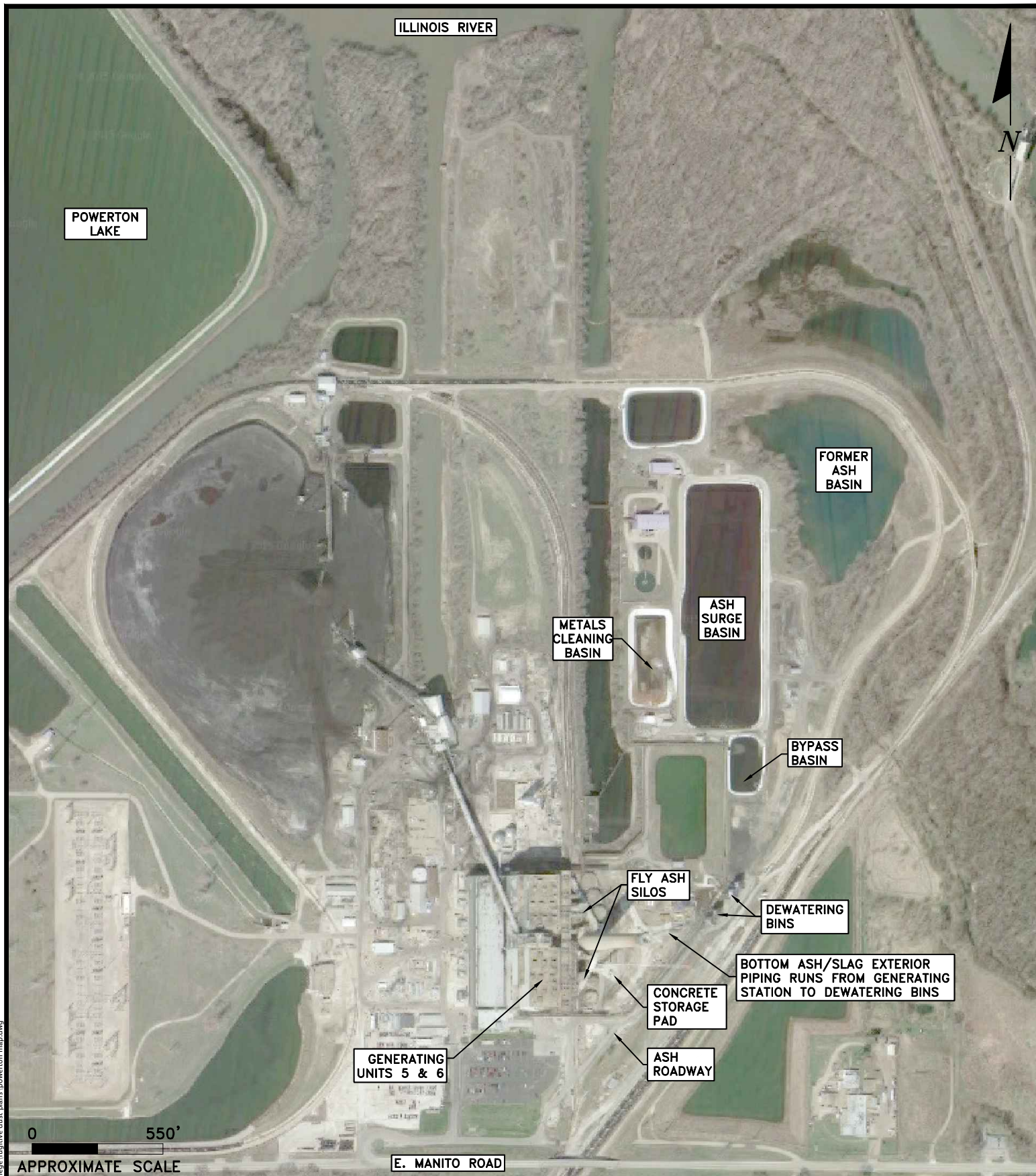
Professional Engineer Stamp:



APPENDIX A

SITE DIAGRAM

POTENTIAL FUGITIVE DUST SOURCES



ENVIRONMENTAL CONSULTATION & REMEDIATION

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 28 Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

SITE DIAGRAM/FUGITIVE DUST SOURCES

POWERTON GENERATING STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: October 15, 2021

KPRG Project No. 15315

APPENDIX A

APPENDIX B

EXAMPLE ASSESSMENT RECORD

APPENDIX B

POWERTON STATION

EXAMPLE ASSESSMENT RECORD

Date	Inspector	Unit Inspected (See Key Below)	Maintenance/Cleanup Required (yes/no)	Response Action Performed (completion date)	Inspector Signature

Unit Key:

1 - Exterior Bottom Ash/Slag Piping

2 - Dewatering Bins

3 - Concrete Storage Pad

4 - Ash Roadways

5 - Ash Surge Basin

6 - Bypass Basin

APPENDIX C

EXAMPLE PLAN REVIEW AND AMENDMENT RECORD

POWERTON STATION

EXAMPLE CCR PLAN REVIEW/AMENDMENT RECORD

[illegible]

APPENDIX D

EXAMPLE CITIZEN COMPLAINT LOG

EXAMPLE CITIZEN COMPLAINT LOG

[illegible]

ATTACHMENT 8-1
WRITTEN RETROFIT PLAN

MWVG

Midwest Generation, LLC

Powerton Generating Station

Metal Cleaning Basin Retrofit Plan

Revision 0

July 19, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



LEGAL NOTICE

This report was prepared by Sargent & Lundy (S&L) expressly for the sole use of Midwest Generation, LLC (Client) in accordance with the contract agreement between S&L and Client. This report was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges: (1) S&L prepared this report subject to the particular scope limitations, budgetary and time constraints, and business objectives of Client; (2) information and data provided by others, including Client, may not have been independently verified by S&L; and (3) the information and data contained in this report are time-sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this report. Any use or reliance upon this report by third parties shall be at their sole risk.

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1.0 PURPOSE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)

Midwest Generation, LLC (MWG) plans to retrofit the Metal Cleaning Basin at the Powerton Generating Station (“Powerton” or “Station”) in Pekin, Illinois with a new composite liner system and a new leachate collection and removal system. The Metal Cleaning Basin is a surface impoundment that the Station primarily uses for temporarily storing gas-side boiler cleaning wash water prior to treatment in the Station’s Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. The basin is currently lined with a 60-mil high-density polyethylene (HDPE) geomembrane liner, has a surface area of approximately 1.8 acres, and has a storage capacity of approximately 21,000 cubic yards.

The Metal Cleaning Basin is regulated by the Illinois Pollution Control Board’s regulations for coal combustion residual (CCR) surface impoundments as codified in Title 35, Part 845 to the Illinois Administrative Code (35 Ill. Adm. Code 845), also referred to herein as the Illinois CCR Rule. Pursuant to 35 Ill. Adm. Code 845.770(c), this document provides MWG’s written retrofit plan for the Metal Cleaning Basin.

2.0 RETROFIT PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(A)

MWG plans to retrofit the Metal Cleaning Basin by executing the following sequential steps:

1. Removing any remaining boiler wash water sediments from the basin and transporting the material to a permitted disposal facility in accordance with current and historic Station maintenance procedures for the Metal Cleaning Basin;
2. Obtaining a construction permit from the Illinois EPA for retrofitting the Metal Cleaning Basin;
3. Removing the gravel warning, sand cushion, and riprap layers over the existing geomembrane liner from the basin and transporting these materials to a permitted disposal facility;
4. Decontaminating the basin’s existing geomembrane liner for re-use as a supplemental liner in the retrofitted basin, including submittal of visual inspection documentation and analytical testing results to demonstrate the existing liner is not contaminated with CCR constituents in accordance with 35 Ill. Adm. Code 845.770(a)(4);
5. Decontaminating the basin’s appurtenant structures (e.g., inlet aprons, weir walls, piping);
6. Placing structural fill within the basin floor to establish the slopes for the new leachate collection and removal system and to support the new composite liner (see Section 2.1);
7. Installing an alternative composite liner system in accordance with 35 Ill. Adm. Code 845.410 (see Section 2.2);
8. Installing a leachate collection and removal system in accordance with 35 Ill. Adm. Code 845.420 (see Section 2.3);

9. Submitting to the Illinois EPA:

- a. A retrofit completion report (see Section 8.0), and
- b. A certification from a qualified professional engineer licensed in the State of Illinois that the Metal Cleaning Basin has been retrofitted in accordance with the activities outlined in this retrofit plan (or subsequent amendment of this retrofit plan) and the requirements stipulated in 35 Ill. Adm. Code Part 845.

2.1 STRUCTURAL FILL

Pursuant to 35 Ill. Adm. Code 845.420(a)(3), the retrofitted Metal Cleaning Basin will have a new leachate collection and removal system that slopes towards a collection pipe at a minimum slope of three percent. Because the existing basin floor is approximately flat, MWG plans to place, compact, and grade structural fill along the basin floor to establish the lines and grades for the new leachate collection and removal system. The structural fill will be placed over the Metal Cleaning Basin's existing HDPE geomembrane liner, which MWG plans to leave in-place as a supplemental liner under the basin's new composite liner. All earthwork activities associated with placing, compacting, and grading structural fill along the basin floor will be done in a manner to prevent tearing, ripping, or otherwise damaging the Metal Cleaning Basin's existing HDPE geomembrane liner.

2.2 COMPOSITE LINER SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(a) & 845.400(c)

MWG plans to retrofit the Metal Cleaning Basin with an alternative composite liner system that meets the requirements of 35 Ill. Adm. Code 845.400(c). The composite liner will consist of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL). Pursuant to 35 Ill. Adm. Code 845.400(c)(2), the GCL component will have a hydraulic conductivity of no more than 1×10^{-9} cm/sec to ensure that the liquid flow rate through the GCL is less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec.

2.3 LEACHATE COLLECTION & REMOVAL SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)

In addition to installing a new composite liner in the basin, MWG plans to install a new leachate collection and removal system (LCRS) in the Metal Cleaning Basin pursuant to 35 Ill. Adm. Code 845.420. This LCRS will be placed over the new composite liner and will be constructed of drainage geocomposite with a transmissivity of at least 6×10^{-4} m²/sec in accordance with 35 Ill. Adm. Code 845.420(a)(4). The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core, and will be sloped towards a perforated collection pipe installed in a trench along the

middle of the basin. As discussed in Section 2.1, the structural fill placed along the basin floor will ensure the drainage geocomposite slopes towards the collection pipe at a slope of at least three percent pursuant to 35 Ill. Adm. Code 845.420(a)(3). This collection pipe will then convey leachate to the existing discharge pipe at the northern end of the retrofitted Metal Cleaning Basin to ultimately be discharged out of the basin. A wye branch in the leachate collection pipe will also be installed and lead to a non-perforated riser pipe in the northeastern quadrant of the basin, where a wheeled, submersible pump will be installed. The Station will use this pump to dewater the Metal Cleaning Basin during periodic cleanings, at the time of closure, and as needed during the post-closure care period. The drainage geocomposite and collection pipe system will ensure leachate flows from all points within the basin to the existing drain outlet, will be constructed in such a way as to prevent clogging of the LCRS during the active life and post-closure care period of the basin, and will be large enough to conduct periodic cleaning. The upper non-woven geotextile component of the drainage geocomposite will also prevent CCR and non-CCR sediments from intruding into, clogging, and impeding the flow of leachate through the HDPE geonet core.

In addition to the upper non-woven geotextile component of the drainage geocomposite, a sand filter layer will be installed above the retrofitted Metal Cleaning Basin's LCRS to prevent CCR and non-CCR sediments from clogging the LCRS. This sand filter layer will have a hydraulic conductivity of at least 1×10^{-5} cm/sec pursuant to 35 Ill. Adm. Code 845.420(a)(2). Meanwhile, the upper non-woven geotextile component of the drainage geocomposite will preclude the intrusion of sand particles from the filter layer into the HDPE geonet core's apertures, which would otherwise impede the flow of leachate through the geonet.

Finally, in accordance with 35 Ill. Adm. Code 845.420(a)(8), a protective warning layer will be installed over the sand filter layer to provide a means of deflecting the force of CCR flowing into the retrofitted Metal Cleaning Basin. Along the floor of the retrofitted Metal Cleaning Basin, this uppermost layer will be comprised of coarse aggregate materials to provide a working surface for operators removing CCR from the basin; it will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's side slopes, the protective warning layer will consist of riprap on a gravel bedding layer to protect the sand filter layer from erosion.

3.0 CCR REMOVAL & DECONTAMINATION PROCEDURES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(B)

After temporarily ceasing all flows into the impoundment, MWG will remove any remaining boiler wash water sediments stored above the granular protective layers covering the Metal Cleaning Basin's existing geomembrane liner in accordance with the Station's usual cleaning and maintenance practices. After the boiler wash water sediments stored in the Metal Cleaning Basin have been removed, the retrofit work

described in Section 2.0 will be performed in accordance with this retrofit plan (or subsequent amendment of this retrofit plan) and the construction permit issued by the Illinois EPA.

After receiving a retrofit construction permit from the Illinois EPA, MWG will first remove the granular protective layers covering the Metal Cleaning Basin's existing geomembrane liner: a 6-inch-thick gravel warning layer and a 12-inch-thick sand cushion layer. MWG will also remove an 18-inch-thick layer of riprap above the basin's existing geomembrane liner between the basin's concrete weir wall and discharge pipe. These materials will be loaded onto trucks and transported to a permitted disposal facility. Because these materials are likely to contain boiler wash water sediments, the trucks transporting the material off-site will carry manifests pursuant to 35 Ill. Adm. Code 845.740(c)(1)(A) and as specified in 35 Ill. Adm. Code 809. In addition, a CCR transportation plan will be prepared in accordance with 35 Ill. Adm. Code 845.740(c)(1)(B) which will include:

- Identification of the transportation method selected;
- The frequency, time of day, and routes of CCR transportation;
- Any measures to minimize noise, traffic, and safety concerns caused by the transportation of the CCR;
- Measures to limit fugitive dust from any transportation of CCR;
- Installation and use of a vehicle washing station;
- A means of covering the CCR for any mode of CCR transportation;
- A requirement that the CCR is transported by a permitted special waste hauler under 35 Ill. Adm. Code 809.201.

On-site fugitive dust control measures will also be implemented as necessary to minimize airborne particulates with boiler wash water sediments, the basin's granular protective layers, and riprap are being removed and handled. Pursuant to 35 Ill. Adm. Code 845.740(c)(2)(A), these dust control measures will include a water spray, commercial dust suppressant, or a combination of these.

Prior to the removal of the granular protective layers covering the Metal Cleaning Basin's existing geomembrane liner, signage will be posted at the Station's entrance warning of the hazards of CCR dust inhalation in accordance with 35 Ill. Adm. Code 845.740(c)(3)(A). Pursuant to 35 Ill. Adm. Code 845.740(c)(3)(B), a written notice will be issued to each of the local governments through which the CCR-impacted material will be transported. This written notice will include an explanation of the hazards of CCR dust inhalation, the aforementioned CCR transportation plan, and a tentative transportation schedule.

After the granular protective layers and riprap in the basin have been removed, MWG will begin decontaminating the Metal Cleaning Basin's existing geomembrane liner to be re-used as a supplemental liner under the new composite liner. The basin's inlet aprons, weir walls, associated piping, *etc.* will also be decontaminated. At a minimum, decontamination procedures will include pressure washing of the

geomembrane liner and pond appurtenances in a systematic manner to remove all boiler wash water sediments. Following decontamination, the existing geomembrane liner will be visually inspected, and an electrical leak location survey will be conducted to ensure the liner is competent. Analytical tests will also be conducted in accordance with the construction permit issued by the Illinois EPA at the time of the retrofit work to demonstrate that the liner is not contaminated with CCR constituents. The results from the visual inspection and analytical tests will be submitted to the Illinois EPA for approval of re-using the existing geomembrane liner as a supplemental liner under the new composite liner in the retrofitted Metal Cleaning Basin.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR TO BE REMOVED

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(C)

For the purposes of this retrofit plan, the maximum amount of CCR that will be removed during the retrofit of the Metal Cleaning Basin is conservatively based on the estimated maximum capacity of the basin: 21,000 cubic yards.

5.0 ESTIMATED LARGEST AREA TO BE RETROFITTED

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(D)

The estimated largest area of the Metal Cleaning Basin to be retrofitted is anticipated to be the basin's full surface area: 1.8 acres.

6.0 RETROFIT SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(E)

MWG expects to complete the retrofit work for the Metal Cleaning Basin in 2025. Table 1 lists the major milestones necessary for retrofitting the Metal Cleaning Basin and the expected duration for completing each milestone.

Table 1 – Planning Level Schedule for Retrofitting the Metal Cleaning Basin

Activity	Estimated Duration
Prepare Retrofit Construction Design Documents	2 Months
Obtain Retrofit Construction Permit from Illinois EPA	18 Months
Hire Contractor to Complete Retrofit Activities in Accordance with Illinois EPA Permit	4 Months
Remove Protective Granular Layers Above Existing Liner	2 Weeks
Decontaminate Existing Liner and Basin Appurtenances (Including Laboratory Testing)	6 Weeks
Obtain Approval from Illinois EPA to Re-Use Existing Liner as Supplemental Liner	6 Weeks
Install Composite Liner System	2 Weeks
Install Leachate Collection and Removal System (Including Filter and Protective Layers)	2 Weeks
Submit Retrofit Completion Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Retrofit Completion Report and Certification from Illinois EPA	6 Weeks
Complete and Certify Retrofit of the Metal Cleaning Basin	--

7.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(3)

This retrofit plan will be amended in accordance with 35 Ill. Adm. Code 845.770(c)(3) if a change in the operation of the Metal Cleaning Basin would substantially affect this retrofit plan or if an unanticipated event necessitates a revision to this retrofit plan. Any and all amendments to this retrofit plan will be certified by a qualified professional engineer licensed in the State of Illinois in accordance with 35 Ill. Adm. Code 845.770(c)(4).

8.0 COMPLETION OF RETROFIT ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(g)

Upon completion of all retrofit activities required by 35 Ill. Adm. Code Part 845 and approved by the Illinois EPA in a construction permit, a retrofit completion report and certification will be submitted to the Illinois EPA. The retrofit completion report will include (1) the engineering and hydrogeology reports containing monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time,

date, and location information of the liner system and leachate collection system; (3) other photographs relied upon for documentation of construction activities; (4) a written summary of the retrofit requirements and completed activities as stated in the construction permit and 35 Ill. Adm. Code 845; and (5) any other information relied upon by the qualified professional engineer for the certification. Pursuant to 35 Ill. Adm. Code 845.770(g)(2), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that the Metal Cleaning Basin has been retrofitted in accordance with this retrofit plan (or subsequent amendment of this retrofit plan) and the requirements of 35 Ill. Adm. Code Part 845. Finally, within 30 days of the Illinois EPA approving the retrofit completion report and certification, a notification of completion of retrofit activities will be prepared in accordance with 35 Ill. Adm. Code 845.770(h).

9.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(4)

I certify that:

- This written retrofit plan for the Metal Cleaning Basin was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.770.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 19, 2023

Seal:



Th. Dehlin
7/19/2023
Exp. 11/30/2023

ATTACHMENT 8-2
PRELIMINARY WRITTEN CLOSURE PLAN



Midwest Generation, LLC

Powerton Generating Station

Preliminary Written Closure Plan for Metal Cleaning Basin

Revision 0

July 19, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)

The Metal Cleaning Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing surface impoundment that the Station uses for temporarily storing gas-side boiler cleaning wash water prior to treatment in the Station's Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. The Metal Cleaning Basin is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 Title 35, Part 845 to the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.720(a), this document provides the preliminary written closure plan for the Metal Cleaning Basin at Powerton. In accordance with the Illinois CCR Rule, this document describes the steps necessary to close the Metal Cleaning Basin at any point during its active life. MWG intends to first retrofit this CCR surface impoundment with a composite liner and a leachate collection and removal system in accordance with 35 Ill. Adm. Code 845.770(a)(1). After Powerton ceases coal-fired power generating operations, the Station will initiate closure of the surface impoundment. This preliminary written closure plan describes the steps necessary to close the Metal Cleaning Basin after it has been retrofitted.

2.0 CLOSURE PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(A) & 845.740(a)

MWG plans to close the retrofitted Metal Cleaning Basin by removing boiler wash water sediments remaining in the basin at the time of closure and decontaminating affected areas pursuant to 35 Ill. Adm. Code 845.740(a). The Metal Cleaning Basin closure will be executed according to the following sequential steps:

1. Obtaining a construction permit from the Illinois EPA for closing the retrofitted basin;
2. Ceasing all inflows to and material placement in the basin;
3. Drawing down free surface water in the basin by draining water north towards the basin's drain outlet and by operating the LCRS;
4. Removing the boiler wash sediments from the retrofitted basin, loading the material onto trucks, and transporting the material to a permitted off-site disposal facility;
5. Removing the retrofitted basin's LCRS, filter layer installed over the LCRS, and any soil and geosynthetic materials installed over the filter layer and transporting the materials to a permitted disposal facility;
6. Removing the retrofitted basin's composite liner system;

7. Removing the original geomembrane liner (which MWG plans to use as a supplemental liner for the retrofitted basin pursuant to 35 Ill. Adm. Code 845.770(a)(4));
8. Inspecting the basin subgrade to verify it is not contaminated with CCR constituents;
9. Removing the retrofitted basin's appurtenant structures (e.g., inlet aprons, weir wall, associated piping);
10. Sampling the groundwater at the basin site to verify the groundwater monitoring concentrations do not exceed the groundwater protection standards established for constituents in accordance with the operating permit issued by the Illinois EPA for the basin; and
11. Certifying (via a qualified professional engineer licensed in the State of Illinois) that the CCR has been removed from the basin and the CCR surface impoundment has been decontaminated in accordance with the closure plan in effect at the time of closure and in accordance with the corresponding construction permit issued by the Illinois EPA.

3.0 CCR REMOVAL & DECONTAMINATION PROCEDURES

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(B) & 845.740(a)

The preliminary closure plan for the retrofitted Metal Cleaning Basin is to follow the sequential steps outlined in Section 2.0.

Upon receipt of the construction permit from the Illinois EPA for closing the retrofitted Metal Cleaning Basin and after permanent cessation of all flows into the impoundment, MWG will first draw down the free surface water remaining in the surface impoundment and dewater the boiler wash water sediments stored therein. Free water remaining in the retrofitted basin will be drawn down by allowing the water to drain through the basin's drain outlet and by using the LCRS pump.

Once the boiler wash water sediments remaining in the impoundment are sufficiently dewatered to handle, construction equipment will then be used to load the sediments onto trucks and transported to a permitted off-site disposal facility. Trucks transporting the sediments off-site will carry manifests pursuant to 35 Ill. Adm. Code 845.740(c)(1)(A) and as specified in 35 Ill. Adm. Code 809. In addition, a CCR transportation plan will be prepared in accordance with 35 Ill. Adm. Code 845.740(c)(1)(B) which will include:

- Identification of the transportation method selected;
- The frequency, time of day, and routes of CCR transportation;
- Any measures to minimize noise, traffic, and safety concerns caused by the transportation of the CCR;
- Measures to limit fugitive dust from any transportation of CCR;
- Installation and use of a vehicle washing station;

- A means of covering the CCR and CCR mixed materials for any mode of CCR transportation;
- A requirement that the CCR is transported by a permitted special waste hauler under 35 Ill. Adm. Code 809.201.

On-site fugitive dust control measures will also be implemented as necessary to minimize airborne particulates while boiler wash water sediments, the basin's granular warning and filter layers, and riprap are being removed and handled. Pursuant to 35 Ill. Adm. Code 845.740(c)(2)(A), these dust control measures will include a water spray, commercial dust suppressant, or a combination of these.

Prior to the removal of boiler wash water sediments from the retrofitted Metal Cleaning Basin, signage will be posted at the Station's entrance warning of the hazards of CCR dust inhalation in accordance with 35 Ill. Adm. Code 845.740(c)(3)(A). Pursuant to 35 Ill. Adm. Code 845.740(c)(3)(B), a written notice will be issued to each of the local governments through which the materials will be transported. This written notice will include an explanation of the hazards of CCR dust inhalation, the aforementioned CCR transportation plan, and a tentative transportation schedule.

The containment systems installed within the retrofitted Metal Cleaning Basin (*i.e.*, LCRS, composite liner, filter layer over the LCRS, *etc.*) will be removed from the impoundment. The original geomembrane liner and appurtenant structures (*i.e.*, inlet aprons, weir wall, piping, *etc.*) will also be removed. Materials removed from the impoundment site will be loaded onto trucks and transported to permitted off-site disposal facilities in accordance with the aforementioned CCR transportation plan developed for the closure work. Finally, the basin subgrade will be visually inspected to verify the area is not contaminated with CCR constituents.

In accordance with 35 Ill. Adm. Code 845.740(e), CCR removal and decontamination will be complete when constituent concentrations throughout the retrofitted Metal Cleaning Basin and areas that may have been affected by releases from the basin have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standards established under 35 Ill. Adm. Code 845.600. After CCR removal and decontamination of the retrofitted Metal Cleaning Basin have been completed, MWG will submit a report documenting the completion of CCR removal and decontamination of the unit, which will include a certification from a qualified professional engineer licensed in the State of Illinois that CCR removal and decontamination was completed in accordance with 35 Ill. Adm. Code 845.740.

In accordance with 35 Ill. Adm. Code 845.740(b), MWG will continue groundwater monitoring in accordance with Subpart F of the Illinois CCR Rule ("Groundwater Monitoring and Corrective Action") for three years after the completion of CCR removal and decontamination. After groundwater monitoring has been completed, MWG will submit a report documenting the completion of groundwater monitoring, which will include a certification from a qualified professional engineer licensed in the State of Illinois that groundwater monitoring was completed in accordance with 35 Ill. Adm. Code 845.740.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(D)

Detailed records of the maximum inventory of CCR ever stored in the Metal Cleaning Basin are not available. For the purposes of this preliminary written closure plan, the maximum inventory of CCR ever on-site over the active life of the Metal Cleaning Basin is conservatively based on the estimated maximum capacity of the basin prior to retrofit: 21,000 cubic yards.

5.0 CLOSURE SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(F)

Closure activities for the retrofitted Metal Cleaning Basin are expected to be completed by 2030. Table 1 lists the major milestones necessary for closing the basin and the expected duration for completing each milestone.

Table 1 – Planning Level Schedule for Closing the Retrofitted Metal Cleaning Basin

Activity	Estimated Duration
Prepare Closure Construction Design Documents	6 Months
Cease All Flows into Retrofitted Metal Cleaning Basin	--
Obtain Closure Construction Permit from Illinois EPA	18 Months
Hire Contractor to Complete Closure Activities in Accordance with Illinois EPA Permit	4 Months
Draw Down Water & Dewater Impounded Boiler Wash Water Sediments	1 Month
Remove Boiler Wash Water Sediments	1 Month
Remove Basin Containment Systems and Appurtenant Structures	2 Months
Submit Completion of CCR Removal and Decontamination Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Completion of CCR Removal and Decontamination Report from Illinois EPA	3 Months
Complete and Certify Closure of the Retrofitted Metal Cleaning Basin	--

6.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(3)

This closure plan will be amended in accordance with 35 Ill. Adm. Code 845.720(a)(3) if a change in the operation of the Metal Cleaning Basin would substantially affect this closure plan or if an unanticipated event necessitates a revision to this closure plan. Any and all amendments to this closure plan will be certified by a qualified professional engineer registered in the State of Illinois in accordance with 35 Ill. Adm. Code 845.720(a)(4).

7.0 COMPLETION OF CLOSURE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.760

Upon completion of all CCR removal and decontamination activities required by 35 Ill. Adm. Code Part 845 and approved by the Illinois EPA in a construction permit, a closure report and a closure certification for the retrofitted Metal Cleaning Basin will be submitted to the Illinois EPA in accordance with 35 Ill. Adm. Code 845.760(e). The closure report will include (1) the engineering and hydrogeology reports containing any monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time, date, and location information relied upon for documentation of construction activities; (3) a written summary of the closure requirements and completed activities as stated in the closure plan in effect and 35 Ill. Adm. Code Part 845; and (4) any other information relied upon by the qualified professional engineer for the certification. Pursuant to 35 Ill. Adm. Code 845.760(e)(2), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that the retrofitted Metal Cleaning Basin has been closed in accordance with the closure plan in effect at the time of the closure work and the requirements of 35 Ill. Adm. Code Part 845. Finally, within 30 days of the Illinois EPA approving the closure report and closure certification, a notification of completion of closure will be prepared in accordance with 35 Ill. Adm. Code 845.760(f).

8.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(4)

I certify that:

- This preliminary written closure plan for the Metal Cleaning Basin was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code Part 845.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 19, 2023

Seal:



Th. Dehlin
7/19/2023
Exp. 11/30/2023

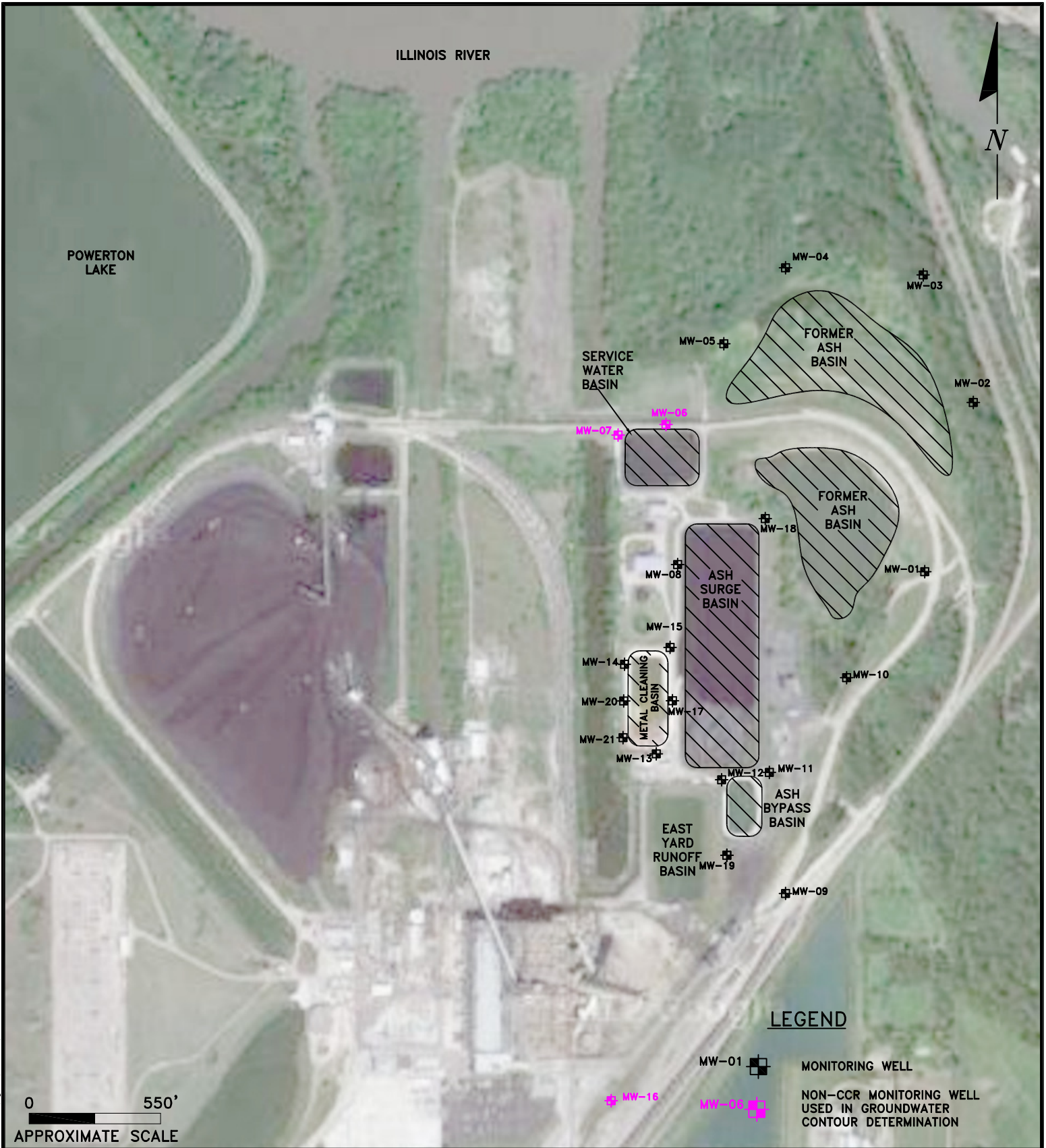
9.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed July 18, 2021.

ATTACHMENT 9-0

GROUNDWATER MONITORING FIGURES & TABLES

FIGURE	TITLE
FIGURE 9-1	MONITORING WELL MAP
FIGURE 9-2	METAL CLEANING BASIN CROSS SECTION A-A'
FIGURE 9-3	METAL CLEANING BASIN CROSS SECTION B-B'
FIGURE 9-4	METAL CLEANING BASIN CROSS SECTION C-C'
FIGURE 9-5	MCB WELLS HYDROGRAPH
FIGURE 9-6	GROUNDWATER MANAGEMENT ZONE & ENVIRONMENTAL LAND USE CLASSIFICATION FOR CCR SURFACE IMPOUNDMENTS
FIGURE 9-7	2500' RADIUS POTABLE WELL MAP



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

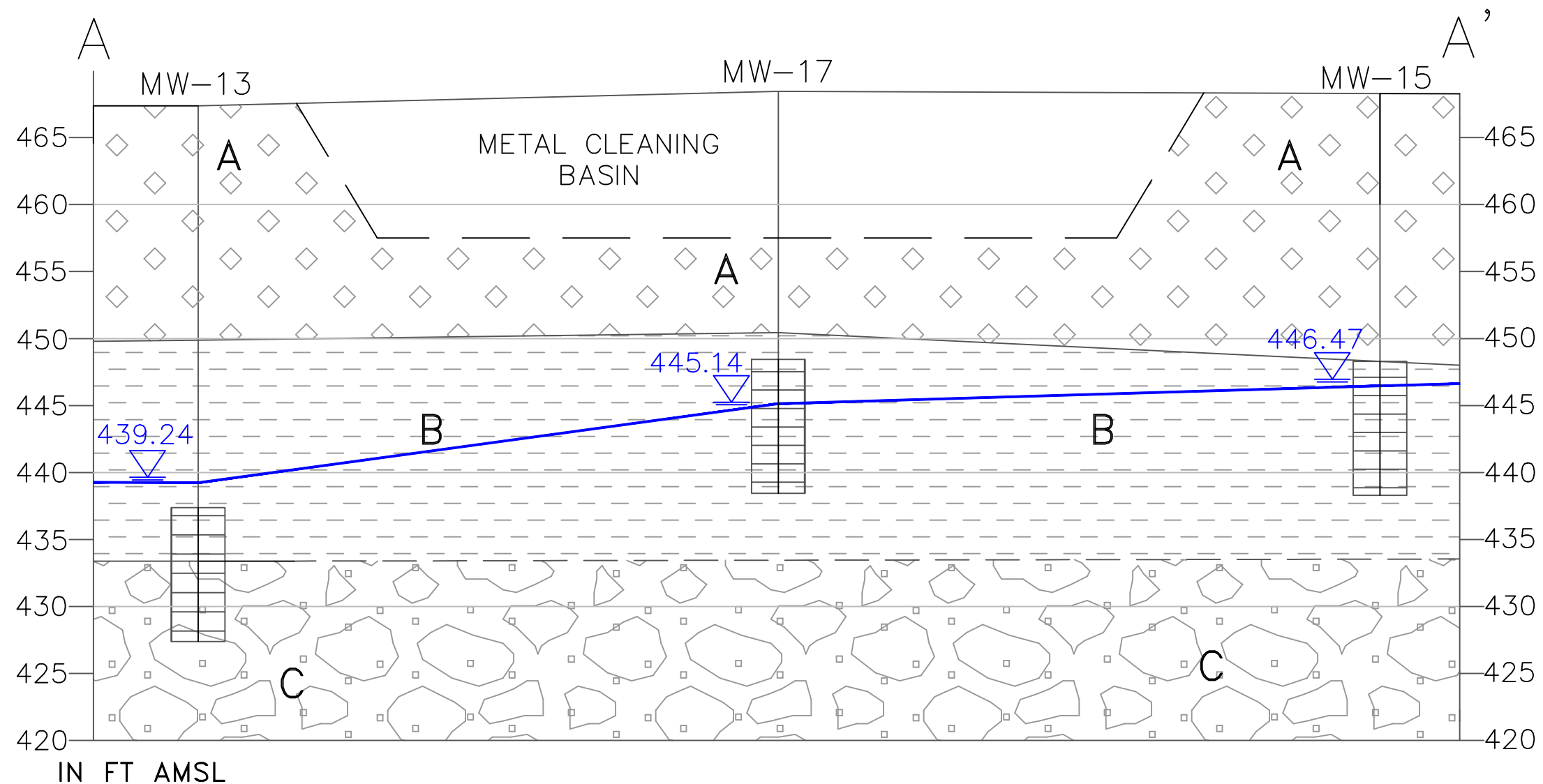
MONITORING WELL MAP

**POWERTON STATION
PEKIN, ILLINOIS**

Scale: 1" = 550' Date: August 31, 2021

KPRG Project No. 19520.1

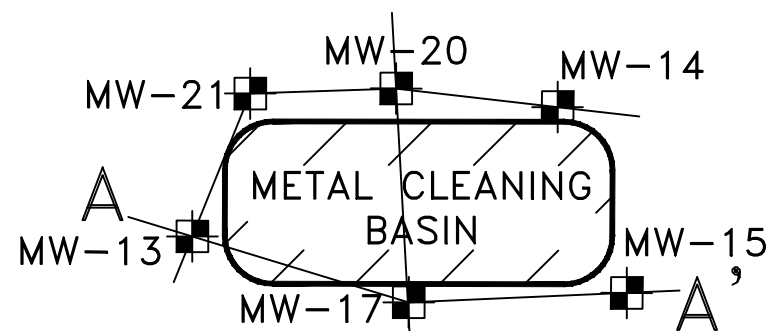
FIGURE 9-1



B

Micrograph C shows a field of cells. A large, central cell is labeled 'C'. It has a large, irregular nucleus and a prominent nucleolus. The cell is surrounded by several smaller cells, some of which are also labeled with 'C'.

— — — — POND OUTLINE

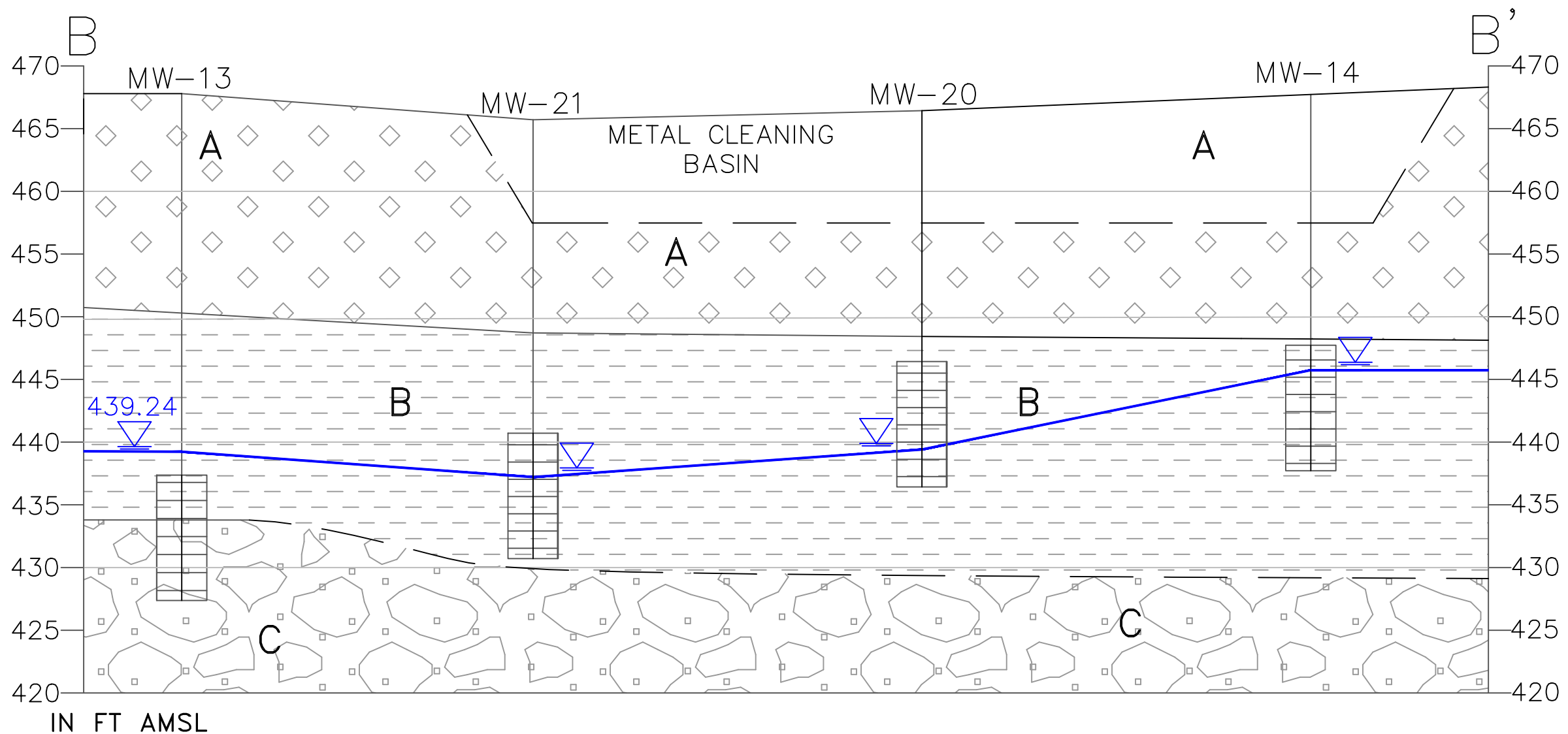


0 200'

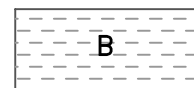
APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION

METAL CLEANING BASIN CROSS SECTION A-A'



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).



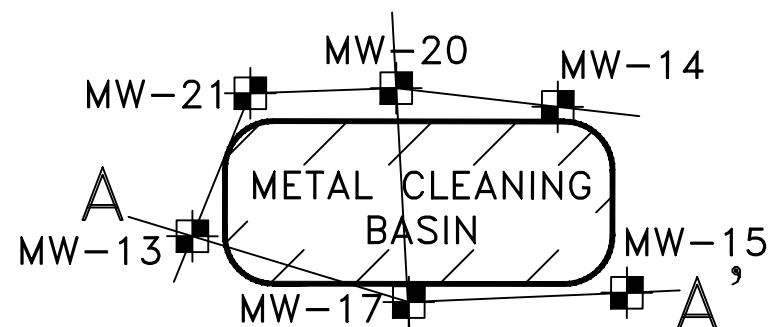
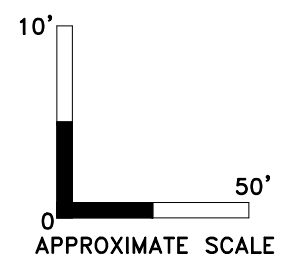
C SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



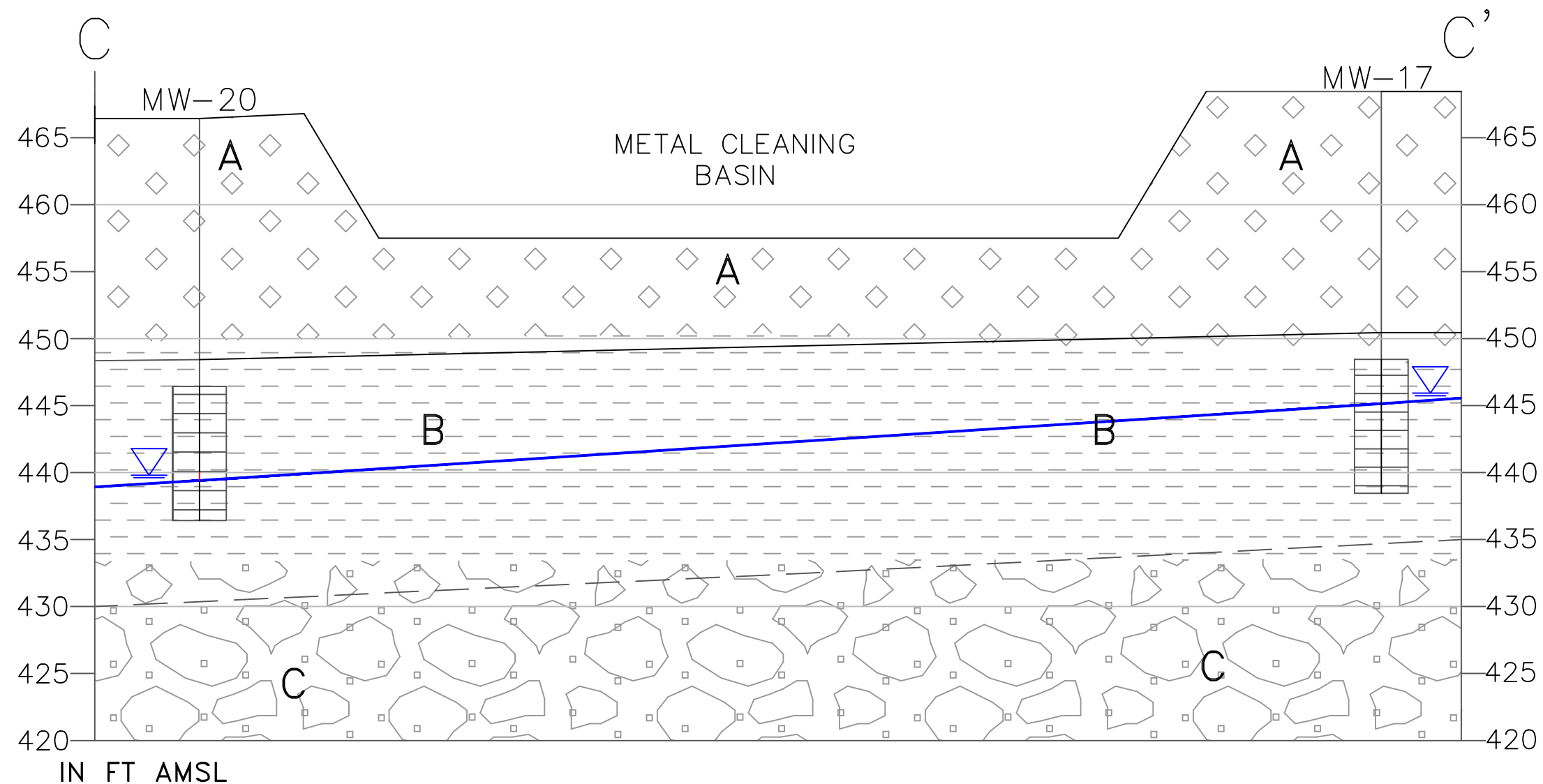
WATER LEVEL (12/21)



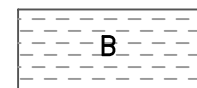
POND OUTLINE



ENVIRONMENTAL CONSULTATION & REMEDIATION		METAL CLEANING BASIN CROSS SECTION B-B'	
K P R G		POWERTON STATION PEKIN, ILLINOIS	
KPRG and Associates, inc.		SEE SCALE	Date: March 14, 2022
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478		KPRG Project No. 19520.1	FIGURE 9-3
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593			



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).



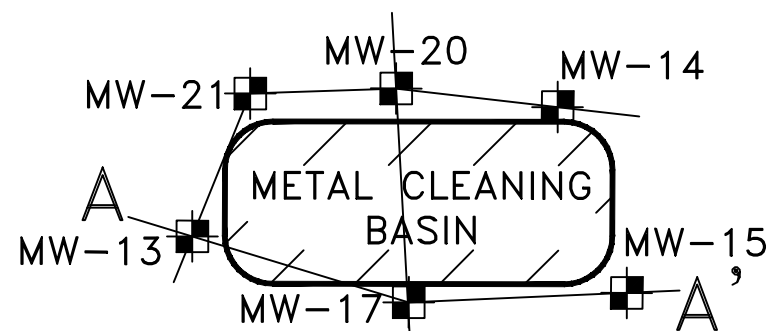
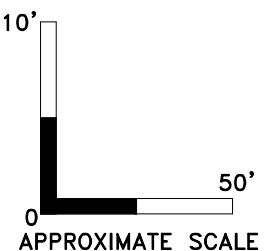
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



WATER LEVEL (5/21)



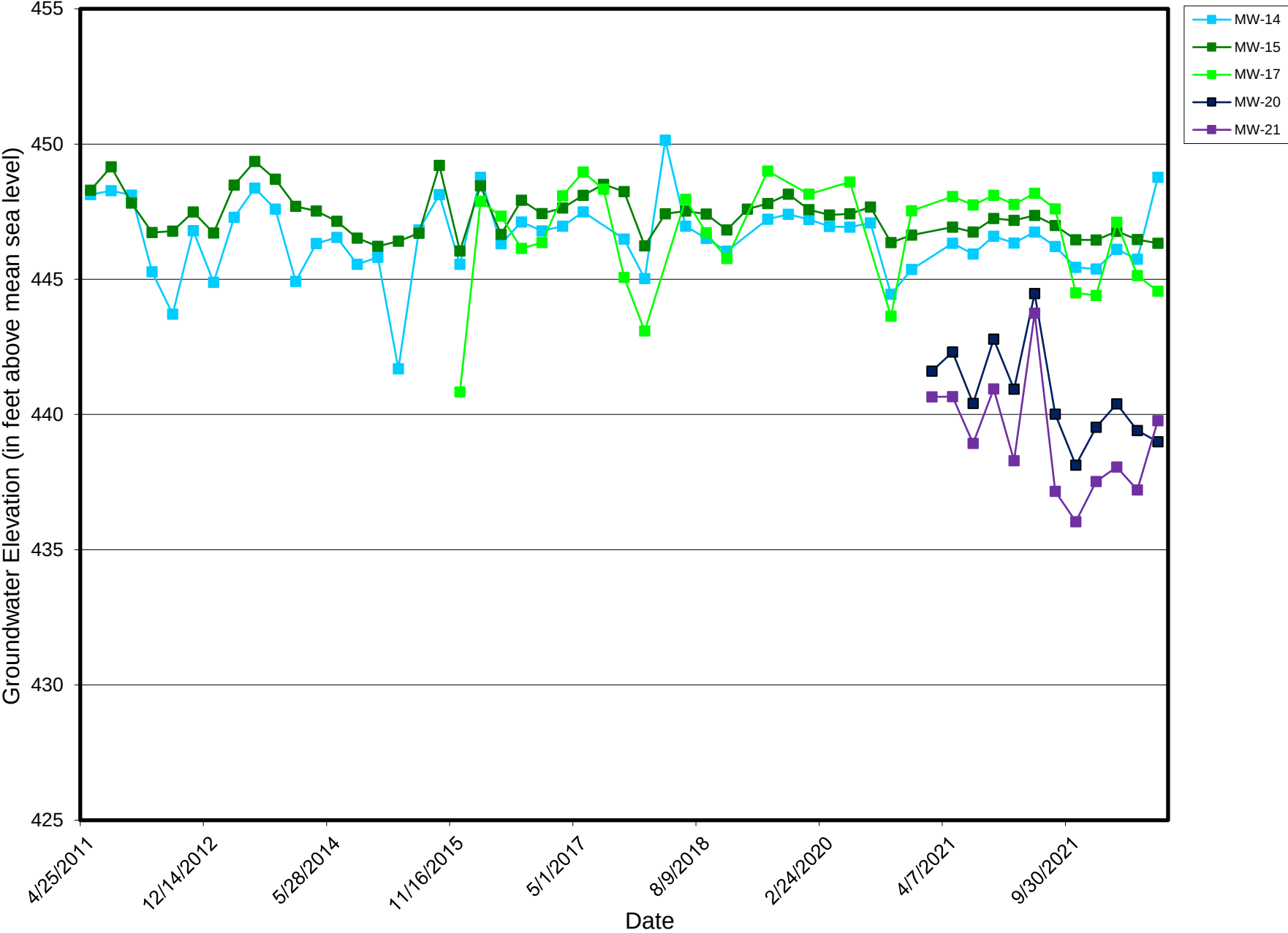
POND OUTLINE

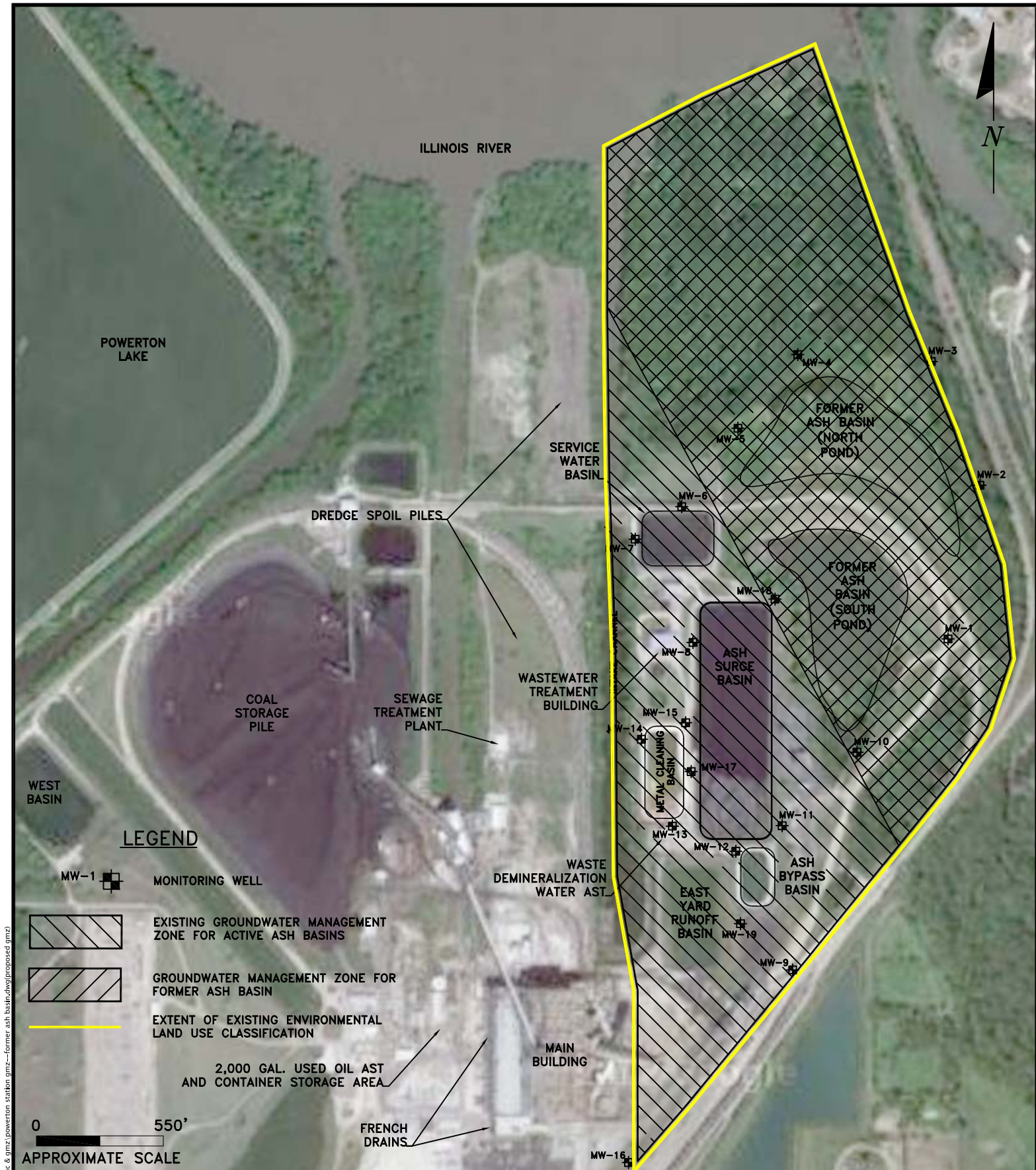


ENVIRONMENTAL CONSULTATION & REMEDIATION		METAL CLEANING BASIN CROSS SECTION C-C'	
K P R G KPRG and Associates, inc.		POWERTON STATION PEKIN, ILLINOIS	
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478		SEE SCALE	Date: March 14, 2022
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593		KPRG Project No. 19520.1	FIGURE 9-4

Figure 9-5. Midwest Generation Powerton Station (MCB), Pekin, IL

Groundwater Elevation vs Time





T:\projects\midwest generation\ash pond issues\aluc & gmz\powerton station gmz--former ash basin.dwg[proposed gmz]

ENVIRONMENTAL CONSULTATION & REMEDIATION		GROUNDWATER MANAGEMENT ZONE & ENVIRONMENTAL LAND USE CLASSIFICATION FOR CCR SURFACE IMPOUNDMENTS	
K P R G KPRG and Associates, inc.		POWERTON STATION PEKIN, ILLINOIS	
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478		Scale: 1" = 550'	Date: March 10, 2022
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593		KPRG Project No. 19520.1 Figure 9-6	



LEGEND

- WATER WELL
- 21797 SHORT API WELL ID
- 67 TOTAL WELL DEPTH
- WATER WELLS TAKEN OUT OF SERVICE/ABANDONED

ENVIRONMENTAL CONSULTATION & REMEDIATION



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: March 10, 2022
KPRG Project No. 19520.1	FIGURE 9-7

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

ATTACHMENT 9-0

GROUNDWATER MONITORING FIGURES & TABLES

TABLE	TITLE
TABLE 9-1	SUMMARY OF LOCAL PRECIPITATION DATA
TABLE 9-2	GROUNDWATER ELEVATION SUMMARY MCB CCR
TABLE 9-3	GROUNDWATER FLOW DIRECTION & ESTIMATED SEEPAGE RATE POWERTON MCB
TABLE 9-4	MCB CCR GROUNDWATER DATA 4Q2021
TABLE 9-5	TURBIDITY MEASUREMENTS
TABLE 9-6	SUMMARY OF SAMPLE BOTTLES, PRESERVATION HOLDING TIME, AND ANALYTICAL METHODS
TABLE 9-7	PROPOSED GROUNDWATER PROTECTION STANDARDS

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. Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL. Metal Cleaning Basin.

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-14	2/22/2021	470.79	25.43	445.36
	4/7/2021	470.79	24.46	446.33
	5/10/2021	470.79	24.86	445.93
	6/2/2021	470.79	24.20	446.59
	6/28/2021	470.79	24.45	446.34
	7/19/2021	470.79	24.04	446.75
	8/23/2021	470.79	24.58	446.21
	9/30/2021	470.79	25.35	445.44
	10/25/2021	470.79	25.41	445.38
	11/29/2021	470.79	24.68	446.11
	12/30/2021	470.79	25.05	445.74
MW-15	11/16/2015	471.37	25.33	446.04
	2/22/2016	471.37	22.91	448.46
	5/16/2016	471.37	24.71	446.66
	8/15/2016	471.37	23.45	447.92
	11/14/2016	471.37	23.94	447.43
	2/13/2017	471.37	23.73	447.64
	5/1/2017	471.37	23.27	448.10
	6/20/2017	471.37	22.86	448.51
	8/29/2017	471.37	23.13	448.24
	11/10/2017	471.37	25.13	446.24
	5/17/2018	471.37	23.85	447.52
	8/9/2018	471.37	23.96	447.41
	10/31/2018	471.37	24.55	446.82
	4/29/2019	471.37	23.57	447.80
	11/11/2019	471.37	23.79	447.58
	4/27/2020	471.37	23.95	447.42
	12/7/2020	471.37	25.01	446.36
	4/7/2021	471.37	24.44	446.93
	5/10/2021	471.37	24.62	446.75
	6/2/2021	471.37	24.12	447.25
	6/28/2021	471.37	24.19	447.18
	7/19/2021	471.37	24.01	447.36
	8/23/2021	471.37	24.38	446.99
	9/30/2021	471.37	24.91	446.46
	10/25/2021	471.37	24.92	446.45
	11/29/2021	471.37	24.60	446.77
	12/30/2021	471.37	24.90	446.47
MW-17	11/16/2015	467.75	26.92	440.83
	2/22/2016	467.75	19.86	447.89
	5/16/2016	467.75	20.42	447.33
	8/15/2016	467.75	21.61	446.14
	11/14/2016	467.75	21.39	446.36
	2/13/2017	467.75	19.66	448.09
	5/1/2017	467.75	18.78	448.97
	6/20/2017	467.75	19.42	448.33
	8/29/2017	467.75	22.68	445.07
	11/6/2017	467.75	24.66	443.09
	5/14/2018	467.75	19.79	447.96
	8/6/2018	467.75	21.03	446.72
	10/29/2018	467.75	21.98	445.77
	4/29/2019	467.75	18.75	449.00
	11/11/2019	467.75	19.60	448.15
	4/27/2020	467.75	19.15	448.60
	12/7/2020	467.75	24.12	443.63
	2/22/2021	467.75	20.22	447.53
	4/7/2021	467.75	19.69	448.06
	5/10/2021	467.75	20.00	447.75
	6/2/2021	467.75	19.65	448.10
	6/28/2021	467.75	19.98	447.77
	7/19/2021	467.75	19.57	448.18
	8/23/2021	467.75	20.15	447.60
	9/30/2021	467.75	23.25	444.50
	10/28/2021	467.75	23.35	444.40
	11/29/2021	467.75	20.64	447.11
	12/30/2021	467.75	22.61	445.14
MW-20	3/12/2021	468.95	27.35	441.60
	4/7/2021	468.95	26.64	442.31
	5/10/2021	468.95	28.54	440.41
	6/2/2021	468.95	26.16	442.79
	6/28/2021	468.95	28.01	440.94
	7/19/2021	468.95	24.48	444.47
	8/23/2021	468.95	28.94	440.01
	9/30/2021	468.95	30.82	438.13
	10/25/2021	468.95	29.42	439.53
	11/29/2021	468.95	28.56	440.39
	12/30/2021	468.95	29.54	439.41
MW-21	3/12/2021	468.17	27.52	440.65
	4/7/2021	468.17	27.51	440.66
	5/10/2021	468.17	29.24	438.93
	6/2/2021	468.17	27.22	440.95
	6/28/2021	468.17	29.78	438.39
	7/19/2021	468.17	24.42	443.75
	8/23/2021	468.17	31.01	437.16
	9/30/2021	468.17	32.13	436.04
	10/25/2021	468.17	30.65	437.52
	11/29/2021	468.17	30.11	438.06
	12/30/2021	468.17	30.96	437.21

MSL - Mean Sea Level
TOC - Top of Casing

Table 9-3. Groundwater Flow Direction and Estimated Seepage Velocity/Flow Rate - Powerton Generation Station. Metal Cleaning Basin.

DATE	Screened Unit	Groundwater Flow Direction	Kavg (ft/sec)*	Average Hydraulic Gradient (ft/ft)	Porosity (unitless)**	Estimated Seepage Velocity (ft/day)
5/2021	Silt/clay	Westerly	3.280E-07	0.0276	0.4	0.0020
6/2021	Silt/clay	Westerly	3.280E-07	0.0288	0.4	0.0020
7/2021	Silt/clay	Westerly	3.280E-07	0.0157	0.4	0.0011
8/2021	Silt/clay	Westerly	3.280E-07	0.0350	0.4	0.0025
9/2021	Silt/clay	Westerly	3.280E-07	0.0285	0.4	0.0020
10/2021	Silt/clay	Westerly	3.280E-07	0.0234	0.4	0.0017
11/2021	Silt/clay	Westerly	3.280E-07	0.0230	0.4	0.0016
12/2021	Silt/clay	Westerly	3.280E-07	0.0237	0.4	0.0017

* Kavg - K values from re-evaluation of slug test data as part of groundwater modeling in support of Application for Construction Permit per Illinois State CCR Rule.

Average hydraulic conductivity for silt/clay unit (feet/second) from Groundwater, Freeze and Cherry, 1979.

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

Table 9-4. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Metal Cleaning 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-15 (CL) up-gradient	11/18/2015	1.5	270	H 210	H 0.53	6.55	H 1400	2400	< 0.003	0.03	0.096	^ < 0.001	0.00061	< 0.005	< 0.001	< 0.0005	0.042	H < 0.0002	0.023	< 0.599	0.0065	< 0.002
	2/25/2016	2.0	240	110	0.61	6.84	640	1700	< 0.003	0.025	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.041	< 0.0002	0.035	0.870	0.045	< 0.002
	5/19/2016	2.7	320	240	0.53	6.83	1200	2800	< 0.003	0.04	0.097	< 0.001	0.00098	< 0.005	< 0.001	< 0.0005	0.044	< 0.0002	0.041	< 0.420	0.0067	< 0.002
	8/18/2016	1.5	200	F1 170	0.54	6.96	660	1900	< 0.003	0.13	0.11	< 0.001	0.0041	< 0.005	< 0.001	< 0.0005	0.028	< 0.0002	0.027	< 0.672	0.0061	< 0.002
	11/17/2016	1.3	120	180	0.47	6.91	560	1900	< 0.003	0.0033	0.031	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.016	< 0.0002	0.018	< 0.570	0.0078	< 0.002
	2/17/2017	1.9	200	190	0.43	7.24	670	1700	< 0.003	0.02	0.056	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.025	< 0.0002	0.027	< 0.392	0.0032	< 0.002
	5/4/2017	1.5	180	190	0.57	7.35	670	1700	< 0.003	0.011	0.049	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.023	< 0.0002	0.023	< 0.456	0.0034	< 0.002
	6/21/2017	1.6	180	200	0.56	7.30	530	1600	< 0.003	0.0093	0.054	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.027	< 0.0002	0.03	< 0.347	0.019	< 0.002
	8/29/2017	2.2	190	200	0.53	6.87	540	1800	< 0.003	0.0018	0.044	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.023	< 0.0002	0.032	0.377	0.0092	< 0.002
	11/10/2017	1.6	170	180	0.63	7.09	530	1500	< 0.003	0.0063	0.046	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.025	< 0.0002	0.02	< 0.313	0.016	< 0.002
	5/17/2018	2.3	200	160	0.5	6.75	680	1800	< 0.003	0.0081	0.05	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.029	< 0.0002	0.03	0.397	0.077	< 0.002
	8/9/2018	2.3	200	200	0.48	7.06	520	1700	< 0.003	0.0083	0.048	<^ 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.026	< 0.0002	0.033	0.566	0.06	< 0.002
	5/2/2019	1.5	180	200	0.52	6.89	420	1500	< 0.003	0.0045	0.052	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.027	< 0.0002	0.023	< 0.424	< 0.0025	< 0.002
	11/14/2019	1.8	170	170	0.5	7.24	260	1300	< 0.003	0.0044	0.053	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.029	< 0.0002	0.025	< 0.475	< 0.0025	< 0.002
	4/29/2020	1.2	160	200	0.58	6.90	370	1300	NA	0.0036	0.06	NA	< 0.0005	NA	< 0.0010	< 0.0005	0.027	< 0.0002	0.023	0.578	< 0.0025	< 0.002
	12/8/2020	1.5	170	200	0.55	7.04	540	1400	NA	0.02	0.10	NA	0.00059	NA	0.0012	< 0.0005	0.035	< 0.0002	0.02	0.626	0.012	< 0.002
	5/12/2021	1.3	180	180	0.54	6.97	520	1500	< 0.003	0.0048	0.065	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.026	< 0.0002	0.014	< 0.648	0.0071	< 0.002
	7/20/2021	1.5	190	180	0.49	6.80	440	1500	< 0.003	0.0027	0.057	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.028	< 0.0002	0.02	< 0.398	< 0.0025	< 0.002
	8/23/2021	1.6	200	180	0.52	6.76	440	1500	< 0.003	0.0019	0.052	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	0.026	< 0.0002	0.024	< 0.794	0.012	< 0.002
	10/1/2021	1.2	180	180	0.53	6.97	430	1400	< 0.003	0.0087	0.065	< 0.001	< 0.0005	< 0.0050	< 0.0010	< 0.0005	^1+ 0.028	< 0.0002	0.018	< 0.511	0.009	< 0.002
	11/29/2021	1.9	230	240	0.5	6.71	^ 450	1700	< 0.003	0.0031	0.074	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.024	< 0.0002	0.016	< 0.353	0.055	< 0.002
MW-17 (CL) up-gradient	11/19/2015	1.6	210	H 230	H 0.43	7.11	H 850	1800	< 0.003	0.0028	0.14	^ < 0.001	< 0.0005	< 0.005	0.0012	0.0012	0.019	H < 0.0002	0.035	< 0.790	< 0.0025	< 0.002
	2/22/2016	1.8	290	280	0.55	7.19	960	2100	< 0.003	0.021	0.051	< 0.001	< 0.0005	< 0.005	0.0012	< 0.0005	0.038	< 0.0002	0.093	1.07	< 0.0025	< 0.002
	5/18/2016	1.4	200	230	0.64	7.02	700	1800	< 0.003	0.32	0.12	< 0.001	0.0011	< 0.005	0.0015	< 0.0005	0.026	< 0.0002	0.12	8.27	< 0.0025	0.0028
	8/15/2016	1.1	220	220	0.60	7.08	860	2100	< 0.003	0.34	0.12	< 0.001	0.001	< 0.005	0.0016	< 0.0005	0.022	< 0.0002	0.1	0.606	< 0.0025	0.0031
	11/14/2016	1.5	200	210	0.56	7.26	560	2000	< 0.003	0.19	0.073	< 0.001	0.00051	< 0.005	0.0012	< 0.0005	0.022	< 0.0002	0.042	3.76	< 0.0025	0.0021
	2/13/2017	1.6	190	230	0.56	6.84	770	1600	< 0.003	0.35	0.16	< 0.001	0.00093	< 0.005	0.0014	0.00079	0.019	< 0.0002	0.088	2.08	< 0.0025	0.0025
	5/4/2017	1.2	170	210	0.61	7.29	720	1500	< 0.003	0.24	0.39	0.0013	0.0023	< 0.005	0.0023	0.00066	0.016	< 0.0002	0.036	1.91	< 0.0025	0.0065
	6/22/2017	0.95	150	230	0.72	7.38	580	1600	< 0.003	0.41	0.13	< 0.001	0.0007	< 0.005	0.0012	0.0011	0.022	< 0.0002	0.11	1.21	< 0.0025	0.0022
	8/29/2017	1.4	190	230	0.64	7.19	640	1900	< 0.003	0.24	0.092	< 0.001	< 0.0005	< 0.005	< 0.001	0.00058	0.021	< 0.0002	0.13	3.32	< 0.0025	0.0025
	11/6/2017	1.7	190	240	0.62	7.27	840	1800	< 0.003	0.17	0.38	< 0.001	0.0022	< 0.005	0.0015	< 0.0005	< 0.01	< 0.0002	0.019	2.54	< 0.0025	0.0075
	5/14/2018	1.6	170	220	0.6	7.79	800	1700	< 0.003	0.42	0.17	< 0.001	0.002	< 0.005	0.0029	0.0021	0.015	< 0.0002	0.13	2.03	< 0.0025	0.0068
	8/6/2018	1.3	170	230	0.6	7.12	620	1600	< 0.003	0.087	0.055	<^ 0.001	0.00094	< 0.005	0.0015	< 0.0005	0.019	< 0.0002	0.084	1.34	< 0.0025	0.0023
	4/29/2019	0.98	150	190	0.66	7.25	660	1500	< 0.003	0.042	0.04	< 0.001	0.00052	< 0.005	< 0.001	0.00069	0.015	< 0.0002	0.06	0.517	< 0.0025	< 0.002
	11/13/2019	1.9	230	600	0.55	7.16	730	2300	<													

Table 9-5. Groundwater Turbidity - Midwest Generation, LLC, Powerton Station, Pekin, IL. Metal Cleaning Basin.

Well	Date	Turbidity (NTU)
MW-15	2/24/2021	64.90
	4/9/2021	16.80
	5/12/2021	16.45
	6/3/2021	7.85
	6/29/2021	6.58
	7/20/2021	5.82
	8/23/2021	4.28
	10/1/2021	13.13
	11/29/2021	12.35
MW-17	2/24/2021	42.00
	4/8/2021	17.10
	5/12/2021	10.90
	6/3/2021	38.15
	6/28/2021	29.15
	7/20/2021	16.38
	8/23/2021	26.51
	10/1/2021	21.26
	11/30/2021	8.86
MW-14	2/24/2021	13.90
	4/8/2021	5.39
	5/12/2021	1.22
	6/3/2021	2.63
	6/28/2021	3.74
	7/20/2021	4.34
	8/23/2021	4.26
	10/1/2021	10.27
	11/29/2021	12.29
MW-20	3/12/2021	343.30
	4/8/2021	14.45
	5/12/2021	3.89
	6/3/2021	6.01
	6/28/2021	8.28
	7/20/2021	9.16
	8/23/2021	27.31
	10/1/2021	8.27
	11/29/2021	8.35
MW-21	3/12/2021	49.20
	4/8/2021	5.88
	5/12/2021	26.09
	6/3/2021	17.61
	6/28/2021	6.33
	7/20/2021	44.93
	8/23/2021	19.43
	10/8/2021	94.82
	11/29/2021	20.2

Table 9-6. Summary of Sample Bottles, Preservation Holding Time, and Analytical Methods. Midwest Generation, LLC, Powertton Generating Station MCB, 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

HNO₃ - Nitric Acid

NS- No Standard

Table 9-7. Proposed Site-Specific Groundwater Protection Standards - Powerton Metal Cleaning Basin (MCB)

Upgradient Well(s)	Parameter	Section 845.600 Standards	Interwell Background Prediction Limit	Proposed GWPS
MW-15/MW-17 All Data Pooled	Antimony	0.006	0.003	0.006
MW-17 Last 8 Rounds	Arsenic	0.01	0.024	0.024
MW-15 All Data Pooled	Barium	2	0.116	2
MW-15/MW-17 All Data Pooled	Beryllium	0.004	0.0013	0.004
MW-15 All Data Pooled	Boron	2.0	2.70	2.7
MW-15 All Data Pooled	Cadmium	0.005	0.0041	0.005
MW-15 All Data Pooled	Chloride	200	255.1	255.1
MW-15/MW-17 All Data Pooled	Chromium	0.1	0.005	0.1
MW-15 All Data Pooled	Cobalt	0.006	0.0012	0.006
MW-15 All Data Pooled	Combined Radium 226 + 228 (pCi/L)	5.0	0.87	5.0
MW-15 All Data Pooled	Fluoride	4.0	0.642	4.0
MW-15 All Data Pooled	Lead	0.0075	0.0005	0.0075
MW-15 Last 8 Rounds	Lithium	0.04	0.039	0.040
MW-15/MW-17 All Data Pooled	Mercury	0.002	0.0002	0.002
MW-17 Last 8 Rounds	Molybdenum	0.10	0.084	0.1
MW-15 All Data Pooled	pH (standard units)	6.5-9.0	6.43-7.50	6.43 - 9.0
MW-15 All Data Pooled	Selenium	0.05	0.077	0.077
MW-15 Last 8 Rounds	Sulfate	400	733.9	733.9
MW-15 All Data Pooled	Thallium	0.002	0.002	0.002
MW-17 Last 8 Rounds	Total Dissolved Solids	1200	1477	1477
MW-17 Last 8 Rounds	Calcium	NE	200.6	200.6
MW-17 Last 8 Rounds	Turbidity	NE	55.15	55.15

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)

ATTACHMENT 9-1
LOCAL WELL STRATIGRAPHY INFORMATION

ATTACHMENT 9-1 - Local Stratigraphy Data General Pekin, IL Area

ID	Well_Count	Well_ID	From	To	Original Logged Description	Grouped As
1	1	121792196100	0	2	top soil	topsoil
2		121792196100	2	27	fine sand	sand
3		121792196100	27	95	medium to coarse gravel	coarse sand and/or gravel
4		121792196100	95	95	fine sand at	sand
5	2	121790013100	0	28	sand and gravel, dry	coarse sand and/or gravel
6		121790013100	28	60	sand and gravel, water	coarse sand and/or gravel
7	3	121790013000	0	2	topsoil	topsoil
8		121790013000	2	35	coarse sand and gravel	coarse sand and/or gravel
9		121790013000	35	56	coarse sand, test 1m., 36 sec.	coarse sand and/or gravel
10		121790013000	56	70	medium sand, test 3m., 20 sec.	coarse sand and/or gravel
11		121790013000	70	70	shale at	shale
12	4	121790012900	0	4	topsoil	topsoil
13		121790012900	4	21	dry sand and gravel	coarse sand and/or gravel
14		121790012900	21	44	coarse sand and gravel 1m., 40 s.	coarse sand and/or gravel
15		121790012900	44	66	med coarse sand and gravel, 2m., 10s.	coarse sand and/or gravel
16		121790012900	66	74	medium sand and gravel, 2m. 20s.	coarse sand and/or gravel
17		121790012900	74	74	clay, white at	clay and silt
18	5	121790012800	0	2	cinders and brick	FILL
19		121790012800	2	14	sand, medium	coarse sand and/or gravel
20		121790012800	14	18	sand, coarse	coarse sand and/or gravel
21		121790012800	18	19	coal	coal
22		121790012800	19	20	sand	sand
23		121790012800	20	39	sand, coarse, and gravel, 3m	coarse sand and/or gravel
24		121790012800	39	48	sand, coal, and boulders, 9m	coarse sand and/or gravel
25		121790012800	48	50	clay and rock	silt and clay
26		121790012800	50	55	sand, coarse, 3m	coarse sand and/or gravel
27		121790012800	55	63	sand, coarse, 2m	coarse sand and/or gravel
28		121790012800	63	66	sand, medium, 5m	coarse sand and/or gravel
29		121790012800	66	76	sand, 3m, 10s	coarse sand and/or gravel
30		121790012800	76	76	shale at	shale
31	6	121790025600	0	3	clay	clay
32		121790025600	3	15	sand & gravel	coarse sand and/or gravel
33		121790025600	15	19	gravel, coarse	coarse sand and/or gravel
34		121790025600	19	27	sand and gravel	coarse sand and/or gravel
35		121790025600	27	29	clay	clay
36		121790025600	29	33	gravel and small stones	coarse sand and/or gravel
37		121790025600	33	35	gravel	coarse sand and/or gravel
38		121790025600	35	42	sand, coarse	coarse sand and/or gravel
39		121790025600	42	51	sand, coarse	coarse sand and/or gravel
40	7	121790013800	0	3	soil	Topsoil
41		121790013800	3	82	sand and gravel	coarse sand and/or gravel

42	8	121790013300	0	3	soil, black	Topsoil
43		121790013300	3	5	sand, soil	coarse sand and/or gravel
44		121790013300	5	80	sand and gravel	coarse sand and/or gravel
45	9	121790013200	0	14	gravel, sand and clay	clay, sand, gravel
46		121790013200	14	18	sand and clay	clay, sand
47		121790013200	18	24	sand and gravel	coarse sand and/or gravel
48		121790013200	24	35	gravel and sand	coarse sand and/or gravel
49		121790013200	35	45	gravel	coarse sand and/or gravel
50		121790013200	45	59	gravel and sand	coarse sand and/or gravel
51		121790013200	59	61	shale	shale
52	10	121790052800	0	1	brown fill sand-some rocks	topsoil
53		121790052800	1	3	black sandy dirt	sand
54		121790052800	3	7	yellow sand-medium	coarse sand and/or gravel
55		121790052800	7	15	gray sand-medium	coarse sand and/or gravel
56		121790052800	15	28	gray sand & gravel	coarse sand and/or gravel
57		121790052800	28	49	gray sand & gravel-very coarse	coarse sand and/or gravel
58		121790052800	49	49	blue shale at	shale
59	11	121790050100	0	3	sandy loam	loam
60		121790050100	3	47	dirty sand & gravel	coarse sand and/or gravel
61		121790050100	47	81	yellow sand, trace gravel	coarse sand and/or gravel
62	12	121790048800	0	3	topsoil	topsoil
63		121790048800	3	8	yellow sand	sand
64		121790048800	8	20	gray silty clay	Silt and Clay
65		121790048800	20	21	brown clay	clay
66		121790048800	21	116	brown fine to med sand & gravel	coarse sand and/or gravel
67		121790048800	116	120	med to crs gravel, some coarse sand	coarse sand and/or gravel
68		121790048800	120	121	gray shale	shale
69	13	121790047700	0	3	brown sandy clay	clay, sand
70		121790047700	3	10	yellow clay - very sandy	clay, sand
71		121790047700	10	40	brown sand - coarse & clean	coarse sand and/or gravel
72		121790047700	40	47	brown sand - fine	sand
73		121790047700	47	58	dirty sand & yellow clay	clay, sand
74		121790047700	58	73	brown sand - fine to coarse	sand
75		121790047700	73	78	yellow sand - fine	sand
76		121790047700	78	87	fine to coarse sand - some pebbles	coarse sand and/or gravel
77		121790047700	87	93	fine to crs water sand-some pebbles	coarse sand and/or gravel
78		121790047700	93	96	med to coarse sand - some gravel	coarse sand and/or gravel
79		121790047700	96	101	fine to med sand-some rocks	coarse sand and/or gravel
80		121790047700	101	114	fine red sand	sand
81		121790047700	114	120	fine to coarse brown sand	sand
82		121790047700	120	127	f to crs sand with some fine gravel	coarse sand and/or gravel
83		121790047700	127	127	fine sand at	sand

84	14	121790012700	0	4	topsoil	topsoil
85		121790012700	4	15	sand, gravel, and clay	clay, sand, gravel
86		121790012700	15	32	sand, gravel, and boulders	coarse sand and/or gravel
87		121790012700	32	33	coal	coal
88		121790012700	33	36	hardpan	hardpan
89		121790012700	36	38	boulders	coarse sand and/or gravel
90		121790012700	38	40	sand and gravel, 2m. 15 s.	coarse sand and/or gravel
91		121790012700	40	48	coarse sand and gravel 1m. 40s.	coarse sand and/or gravel
92		121790012700	48	56	sand and gravel, 2 m., 15 s.	coarse sand and/or gravel
93		121790012700	56	58	sand 3m. 25 s.	sand
94		121790012700	58	66	sand, fine 5m, 20s	sand
95		121790012700	66	71	sand, 3m., 5s.	sand
96		121790012700	71	76	sand, 3m., 40 s.	sand
97		121790012700	76	76	shale at	shale
98	15	121790012600	0	18	muck	topsoil
99		121790012600	18	28	gravel, coarse and boulders	coarse sand and/or gravel
100		121790012600	28	36	sand, fine	sand
101		121790012600	36	36	shale at	shale
102	16	121790012500	0	85	sand & gravel	coarse sand and/or gravel
103		121790012500	85	85	shale at	shale
104	17	121790058500	0	4	topsoil	topsoil
105		121790058500	4	71	sand & gravel	coarse sand and/or gravel
106	18	121792462600	0	21	cinders black soil	cinders
107		121792462600	21	26	black & brown clay	clay
108		121792462600	26	39	fine sand w/soft clay mixed	clay, sand
109		121792462600	39	41	large gravel & coarse sand	coarse sand and/or gravel
110		121792462600	41	52	coarse sand & some small gravel	coarse sand and/or gravel
111		121792462600	52	79	coarse sand w/streaks of small gvl	coarse sand and/or gravel
112		121792462600	79	98	fine to coarse sand w/some small gvl	sand
113		121792462600	98	99	fine silty sand	sand
114		121792462600	99	103	dk gray shale & hd dk color limestone	shale

115	19	121792456600	0	4	loam-sandy	Loam
116		121792456600	4	15	sand -yellow	sand
117		121792456600	15	53	sand & gravel	coarse sand and/or gravel
118		121792456600	53	83	sand & gravel-coarse	coarse sand and/or gravel
119	20	121790041500	0	85	Sand	sand
120	21	121790041300	0	2	cindres, fill	FILL
121		121790041300	2	35	fine to coarse sand & gravel	sand
122		121790041300	35	74	f to crs, sand, fine to crs gravel bldrs	sand
123		121790041300	74	80	f to crs sand	sand
124		121790041300	80	93	f to crs sand, medium gravel	sand
125	22	121792453000	0	3	topsoil	topsoil
126		121792453000	3	22	lt. med gravel	coarse sand and/or gravel
127		121792453000	22	44	med-large gravel	coarse sand and/or gravel
128		121792453000	44	45	shale bedrock	shale
129	23	121792323500	0	4	topsoil	topsoil
130		121792323500	4	12	fine silty clay	Silt and clay
131		121792323500	12	48	medium sand	coarse sand and/or gravel
132		121792323500	48	93	medium to coarse gravel	coarse sand and/or gravel
133		121792323500	93	93	shale at	shale
134	24	121792489200	0	21	sand	sand
135		121792489200	21	38	sand & gravel	coarse sand and/or gravel
136		121792489200	38	56	sand medium	coarse sand and/or gravel
137		121792489200	56	61	sand coarse	coarse sand and/or gravel
138		121792489200	61	63	sand & gravel	coarse sand and/or gravel
139		121792489200	63	63	shale below	shale
140	25	121792486200	0	15	fine sand	sand
141		121792486200	15	20	gritty sand	sand
142		121792486200	20	30	fine to medium sand	sand
143		121792486200	30	35	medium-coarse sand with light gravel	coarse sand and/or gravel
144		121792486200	35	40	fine to medium sand	sand
145		121792486200	40	45	clay	clay
146		121792486200	45	60	light to medium sand	sand
147		121792486200	60	65	medium to coarse gravel	coarse sand and/or gravel
148		121792486200	65	88	fine sand	sand
149		121792486200	88	93	fine to medium sand	sand
150		121792486200	93	103	fine sand	sand
151		121792486200	103	108	coarse sand with big gravel	coarse sand and/or gravel
152		121792486200	108	113	medium to coarse sand with gravel	coarse sand and/or gravel
153		121792486200	113	118	medium to coarse sand	coarse sand and/or gravel
154		121792486200	118	120	medium to big gravel	coarse sand and/or gravel
155	26	121792485000	0	70	Sand	sand
156	27	121792377600	0	9	loam	Loam
157		121792377600	9	15	gravel very coarse	coarse sand and/or gravel
158		121792377600	15	60	sand & gravel	coarse sand and/or gravel
159		121792377600	60	85	sand & finer gravel	coarse sand and/or gravel

160	28	121792444600	0	2	topsoil	topsoil
161		121792444600	2	14	sand	sand
162		121792444600	14	75	sand & gravel	coarse sand and/or gravel
163	29	121792326500	0	2	loam sandy	Loam
164		121792326500	2	9	clay yellow sandy	clay, sand
165		121792326500	9	42	sand & gravel - coarse	coarse sand and/or gravel
166		121792326500	42	72	coarse sand	coarse sand and/or gravel
167		121792326500	72	82	sand & gravel	coarse sand and/or gravel
168	30	121792481400	0	2	topsoil	topsoil
169		121792481400	2	29	sand	sand
170		121792481400	29	70	sand & gravel	coarse sand and/or gravel
171	31	121792478800	0	21	cinders, black soil	cinders
172		121792478800	21	26	black & brown clay	clay
173		121792478800	26	39	fine sand clay mixed	clay, sand
174		121792478800	39	46	coarse sand gravel (boulders)	coarse sand and/or gravel
175		121792478800	46	48	black peat	Organic
176		121792478800	48	79	coarse sand gravel	coarse sand and/or gravel
177		121792478800	79	99	medium sand gravel	coarse sand and/or gravel
178	32	121792478800	99	104	gray shale	shale
179		121792477400	0	3	topsoil sandy	topsoil
180		121792477400	3	52	sand	sand
181	33	121792477400	52	70	sand & gravel	coarse sand and/or gravel
182		121792474300	0	4	topsoil	topsoil
183		121792474300	4	23	sand	sand
184	34	121792474300	23	60	sand & gravel	coarse sand and/or gravel
185		121792484700	0	4	topsoil	topsoil
186		121792484700	4	28	fine to medium sand & gravel	sand
187	35	121792484700	28	88	coarse gravel & rocks	coarse sand and/or gravel
188		121792481600	0	6	cinders	cinders
189		121792481600	6	42	coarse sand & gravel	coarse sand and/or gravel
190		121792481600	42	50	brown silty sand & fine gravel	coarse sand and/or gravel
191		121792481600	50	66	coarse sand & gravel	coarse sand and/or gravel
192		121792481600	66	99	fine to coarse sand	sand
193		121792481600	99	102	fine to coarse sand & gravel	coarse sand and/or gravel
194	36	121792481600	102	103	dark gray shale	shale
195		121792478000	0	3	topsoil	topsoil
196		121792478000	3	26	sand	sand
197	37	121792478000	26	70	sand & gravel	coarse sand and/or gravel
198		121792467500	0	4	topsoil	topsoil
199		121792467500	4	10	red clay with light gravel	clay, sand, gravel
200		121792467500	10	14	tan sandy hardpan	hardpan
201		121792467500	14	24	light medium gray with coarse sand	coarse sand and/or gravel
202		121792467500	24	29	light gravel, coarse sand	coarse sand and/or gravel
203		121792467500	29	38	light tan clay, coarse sand	clay, sand
204		121792467500	38	71	medium coarse gravel	coarse sand and/or gravel
205		121792467500	71	72	medium sand with light gravel at	coarse sand and/or gravel

206	38	121792313900	0	4	loam	loam
207		121792313900	4	82	sand & gravel	coarse sand and/or gravel
208		121792313900	82	82	brown clay below	clay
209	39	121792534000	0	2	loam	loam
210		121792534000	2	12	sand - yellow, fine	sand
211		121792534000	12	60	sand & gravel - coarse	coarse sand and/or gravel
212		121792534000	60	67	sand	sand
213		121792534000	67	70	sand & gravel	coarse sand and/or gravel
214	40	121792534000	70	70	boulders or bedrock at	shale
215		121792539500	0	10	sand, gravel, cinders	coarse sand and/or gravel
216		121792539500	10	14	sand, gravel, clay	clay, sand, gravel
217		121792539500	14	26	organic clay	clay
218		121792539500	26	34	organic silt	Silt and clay
219	41	121792539500	34	45	sand and gravel	coarse sand and/or gravel
220		121792539400	0	10	clay and gravel	clay, sand, gravel
221		121792539400	10	14	clayey silt	Silt and clay
222		121792539400	14	18	cinders	cinders
223		121792539400	18	28	organic silt and clay	Silt and clay
224	42	121792509100	0	12	black sand, gravel & cement fill	FILL
225		121792509100	12	25	brown sand & small gravel	coarse sand and/or gravel
226		121792509100	25	27	gray clay with gravel	clay, sand, gravel
227		121792509100	27	104	coarse sand & gravel	coarse sand and/or gravel
228	43	121792497500	0	4	topsoil	topsoil
229		121792497500	4	18	sand	sand
230		121792497500	18	26	clay	clay
231		121792497500	26	86	sand & gravel	coarse sand and/or gravel
232	44	121792497400	0	4	black topsoil, rock	topsoil
233		121792497400	4	15	medium sand	sand
234		121792497400	15	45	medium sand - rocks	coarse sand and/or gravel
235	45	121792501800	0	2	topsoil	topsoil
236		121792501800	2	4	brown clay	clay
237		121792501800	4	73	medium sand & gravel	coarse sand and/or gravel
238		121792501800	73	73	shale at	shale
239	46	121792538900	0	10	cinders, gravel, clay	FILL
240		121792538900	10	18	cinders and sand	sand
241		121792538900	18	32	organic silt	Silt and clay
242		121792538900	32	34	silty clay, sand	clay, sand
243		121792538900	34	40	gravel	coarse sand and/or gravel
244	47	121792538800	0	10	gravel, sand, cinders	coarse sand and/or gravel
245		121792538800	10	16	clay and gravel	clay, sand, gravel
246		121792538800	16	20	silt and clay	Silt and clay
247		121792538800	20	26	organic silt	Silt and clay
248		121792538800	26	33	silty clay	Silt and clay
249		121792538800	33	40	sand and gravel	coarse sand and/or gravel

250	48	121792538700	0	1	topsoil	topsoil
251		121792538700	1	16	clay & silt	Silt and clay
252		121792538700	16	20	sand	sand
253		121792538700	20	34	gravel	coarse sand and/or gravel
254	49	121792492400	0	17	sand	sand
255		121792492400	17	20	gravel	coarse sand and/or gravel
256		121792492400	20	27	sand fine	sand
257		121792492400	27	60	sand & gravel coarse	coarse sand and/or gravel
258	50	121792492400	60	85	blue-green shale below 60'	shale
259		121792539300	0	2	topsoil	topsoil
260		121792539300	2	17	clay and silt with gravel	clay, sand, gravel
261		121792539300	17	31	sand and gravel	coarse sand and/or gravel
262	51	121792539200	0	10	gravel, sand, silt, clay fill	clay, sand, gravel
263		121792539200	10	25	cinders	cinders
264		121792539200	25	28	organic clay	clay
265		121792539200	28	30	organic silt	silt and clay
266	52	121792539100	0	10	cinders, gravel, clay	FILL
267		121792539100	10	20	cinders, gravel, sand	coarse sand and/or gravel
268		121792539100	20	24	fine sand	sand
269		121792539100	24	28	silt	silt and clay
270	53	121792539100	28	30	silty clay	silt and clay
271		121792539000	0	10	cinders, gravel, clay	FILL
272		121792539000	10	20	gravel and clay	clay, sand, gravel
273		121792539000	20	30	organic silt	silt and clay
274	54	121792565200	0	10	topsoil	topsoil
275		121792565200	10	16	fine sand	sand
276		121792565200	16	26	med to coarse sand & gravel	coarse sand and/or gravel
277		121792565200	26	39	super coarse gravel	coarse sand and/or gravel
278	55	121792564300	0	2	cinders	cinders
279		121792564300	2	7	black and dark gray peaty clay	clay
280		121792564300	7	38	brown sandy clay	clay
281		121792564300	38	85	coarse sand & gravel	coarse sand and/or gravel
282	56	121792560500	0	15	med sand light gravel	coarse sand and/or gravel
283		121792560500	15	25	med gravel w/ rocks	coarse sand and/or gravel
284		121792560500	25	35	med sand - med gravel w/ rocks	coarse sand and/or gravel
285		121792560500	35	37	med sand - med gravel	coarse sand and/or gravel
286	57	121792366700	0	2	topsoil	topsoil
287		121792366700	2	15	sand	sand
288		121792366700	15	39	big gravel	coarse sand and/or gravel
289		121792366700	39	100	sand & gravel	coarse sand and/or gravel
290	58	121792354800	0	3	(ML) silt, some clay, little sand	topsoil
291		121792354800	3	6	(SP) sand, little gravel	coarse sand and/or gravel
292		121792354800	6	14	(SW) sand, little gravel	coarse sand and/or gravel
293		121792354800	14	30	(SP) sand ltl gvl, SW sand some gvl @30'	coarse sand and/or gravel
294		121792354800	30	44	sand	sand

295	59	121792355100	0	3	(ML) silt, some clay, little sand	topsoil
296		121792355100	3	6	(SP) sand fine gravel little gravel	coarse sand and/or gravel
297		121792355100	6	14	(SW) sand, little gravel	coarse sand and/or gravel
298		121792355100	14	30	(SP) sand, little gravel	coarse sand and/or gravel
299		121792355100	30	65	(SW) sand, some gravel	coarse sand and/or gravel
300		121792355100	65	69	(SP) sand, little gravel	coarse sand and/or gravel
301		121792355100	69	77	(SW) sand, some gravel	coarse sand and/or gravel
302	60	121792355100	77	103	(SP) sand, little gravel	coarse sand and/or gravel
303		121792355000	0	3	(ML) silt, some clay, little sand	clay, sand
304		121792355000	3	6	(SP) sand fine gravel little gravel	coarse sand and/or gravel
305		121792355000	6	14	(SW) sand, little gravel	coarse sand and/or gravel
306		121792355000	14	30	(SP) sand ltl gvl, SW sand some gvl @30'	coarse sand and/or gravel
307		121792355000	30	44	sand	sand
308		121792354900	0	3	(ML) silt, some clay, little sand	clay, sand
309	61	121792354900	3	6	(SP) sand, little gravel	coarse sand and/or gravel
310		121792354900	6	14	(SW) sand, little gravel	coarse sand and/or gravel
311		121792354900	14	30	(SP) sand, little gravel	coarse sand and/or gravel
312		121792354900	30	30	(SW) sand, some gravel at 30'	coarse sand and/or gravel
313		121792354900	30	44	sand	sand
314		121792378900	0	3	black cinder and gravel fill	FILL
315		121792378900	3	4.5	black silty sand	sand
316	62	121792378900	4.5	6.5	brown clayey sand	clay, sand
317		121792378900	6.5	35	brown fine to coarse sand, little fine to medium gravel, wet at 29'	coarse sand and/or gravel
318	63	121792378800	0	1	black to brown gravel, fill	FILL
319		121792378800	1	3	brown silty sand fill	FILL
320		121792378800	3	5.5	black silty sand , trace clay, topsoil	topsoil
321		121792378800	5.5	7.5	brown silty fine to coarse sand	sand
322		121792378800	7.5	50	brown fine to coarse sand, little fine to medium gravel, more sandy below 36'	sand
323		121792378700	0	1.5	black silty sand fill	FILL
324	64	121792378700	1.5	4	black grading brown silty sand	sand
325		121792378700	4	5.5	tan fine sand, clean	sand
326		121792378700	5.5	8.5	brown silty sand, cobbles at 8.5'	sand
327		121792378700	8.5	17.5	brown fine to coarse sand, little fine to medium gravel, dry, clay seam at 10.5' to 11.5'	coarse sand and/or gravel
328		121792378700	17.5	30	brown fine to coarse sand, trace of gravel, dry	coarse sand and/or gravel
329		121792379400	0	5.5	brown, stiff silt clay loam	loam
330	65	121792379400	5.5	14	brown, loose sandy loam	loam
331		121792379400	14	16.5	brown, medium silt clay loam	loam
332		121792379400	16.5	24	brown, loose, sand	sand
333		121792379400	24	61	brown, medium, sand and gravel	coarse sand and/or gravel
334		121792379400	61	65.5	light gray, hard, shale	shale

335	66	121792379300	0	4	brown stiff silt loam	loam
336		121792379300	4	14	brown and gray stiff, silt clay loam	loam
337		121792379300	14	14.5	brown and gray sand	sand
338		121792379300	14.5	19	dark gray, medium, wet silt clay loam	loam
339		121792379300	19	31.5	gray, loose, sand	sand
340		121792379300	31.5	58	brown, medium sand and gravel	coarse sand and/or gravel
341	67	121792379200	0	1.5	black grading brown clayey sand	clay, sand
342		121792379200	1.5	15	brown fine to coarse sand, little fine to medium gravel, dry	coarse sand and/or gravel
343	68	121792379100	0	1.5	black silty sand, fill, some gravel	clay, sand
344		121792379100	1.5	6	black grading down to brown silty sand	sand
345		121792379100	6	40	brown fine to coarse sand, little fine to medium gravel, water in 27.5'	coarse sand and/or gravel
346	69	121792379000	0	6.5	black silty sand disturbed, fill and topsoil, few sand seams 5'-6.5'	topsoil
347		121792379000	6.5	35	brown fine to coarse sand little fine to medium gravel, wet at 28'	coarse sand and/or gravel
348	70	121792361700	0	5	loam	loam
349		121792361700	5	14	sand & gravel	coarse sand and/or gravel
350		121792361700	14	34	sand & gravel - coarse	coarse sand and/or gravel
351		121792361700	34	39	gravel & rocks	coarse sand and/or gravel
352		121792361700	39	40	shale gray	shale
353	71	121792553800	0	8	cinders old burnt coal	FILL
354		121792553800	8	79	sand & gravel	coarse sand and/or gravel
355	72	121792552000	0	6	topsoil	topsoil
356		121792552000	6	32	sand & gravel-medium	coarse sand and/or gravel
357		121792552000	32	141	sand & gravel-coarse	coarse sand and/or gravel
358		121792552000	141	141	shale below	shale
359	73	121792538600	0	10	silty clay	silt and clay
360		121792538600	10	14	organic silt	silt and clay
361		121792538600	14	17	organic clay	clay
362		121792538600	17	21	silty clay	silt and clay
363		121792538600	21	29	sand & gravel	coarse sand and/or gravel
364	74	121792378600	0	1.5	black clayey silt topsoil	topsoil
365		121792378600	1.5	5.5	dark brown to brown clayey silt, more sandy with depth	clay, sand
366		121792378600	5.5	10	brown fine to coarse sand, trace of fine to medium gravel	coarse sand and/or gravel
367	75	121792356100	0	10	fill	FILL
368		121792356100	10	23	loam - soft	loam
369		121792356100	23	55	sand & gravel	coarse sand and/or gravel
370		121792356100	55	64	sand coarse fine gravel	coarse sand and/or gravel
371		121792356100	64	84	sand & gravel	coarse sand and/or gravel
372	76	121792365600	0	3	loam sandy	loam
373		121792365600	3	5	clay yellow sandy	clay, sand
374		121792365600	5	56	sand & gravel	coarse sand and/or gravel
375		121792365600	56	67	sand medium	coarse sand and/or gravel
376		121792365600	67	83	sand & gravel fine	coarse sand and/or gravel
377	77	121792538100	0	19	sand, gravel fill material	FILL
378		121792538100	19	31	coarse sand and fine gravel	coarse sand and/or gravel
379	78	121792373700	0	82	sand and gravel, red sand at bottom	coarse sand and/or gravel

380	79	121792373400	0	98	sand and gravel	coarse sand and/or gravel
381	80	121792333600	0	2	black dirt	topsoil
382		121792333600	2	9	brown sand	sand
383		121792333600	9	42	light to coarse gravel	coarse sand and/or gravel
384	81	121792538500	0	10	cinders, gravel, clay	FILL
385		121792538500	10	19	cinders	cinders
386		121792538500	19	26	silt and sand	sand
387		121792538500	26	29	clayey silt	silt and clay
388	82	121792538400	0	10	gravel, crushed rock, cinders	FILL
389		121792538400	10	17	cinders, sand, brick	Cinders
390		121792538400	17	19	clayey silt	silt and clay
391		121792538400	19	32	sand	sand
392	83	121792538300	0	1	topsoil	topsoil
393		121792538300	1	34	sand	sand
394	84	121792538200	0	2	topsoil	topsoil
395		121792538200	2	24	sand	sand
396		121792538200	24	34	gravel	coarse sand and/or gravel
397	85	121792439900	0	2	silty topsoil, little sand, trace clay & roots-medium dark brown	topsoil
398		121792439900	2	4	clayey silty fine sand, trace medium sand, rust brown-medium dense-moist	sand
399		121792439900	4	6	fine sand, trace gravel,medium coarse sand & silt-light brown-medium dense moist	sand
400		121792439900	6	8	fine to coarse sand, trace gravel & silt brown & slightly dark gray-medium densemoist	sand
401		121792439900	8	26.5	fine to coarse sand-moist @8' & saturated @19'-little gravel, trace silt-light brown & s	sand
402	86	121792439200	0	2	clayey, sandy. silty topsoil, trace roots, dark brown-loose-moist	topsoil
403		121792439200	2	4.4	sandy, silty & gravelly clay-brown-loosemoist	clay, sand
404		121792439200	4.4	6	clayey silty fine & coarse sand,trace gravel-brown & slightly gray-loose-moist to wet	sand
405		121792439200	6	13.5	gravelly, fine & coarse sand, trace siltbrown & slightly gray & dark gray-medium dense	coarse sand and/or gravel
406		121792439200	13.5	19	fine & medium sand, trace gravel-brown & slightly gray-loose-moist	sand
407		121792439200	19	26.5	fine & medium sand, trace gravel-brown, light gray & dark gray-dense-wet	sand
408	87	121792438800	0	2	silty sandy topsoil, trace roots-dark brown-moist	topsoil
409		121792438800	2	4	fine to coarse sand, little clay & gravel trace silt-brown & slight gray-medium dense-m	sand
410		121792438800	4	6	silty clayey sand, little topsoil, trace gravel-dark brown & slight gray-moist	topsoil
411		121792438800	6	9	fine to coarse sand, little gravel, trace silt-brown & slight gray-medium densemoist	sand
412		121792438800	9	14	silty clayey fine to coarse sand, brown & gray-medium dense-moist	clay, sand
413		121792438800	14	18	gravelly fine to medium sand, trace silt coarse sand & clay-brown-medium densemois	coarse sand and/or gravel
414		121792438800	18	26.5	gravelly fine to coarse sand, trace siltbrown & slight gray-extremely dense	coarse sand and/or gravel
415		121792438000	0	2	silty sandy topsoil-dark brown	topsoil
416		121792438000	2	6	gravelly, fine to medium sand, trace coarse sand & silt-light gray & slight gray-medium	coarse sand and/or gravel
417		121792438000	6	9	fine sand, trace silt & clay-dark brown loose, moist to wet	sand
418		121792438000	9	18	gravelly fine to coarse sand, trace silt, light brown & slight gray-medium dense to den	coarse sand and/or gravel
419		121792438000	18	23	coarse sand, trace fine to medium sand & fine gravel-brown to light gray & dark gray-	coarse sand and/or gravel
420		121792438000	23	45.5	gravelly fine to coarse sand, trace siltbrown & slight gray-medium dense to densesatu	coarse sand and/or gravel
421	88	121792438000	45.5	50.25	clayey shale, gray & rust brown-extremely dense	shale
422		121792430400	0	2	topsoil	topsoil
423		121792430400	2	9	sandy soil	topsoil
424		121792430400	9	17	sand	sand
425		121792430400	17	68	sand & gravel	coarse sand and/or gravel

426	89	121792437700	0	2.5	clay, silty, brown, some organic material	silt and clay
427		121792437700	2.5	4.5	sand, light yellow brown, very fine grained, silty, poorly graded, subangular	sand
428		121792437700	4.5	6.5	sand, brown, fine to medium grained, silty, some clay, sand grains subangular	sand
429		121792437700	6.5	15	sand & gravel, brown, well graded, sand, fine to medium grained, silty some coarse gr	coarse sand and/or gravel
430		121792437700	15	31.5	sand, light yellow brown very fine grained to fine grained, subrounded silty in upper p	sand
431	90	121792440300	0	2	sandy, silty topsoil, trace clay & rootsdark brown	topsoil
432		121792440300	2	4	clayey silty fine to medium sand, little gravel, trace coarse sand, rust brown & slightly	clay, sand
433		121792440300	4	6	fine to coarse sand, trace gravel & silt brown & slightly gray-loose to medium moist	sand
434		121792440300	6	9	fine to medium sand & gravel-trace siltbrown & slightly gray-medium dense to dense	sand
435		121792440300	9	13	gravelly fine to coarse sand trace silt & shale-light brown, slight gray & dark gray-very	coarse sand and/or gravel
436		121792440300	13	18	fine to medium sand & gravel medium dense	coarse sand and/or gravel
437		121792440300	18	28	fine to coarse sand, trace gravel-brown & light gray-medium dense to dense-wetsatur	coarse sand and/or gravel
438		121792440300	28	36.5	Fine to medium sand, trace gravel & siltbrown & slight gray	sand
439		121792440300	36.5	43	fine sand, trace silt-brown-extremely dense-wet	sand
440		121792440300	43	54	fine to medium sand, gravelly @45'-trace silt-reddish brown & slightly gray-densesatur	coarse sand and/or gravel
441		121792440300	54	60	clayey shale-gray-weathered	shale
442		121792440300	60	70	clayey shale;medium dark gray	shale
443	91	121792440000	0	2	clayey sandy silty topsoil, trace rootsdark brown	topsoil
444		121792440000	2	4	silty sand, little clay & gravel-medium dark brown to light gray-medium dense	sand
445		121792440000	4	6	silty clay, trace gravel & sand-brown & slightly gray-hard	silt and clay
446		121792440000	6	8	silty clay, atrace sand-brown to medium dark gray-very stiff	silt and clay
447		121792440000	8	13	silty fine to medium sand & gravel-brown & dark gray-dense to very dense moist	coarse sand and/or gravel
448		121792440000	13	18	gravelly fine to coarse sand, trace siltbrown & slightly gray-loose to medium dense-m	coarse sand and/or gravel
449		121792440000	18	28	fine to medium sand, trace gravel & siltbrown & slightly gray-medium dense to dense	sand
450		121792440000	28	35	fine sand, trace gravel & silt-brown & slightly gray - very dense to extremely dense-we	sand
451		121792440000	35	48.1	clayey shale-gray weathered-very dense	shale
452	92	121792343700	0	4	topsoil	topsoil
453		121792343700	4	37	sand	sand
454		121792343700	37	85	sand & gravel	coarse sand and/or gravel
455	93	121792341200	3	8	gravel brown	coarse sand and/or gravel
456		121792341200	8	40	gravel & big rocks	coarse sand and/or gravel
457		121792341200	40	42	gray clay & gravel	clay, sand, gravel
458	94	121792336400	0	2	topsoil	topsoil
459		121792336400	2	60	sand	sand
460		121792336400	60	70	sand & gravel	coarse sand and/or gravel
461	95	121792336600	0	4	black sandy topsoil	topsoil
462		121792336600	4	7	brown sandy clay	clay, sand
463		121792336600	7	35	brown sand - light gravel	coarse sand and/or gravel
464		121792336600	35	40	coarse brown sand light 3" gravel	coarse sand and/or gravel
465		121792336600	40	68	medium brown sand - light gravel	coarse sand and/or gravel
466		121792336600	68	110	medium brown sand - light coarse gravel	coarse sand and/or gravel
467		121792336600	110	112	gray clay	clay

468	96	121792347100	0	4	fill	Fill
469		121792347100	4	22	brown clay	clay
470		121792347100	22	44	sand & gravel	coarse sand and/or gravel
471		121792347100	44	47	gray clay	clay
472		121792347100	47	77	sand & gravel	coarse sand and/or gravel
473	97	121792517900	0	12	black sand, gravel & cement fill	Fill
474		121792517900	12	25	brown sand & small gravel	coarse sand and/or gravel
475		121792517900	25	27	gray clay with gravel	clay, sand, gravel
476		121792517900	27	104	coarse sand & gravel	coarse sand and/or gravel
477	98	121792516200	0	10	fine sand	sand
478		121792516200	10	25	medium gravel	coarse sand and/or gravel
479		121792516200	25	35	medium sand, light gravel	coarse sand and/or gravel
480		121792516200	35	50	fine sand, light gravel	coarse sand and/or gravel
481		121792516200	50	60	fine coarse sand	coarse sand and/or gravel
482		121792516200	60	65	fine sand, medium light gravel	coarse sand and/or gravel
483		121792516200	65	80	medium sand, light gravel	coarse sand and/or gravel
484		121792516200	80	95	medium fine sand, light gravel	coarse sand and/or gravel
485		121792516200	95	121	coarse sand medium gravel	coarse sand and/or gravel
486	99	121792515900	0	2	gravel	coarse sand and/or gravel
487		121792515900	2	4	loam	loam
488		121792515900	4	15	sand black, clay mix	clay, sand
489		121792515900	15	19	sand black, wood	sand
490		121792515900	19	26	clay black, gray mix	clay
491		121792515900	26	28	sand med to coarse loose	coarse sand and/or gravel
492		121792515900	28	35	sand fine to med	coarse sand and/or gravel
493		121792515900	35	40	sand med to coarse, some gravel	coarse sand and/or gravel
494		121792515900	40	48	sand fine to med, trace coarse	sand
495		121792515900	48	54	sand med to coarse	coarse sand and/or gravel
496		121792515900	54	59	sand coarse, fine gravel	coarse sand and/or gravel
497		121792515900	59	63	sand med to coarse	coarse sand and/or gravel
498		121792515900	63	66	sand med to crs, tr gry cl (backfilled)	coarse sand and/or gravel
499		121792515900	66	72	sand fine to med (backfilled)	sand
500	100	121792515900	72	72	gray shale at	shale
501		121792515800	0	9	fill	fill
502		121792515800	9	15	light brown clay	clay
503		121792515800	15	19	gray clay with gravel embedded	silt and clay
504		121792515800	19	21	coarse sand to coarse gravel	coarse sand and/or gravel
505		121792515800	21	32	sty brn med s to crs gvl (strk cl 22-23)	coarse sand and/or gravel
506		121792515800	32	52	med sand to coarse gvl (sty)	coarse sand and/or gravel
507		121792515800	52	93	fine sand to fine gravel	coarse sand and/or gravel
508	101	121792515800	93	100	soft and hard shale	shale
509		121792336500	0	4	topsoil	topsoil
510		121792336500	4	28	fine sand	sand
511		121792336500	28	54	medium sand	coarse sand and/or gravel
512		121792336500	54	103	medium gravel	coarse sand and/or gravel
513		121792336500	103	103	fine sand at	sand
514		121792520800	0	10	fine sand	sand

515	102	121792520800	10	15	light gravel with medium gravel	coarse sand and/or gravel
516		121792520800	15	20	medium gravel	coarse sand and/or gravel
517		121792520800	20	30	medium sand - light gravel	coarse sand and/or gravel
518		121792520800	30	35	light gravel	coarse sand and/or gravel
519		121792520800	35	38	medium sand - light gravel	coarse sand and/or gravel
520	103	121792520000	0	15	sandy black topsoil	topsoil
521		121792520000	15	50	sand & gravel	coarse sand and/or gravel
522		121792520000	50	68	gray clay	clay
523	104	121792519900	0	14	coarse sand & gravel	coarse sand and/or gravel
524		121792519900	14	56	coarse sand & gravel w/boulders	coarse sand and/or gravel
525		121792519900	56	58	shale	shale
526	105	121792577600	0	2	topsoil	topsoil
527		121792577600	2	42	fine to coarse gravel	coarse sand and/or gravel
528	106	121792312100	0	2	topsoil	topsoil
529		121792312100	2	8	fine sand	sand
530		121792312100	8	12	brown clay	clay
531		121792312100	12	25	fine sand	sand
532		121792312100	25	68	coarse sand	coarse sand and/or gravel
533		121792312100	68	73	fine gravel	coarse sand and/or gravel
534		121792312100	73	77	fine sand	sand
535		121792312100	77	103	fine gravel & medium gravel	coarse sand and/or gravel
536		121792312100	103	103	shale at	shale
537	107	121792200900	0	2	topsoil	topsoil
538		121792200900	2	20	coarse gravel	coarse sand and/or gravel
539		121792200900	20	47	medium to coarse gravel	coarse sand and/or gravel
540		121792200900	47	47	shale at	shale
541	108	121792104600	0	68	yellow sand	sand
542		121792104600	68	88	gray sand	sand
543	109	121792180900	0	5	top soil	topsoil
544		121792180900	5	43	sand	sand
545		121792180900	43	115	gravel	coarse sand and/or gravel
546	110	121792312000	0	2	topsoil	topsoil
547		121792312000	2	10	brown clay	clay
548		121792312000	10	25	fine sand	sand
549		121792312000	25	45	fine gravel	coarse sand and/or gravel
550		121792312000	45	83	medium gravel	coarse sand and/or gravel
551		121792312000	83	86	fine sand	sand
552		121792312000	86	108	medium to coarse gravel	coarse sand and/or gravel
553	111	121792311900	0	4	topsoil	topsoil
554		121792311900	4	28	fine sand	sand
555		121792311900	28	48	medium sand	coarse sand and/or gravel
556		121792311900	48	78	medium sand to coarse gravel	coarse sand and/or gravel
557		121792311900	78	106	medium gravel	coarse sand and/or gravel
558		121792311900	106	106	shale at	shale

559	112	121792311800	0	2	topsoil	topsoil
560		121792311800	2	12	brown clay	clay
561		121792311800	12	24	sand & gravel lenses	coarse sand and/or gravel
562		121792311800	24	55	sand & gravel	coarse sand and/or gravel
563		121792311800	55	60	gravel	coarse sand and/or gravel
564	113	121792307200	0	7	topsoil	topsoil
565		121792307200	7	87	sand	sand
566		121792307200	87	100	pea gravel	coarse sand and/or gravel
567	114	121792180200	0	2	top soil	topsoil
568		121792180200	2	13	fine sand	sand
569		121792180200	13	39	coarse gravel	coarse sand and/or gravel
570		121792180200	39	48	medium sand	coarse sand and/or gravel
571		121792180200	48	104	coarse gravel	coarse sand and/or gravel
572		121792180200	104	104	rocks	shale
573	115	121792179800	0	2	top soil	topsoil
574		121792179800	2	20	yellow fine sand	sand
575		121792179800	20	25	sand & gravel	coarse sand and/or gravel
576		121792179800	25	40	fine/medium sand	sand
577		121792179800	40	50	sand & gravel	coarse sand and/or gravel
578		121792179800	50	60	all fine sand	sand
579		121792179800	60	72	sand, pea gravel	coarse sand and/or gravel
580		121792179800	72	78	sand, stones	coarse sand and/or gravel
581	116	121792179800	78	79	shale	shale
582		121792179700	0	25	sand & gravel	coarse sand and/or gravel
583		121792179700	25	48	clay	clay
584		121792179700	48	67	rock	shale
585	117	121792261600	0	37	sand	sand
586	118	121792180800	0	4	top soil	topsoil
587		121792180800	4	40	sand	sand
588		121792180800	40	108	gravel	coarse sand and/or gravel
589	119	121792180700	0	10	sandy loam	loam
590		121792180700	10	48	sand & crs gvl	coarse sand and/or gravel
591		121792180700	48	50	coarse	coarse sand and/or gravel
592	120	121792180600	0	3	top soil	topsoil
593		121792180600	3	13	sand & gravel	coarse sand and/or gravel
594		121792180600	13	18	fine brown sand	sand
595		121792180600	18	28	brown sand & rocks	coarse sand and/or gravel
596		121792180600	28	31	fine/med brown sand	sand
597	121	121792180500	0	3	top soil	topsoil
598		121792180500	3	88	med sand to/crs gvl	coarse sand and/or gravel
599		121792180500	88	88	shale	shale

600	122	121792256700	0	10	dirty brown sand	sand
601		121792256700	10	16	brown sand, fine & clean	sand
602		121792256700	16	30	brown sand, fine-very coarse some gravel	coarse sand and/or gravel
603		121792256700	30	42	medium sand, coarse gravel	coarse sand and/or gravel
604		121792256700	42	53	fine red sand tr. med sand & few pebbles	sand
605		121792256700	53	56	red fine sand med-coarse sand w/pebbles	sand
606		121792256700	56	57	fine brown sand fine gravel w/rocks	sand
607	123	121792256700	57	61	fine brn sand, coarse sand w/fine gravel	coarse sand and/or gravel
608		121792091900	0	3	fill	fill
609		121792091900	3	9	fine to crs sand, some gravel	coarse sand and/or gravel
610		121792091900	9	22	fine sand to crs gravel	coarse sand and/or gravel
611		121792091900	22	28	fine sand to med gravel	coarse sand and/or gravel
612		121792091900	28	73	fine to crs sand with gvl seams	coarse sand and/or gravel
613		121792091900	73	81	fine sand to med gravel	coarse sand and/or gravel
614		121792091900	81	100	f to crs sand w/gravel seams	coarse sand and/or gravel
615		121792091900	100	105	fine sand to coarse gravel	coarse sand and/or gravel
616		121792090700	105	107	shale	shale
617	124	121792090700	0	6	sandy clay	clay, sand
618		121792090700	6	16	clay (yellow)	clay
619		121792090700	16	20	clay (blue-gravelly)	clay
620		121792090700	20	22	gravel & sand	coarse sand and/or gravel
621		121792090700	22	70	sand (brown-coarse)	coarse sand and/or gravel
622	125	121792088600	0	11	fine brown sand--dirty	sand
623		121792088600	11	29	fine to coarse brown sand-some rocks	sand
624		121792088600	29	32	coarse brown sand & gravel	coarse sand and/or gravel
625		121792088600	32	38	coarse brown water sand & gravel	coarse sand and/or gravel
626		121792088600	38	48	fine to coarse brown sand-some pebbles	coarse sand and/or gravel
627		121792088600	48	53	fine to med. sand-some pebbles	coarse sand and/or gravel
628		121792088600	53	54	brown & gray sand-some coal	sand
629	126	121792088600	54	54	cap rock & gray shale at	shale
630		121792261500	0	4	brown silt	silt and clay
631	127	121792261500	4	42	sand	sand
632	128	121792260000	0	4	silt & loam	loam
633	129	121792260000	4	40	sand	sand
634	130	121792259900	0	37	Sand	sand
635	129	121792259800	0	3	silt	silt and clay
636		121792259800	3	37	sand	sand
637	130	121792238000	0	2	top soil	topsoil
638		121792238000	2	25	fine sand	sand
639		121792238000	25	45	medium sand	coarse sand and/or gravel
640		121792238000	45	105	medium gravel	coarse sand and/or gravel
641		121792238000	105	105	rocks at	shale

642	131	121792237900	0	2	black & brown sandy topsoil	topsoil
643		121792237900	2	4	bricks & fill	fill
644		121792237900	4	7	black clayey sand	clay, sand
645		121792237900	7	16	sand & gravel	coarse sand and/or gravel
646		121792237900	16	23	coarse sand to small gravel	coarse sand and/or gravel
647		121792237900	23	45	coarse sand & gravel with boulders	coarse sand and/or gravel
648		121792237900	45	59	fine sand to coarse gravel with boulders	coarse sand and/or gravel
649		121792237900	59	95	f to crs s w/med to crs g layers & bldrs	coarse sand and/or gravel
650		121792237900	95	100	firm gray shale	shale
651	132	121792237800	0	16	fill	fill
652		121792237800	16	26	black & gray peaty clay with sand	clay, sand
653		121792237800	26	50	yellow & brown coarse sand & gravel	coarse sand and/or gravel
654		121792237800	50	61	fine sand & gravel	coarse sand and/or gravel
655		121792237800	61	83	fine sand, coarse gravel & boulders	coarse sand and/or gravel
656		121792237800	83	85	gray clay	clay
657	133	121792237700	0	4	parking lot gravel & fill	fill
658		121792237700	4	17	coarse s & g w/buff colored clay layers	dirty coarse sand and/or gravel
659		121792237700	17	47	yellow brown coarse s & g w/boulders	coarse sand and/or gravel
660		121792237700	47	81	f to med sd w/coarse gravel & sand	coarse sand and/or gravel
661		121792237700	81	85	firm gray shale	shale
662	134	121792246300	0	19	fine brown sand	sand
663		121792246300	19	52	brown sand & rock	coarse sand and/or gravel
664		121792246300	52	81	brown medium sand, not on shale	coarse sand and/or gravel
665	135	121792157500	0	7	top soil	topsoil
666		121792157500	7	42	fine/coarse gravel	coarse sand and/or gravel
667		121792157500	42	42	shale	shale
668	136	121792156800	0	105	sand & gravel	coarse sand and/or gravel
669		121792156800	105	108	black shale	shale
670	137	121792238100	0	4	top soil (black)	topsoil
671		121792238100	4	25	sand (brown) fine	sand
672		121792238100	25	39	sand (brown) medium	coarse sand and/or gravel

673	138	121792219300	0	3	top soil	topsoil
674		121792219300	3	5	clay	clay
675		121792219300	5	43	coarse sand & gravel	coarse sand and/or gravel
676		121792219300	43	49	blue clay	clay
677		121792219300	49	53	fine sand	sand
678		121792219300	53	80	coarse sand & gravel	coarse sand and/or gravel
679		121792219300	80	105	medium gravel	coarse sand and/or gravel
680		121792219300	105	136	fine to coarse sand	coarse sand and/or gravel
681		121792219300	136	136	shale at	shale
682	139	121792138700	0	3	sand and dirt	sand
683		121792138700	3	53	sand and gravel and rocks	coarse sand and/or gravel
684		121792138700	53	74	sand (brown) fine	sand
685		121792138700	74	84	sand (medium)	coarse sand and/or gravel
686		121792138700	84	88	sand, gravel and rocks	coarse sand and/or gravel
687	140	121792138600	0	5	topsoil	topsoil
688		121792138600	5	25	yellow fine sand	sand
689		121792138600	25	75	coarse gray sand	coarse sand and/or gravel
690	141	121792138000	0	3	topsoil	topsoil
691		121792138000	3	50	coarse gravel and rocks	coarse sand and/or gravel
692		121792138000	50	80	sand gravel and rocks	coarse sand and/or gravel
693		121792138000	80	108	rocks	shale
694	142	121792237600	0	1	top soil	topsoil
695		121792237600	1	10	brown sand	sand
696		121792237600	10	20	sand & gravel	coarse sand and/or gravel
697		121792237600	20	55	coarse gravel	coarse sand and/or gravel
698		121792237600	55	90	medium gravel & sand	coarse sand and/or gravel
699		121792237600	90	117	brown fine sand, some small gravel	sand
700		121792237600	117	118	coarse gravel	coarse sand and/or gravel
701		121792237600	118	120	gray shale	shale
702	143	121792154000	0	2	top soil	topsoil
703		121792154000	2	11	fine sand	sand
704		121792154000	11	99	medium/coarse gravel	coarse sand and/or gravel
705	144	121790072100	0	66	yellow sand	sand
706		121790072100	66	86	blue sand	sand
707	145	121790071600	0	4	black sandy loam	loam
708		121790071600	4	75	dirty yellow sand	sand
709		121790071600	75	112	sand trace gravel	coarse sand and/or gravel
710	146	121792285300	0	2	top soil	topsoil
711		121792285300	2	54	fine to coarse gravel	coarse sand and/or gravel
712		121792285300	54	60	clay	clay
713		121792285300	60	92	coarse sand to coarse gravel	coarse sand and/or gravel
714		121792285300	92	133	coarse sand to medium gravel	coarse sand and/or gravel
715		121792285300	133	133	shale at	shale

716	147	121792282400	0	2	top soil	topsoil
717		121792282400	2	13	fine sand	sand
718		121792282400	13	21	blue clay	clay
719		121792282400	21	62	fine to medium sand	sand
720		121792282400	62	107	fine to coarse sand & gravel	coarse sand and/or gravel
721		121792282400	107	107	fine sand at	sand
722	148	121792204800	0	13	misc. fill, gravel, cinders, bricks etc	fill
723		121792204800	13	17	black clayey gravel & sand	clay, sand, gravel
724		121792204800	17	25	black sand w/clay & other misc.	clay, sand, gravel
725		121792204800	25	50	loos crs sand to crs gravel & boulders	clay, sand, gravel
726		121792204800	50	60	med brn sand-crs gvl w/clay pckts & lyrs	coarse sand and/or gravel
727		121792204800	60	66	coarse sand to coarse gravel	coarse sand and/or gravel
728		121792204800	66	95	loose med s-sml gvl, occ bldrs & crs gvl	coarse sand and/or gravel
729		121792204800	95	96	dark gray lime	limestone
730		121792204800	96	100	dark gray shale	shale
731	149	121792197300	0	2	top soil	topsoil
732		121792197300	2	17	fine sand	sand
733		121792197300	17	42	coarse gravel	coarse sand and/or gravel
734		121792197300	42	61	medium sand	coarse sand and/or gravel
735		121792197300	61	85	coarse gravel	coarse sand and/or gravel
736	150	121792885900	0	16	sand (brown) fine	sand
737		121792885900	16	18	sand (brown) fine with rocks	sand
738		121792885900	18	26	sand (brown) medium	coarse sand and/or gravel
739		121792885900	26	30	sand (brown) medium with rocks	coarse sand and/or gravel
740		121792885900	30	40	sand (brown) medium	coarse sand and/or gravel
741		121792885900	40	71	sand (brown) medium with rocks	coarse sand and/or gravel
742	151	121792293000	0	4	topsoil	topsoil
743		121792293000	4	28	sand w/clay streaks	clay, sand
744		121792293000	28	58	medium sand	coarse sand and/or gravel
745		121792293000	58	105	big gravel	coarse sand and/or gravel
746	152	121790067100	0	6	fill	fill
747		121790067100	6	22	sand	sand
748		121790067100	22	25	silty clay	silt and clay
749		121790067100	25	100	sand & gravel	coarse sand and/or gravel
750		121790067100	100	100	hardpan at	shale
751	153	121792124200	0	4	brown sandy clay	clay, sand
752		121792124200	4	38	brown fine sand to crs gravel boulders	coarse sand and/or gravel
753		121792124200	38	62	brown fine sand to coarse gravel	coarse sand and/or gravel
754		121792124200	62	68	brown fine to coarse sand	coarse sand and/or gravel
755		121792124200	68	113	multi-colored medium to coarse sand	coarse sand and/or gravel

ATTACHMENT 9-2
MONITORING WELL BORING LOGS

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-1-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET 1 OF 2

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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF)					LL
						10	20	30	40	50		
						1	2	3	4	5		
461.7	0.0		Brown coarse to fine sand, dry	FILL							qu=NT Bentonite seal 3.0'-18.0'. Stickup protective cover installed. qu=NT qu=NT qu=NT qu=NT qu=NT qu=NT Sand pack 18.0'-30.0' qu=NT	
			SS-1 1.0-2.5 14"R	3 4 4								
			SS-2 3.5-5.0 12"R	3 3 5								
			SS-3 6.0-7.5 12"R	2 6 8								
			SS-4 8.5-10.0 10"R	2 5 8								
			SS-5 11.0-12.5 8"R	5 9 10								
			SS-6 13.5-15.0 12"R	3 6 6								
			SS-7 16.0-17.5 16"R	4 6 7								
			SS-8 18.5-20.0 14"R	4 5 6								
443.2	18.5		Brown coarse to medium sand, trace fine gravel, medium dense, saturated	SW								

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

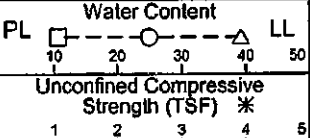
PROJECT & NO.

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	PL  LL					NOTES & TEST RESULTS
						1	2	3	4	5	
441.7	20.0										Set screen (slot 0.010") 20.5'-30.5' qu=NT
				SS-9 21.0-22.5 15"R	4 5 5						
439.7	22.0										
				SS-10 23.5-25.0 18"R	4 4 4						
			Coarse to fine gravel, some coarse sand, medium dense, saturated GP	SS-11 26.0-27.5 18"R	4 4 6						qu=NT
433.7	28.0										
				SS-12 28.5-30.0 18"R	4 5 6						
				SS-13 31.0-32.5 18"R	4 6 7						
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					NOTES & TEST RESULTS
						PL	LL				
						10	20	30	40	50	
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
459.2	0.0		Dark brown topsoil, silty clay, dry								
			FILL								
457.7	1.5		Light brown coarse to fine sand, loose, dry	SS-1 1.0-2.5 10"R	4 4 4						qu=NT
			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
				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
				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
				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' qu=NT
				SS-9 21.0-22.5 18"R	4 10 11						
435.7	23.5		Gray coarse to fine gravel, coarse sand, trace fine sand and silt, poorly graded, medium dense	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						
				SS-12 28.5-30.0 18"R	7 10 10						
				SS-13 31.0-32.5 18"R	7 8 7						
				SS-14 33.5-35.0 18"R	6 9 10						
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.

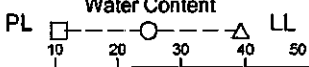
WATER LEVEL (ft.)
 ▽ 24.0
 ▽
 ▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-3-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

LOGGED BY **MPG**
 GROUND ELEVATION **459.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL 					NOTES & TEST RESULTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
						Unconfined Compressive Strength (TSF) *																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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459.4 458.6	0.0 0.9		Dark brown silty clay topsoil																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

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 10 20 30 40 50 Unconfined Compressive Strength (TSF) * LL					NOTES & TEST RESULTS
						1	2	3	4	5	
439.1	20.0		SW Saturated								Sand pack 20.0'-34.0' qu=NT qu=NT Set screen (slot 0.010") 24.0'-34.0' qu=NT qu=NT qu=NT
				SS-9 21.0-22.5 18"R	1 1 1						
436.1	23.0										
				SS-10 23.5-25.0 0"R	1 2 2						
				SS-11 26.0-27.5 18"R	1 2 2						
				SS-12 28.5-30.0 18"R	2 1 2						
				SS-13 31.0-32.5 18"R	1 2 2						
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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
							1	2	3	4		
457.3	0.0		Brown silty clay, roots, topsoil									
456.5	0.8		FILL									
			Light brown sand, medium to fine brown silty clay, fine gravel, dry	SS-1 1.0-2.5 10"R	6 3 4							
			FILL									
				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	SS-7 16.0-17.5 18"R	2 2 3							
			SP									
				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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
437.3	20.0		Brown coarse to fine gravel, trace coarse to medium sand, loose to medium dense, poorly graded								Sand pack 20.0'-34.0' qu=NT
				SS-9 21.0-22.5 12"R	4 8 6						
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						
				SS-13 31.0-32.5 10"R	4 4 8						qu=NT
423.3	34.0		Coarse to fine gravel, trace silt								
			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.

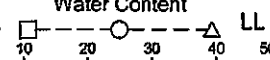
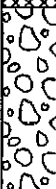
21053.070

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	PL 					NOTES & TEST RESULTS	
						Unconfined Compressive Strength (TSF) *						
						1	2	3	4	5		
455.8	0.0		Dark brown silty clay, black coal cinders, topsoil									qu=NT Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT qu=1.25**tsf qu=1.0**tsf qu=0.5**tsf
			FILL									
				SS-1 1.0-2.5 12"R	2 2 3							
			Dry									
				SS-2 3.5-5.0 14"R	6 8 10							
			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							
				SS-4 8.5-10.0 18"R	1 2 2							
				SS-5 11.0-12.5 18"R	2 2 3							
			Trace black coal cinders Trace coarse sand, moist									
			Gray clayey silt	SS-6 13.5-15.0 18"R	WOH 2 2							
438.8	17.0		Gray coarse to fine gravel, coarse to fine sand, poorly graded, medium dense, dry	SS-7 16.0-17.5 18"R	WOH 6 6							
				GP								
				SS-8 18.5-20.0 18"R	4 8 7							
435.8	20.0										Sand pack 19.0'-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

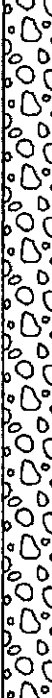
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PATRICK ENGINEERING INC.

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					NOTES & TEST RESULTS		
						PL	LL						
						10	20	30	40	50			
						Unconfined Compressive Strength (TSF) *							
						1	2	3	4	5			
435.8 435.3	20.0 20.5		Coarse to fine gravel, trace coarse to fine sand, poorly graded, medium dense, saturated Loose	GP							qu=NT Set screen (slot 0.010") 21.0'-31.0'		
					SS-9 21.0-22.5 0"R	4 6 6							
					SS-10 23.5-25.0 10"R	4 6 6							
					SS-11 26.0-27.5 10"R	3 4 4							
					SS-12 28.5-30.0 10"R	4 5 6							
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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF)			LL		
						10	20	30	40	50		
461.2	0.0		Gravel, clay, coal cinders	FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5								
				SS-2 3.5-5.0								
				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								qu=0.25**tsf
				SS-5 11.0-12.5 17"R	WOH 1 1							
447.2	14.0		Black coal cinders, loose, wet	FILL								qu=0.25**tsf
				SS-6 13.5-15.0 16"R	WOH 3 3							
444.2	17.0											Sand pack 18.0'-28.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'
				SS-7 16.0-17.5 14"R	2 3 3							
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							

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
CLIENT
PROJECT & NO.
LOCATION

B-MW-6-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 2

LOGGED BY **MPG**

GROUND ELEVATION **461.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	PL Water Content LL Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
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			SS-12 28.5-30.0 18"R	2 2 3						qu=1.25**tsf
			Dark gray organic clay, trace fine sand, medium stiff, moist	OL							
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.

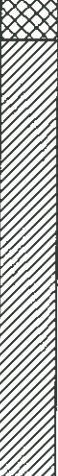
WATER LEVEL (ft.)
 ▽ **17.0**
 ▽
 ▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-7-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **3**

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
459.6	0.0		Sand, gravel, black cinders, dry FILL								Bentonite seal 3.0'-32.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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
				SS-7 16.0-17.5 18"R	2 1 2						
				SS-8 18.5-20.0 18"R	WOH 2 2						
439.6	20.0		Moist Trace fine sand, organic silt, moist								qu=0.75**tsf

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					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF)			LL			
						10	20	30	40	50			
						1	2	3	4	5			
439.6	20.0		Dark gray organic clay, mottled black, medium stiff, dry	OH							qu=1.0**tsf		
				SS-9 21.0-22.5 18"R	3 2 4								
				SS-10 23.5-25.0 18"R	2 3 4								
433.6	26.0		Gray organic silt, trace shells, fibers, very soft, moist	OL							qu=0.25**tsf		
				SS-11 26.0-27.5 18"R	2 2 2								
				Dry									
				SS-12 28.5-30.0 18"R	2 3 3								
428.6	31.0		Dark gray organic clay, trace fine gravel, moist	OH							qu=1.25**tsf Sand pack 32.0'-45.0'		
				SS-13 31.0-32.5 18"R	2 4 3								
426.1	33.5			Gray clayey gravel, coarse sand, clay, silt, moist	GC								qu=NT Set screen (slot 0.010") 35.0'-45.0'
					SS-14 33.5-35.0 18"R	WOH 2 2							
423.6	36.0			Medium dense, saturated								qu=NT	
					SS-15 36.0-37.5 18"R	2 7 6							
				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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
468.7	0.0		Fine gravel, sand, silt, clay, black cinders, dry FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							
458.7	10.0		Black cinders FILL								Sand pack 18.0'-30.0'
				SS-5 11.0-12.5 14"R	15 28 15/3"						
				SS-6 13.5-15.0 18"R	11 15 12						
				SS-7 16.0-17.5 17"R	15 15 14						
				SS-8 18.5-20.0 18"R	7 11 11						
449.2	19.5		Silty clay seam 15.5'-16.5'								

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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **2** OF **2**

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						qu=0.75**tsf qu=1.0**tsf qu=1.25**tsf
				SS-10 23.5-25.0 18"R	1 1 2						
444.2	24.5		Dark gray organic clay, soft, moist	OH							
				SS-11 26.0-27.5 18"R	1 2 2						
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						
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					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF) *					LL	
							1	2	3	4			5
466.2	0.0		Black cinders, fine gravel, crushed rock, dry FILL									Bentonite seal 3.0'-20.0'. Stickup protective cover installed.	
			SS-1 1.0-2.5										
			SS-2 3.5-5.0										
			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										qu=NT
			SS-5 11.0-12.5 14"R	6 12 15									
			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									qu=NT		
		Brown clayey silt, trace fine sand, moist CL											
447.2	19.0		Light brown fine to medium sand, loose, well graded										
			SS-8 18.5-20.0 18"R	3 6 11									

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
 ▽

Bentonite seal 3.0'-20.0'. Stickup protective cover installed.

qu=NT

qu=NT

qu=NT

qu=NT

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	Water Content					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF)			LL			
						10	20	30	40	50			
						1	2	3	4	5			
446.2	20.0		SW Medium dense Trace fine gravel								Sand pack 20.0'-32.0' Set screen (slot 0.010") 22.0'-32.0'		
444.6	21.6			SS-9 21.0-22.5 18"R	3 3 4								
442.7	23.5			SS-10 23.5-25.0 18"R	1 3 8								
				SS-11 26.0-27.5 18"R	0 2 2								
				SS-12 28.5-30.0 18"R	2 6 13								
				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**
 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-10-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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 Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
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							qu=0.5**tsf
				SS-5 11.0-12.5 16"R	1 2 2						
440.6	13.5		Black organic clay, medium plasticity, medium stiff, dry	OL							qu=1.5**tsf
				SS-6 13.5-15.0 18"R	2 3 4						
438.1	16.0		Brown and gray silty clay, trace to little coarse to fine sand, medium stiff, dry	CL							qu=2.0**tsf Sand pack 17.0'-29.0' Set screen (slot 0.010") 19.0'-29.0'
				SS-7 16.0-17.5 18"R	4 4 4						
				SS-8 18.5-20.0							

DRILLING CONTRACTOR **Groff Testing**
 DRILLING METHOD **4.25" I.D. HSA**
 DRILLING EQUIPMENT **CME 550 ATV**
 DRILLING STARTED **10/4/10** ENDED **10/4/10**

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.

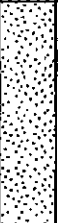
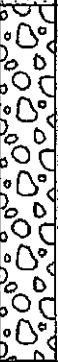
21053.070

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					NOTES & TEST RESULTS	
						PL	LL					
						Unconfined Compressive Strength (TSF) *						
						10	20	30	40	50		
						1	2	3	4	5		
434.1	20.0											
433.1	21.0											
			Gray coarse to fine sand, trace fine gravel, silt, poorly graded, loose, saturated	SS-9 21.0-22.5 18"R	2 2 1						qu=NT	
429.6	24.5			SS-10 23.5-25.0 10"R	2 4 3						qu=NT	
			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
CLIENT
PROJECT & NO.
LOCATION

B-MW-11-Po

Midwest Generation

21053.070

Powerton

SHEET 1 OF 2

LOGGED BY MPG

GROUND ELEVATION 468.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL Unconfined Compressive Strength (TSF) * LL					NOTES & TEST RESULTS
						1	2	3	4	5	
468.1	0.0		Cinders, gravel, sand, silt FILL								Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							qu=NT
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						
				SS-6 13.5-15.0 17"R	2 2 3						
452.1	16.0		Brown and gray silty clay, trace fine gravel, trace fine sand, stiff, dry CL								qu=1.5**tsf
				SS-7 16.0-17.5 18"R	1 3 4						
449.6	18.5		Gray clayey silt, organics, very soft, moist ML								qu=0.5**tsf
				SS-8 18.5-20.0 18"R	WOH 2 2						

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
CLIENT
PROJECT & NO.
LOCATION

B-MW-11-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 2

LOGGED BY MPG

GROUND ELEVATION 488.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Strength (TSF)	Compressive Strength (TSF)	LL			
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			SS-15 36.0-37.5 18"R	1 0 0							qu=NT
			Light brown fine sand, well graded, very loose, saturated SW	SS-16 38.5-40.0 18"R	2 3 4							qu=NT
428.1	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 9/28/10 **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
CLIENT Midwest Generation
PROJECT & NO. 21053.070
LOCATION Powerton

SHEET 1 OF 2

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 10 20 30 40 50 LL Unconfined Compressive Strength (TSF) %					NOTES & TEST RESULTS
						1	2	3	4	5	
470.0	0.0		Black cinders, fine gravel, silty clay, dry	FILL							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							qu=NT
460.0	10.0		Black cinders	FILL							
				SS-5 11.0-12.5 18"R	17 18 11						
				SS-6 13.5-15.0 18"R	12 20 17						
				SS-7 16.0-17.5 18"R	6 7 6						qu=NT
			Seam of light brown coarse sand								
				SS-8 18.5-20.0 18"R	1 5 2						
451.5	18.5		Gray silt, little to some coarse to fine sand, trace clay, very soft, saturated								
450.5	19.5										Sand pack 18.0'-35.0' 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 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
CLIENT
PROJECT & NO.
LOCATION

B-MW-12-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 2

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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
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	SS-11 26.0-27.5 18"R	WOH WOH 2						qu=0.5**tsf
			OH	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	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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Black cinders, sand, rock, dry	FILL							Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 2.5-4.0							
				SS-3 6.0-7.5							
			Black cinders, medium sand	FILL							qu=NT
457.7	10.0			SS-4 8.5-10.0							
				SS-5 11.0-12.5 14"R	5 9 7						
				SS-6 13.5-15.0 15"R	3 3 2						
			Some organic silt, moist								qu=NT
				SS-7 16.0-17.5 18"R	WOH 1 1						
450.2	17.5		Gray/olive gray organic silt, very soft	OL							qu=0.0**tsf
				SS-8 18.5-20.0 18"R	1 0 0						
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.

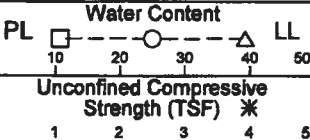
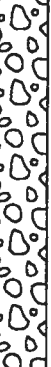
21053.070

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  LL					NOTES & TEST RESULTS
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
447.7	20.0		Dark gray and black organic clay, very soft, moist	OH							qu=0.25**tsf
			SS-9 21.0-22.5 18"R	WOH 2							
445.2	22.5		Dark gray and black organic silt, very soft, moist	OL							qu=0.25**tsf
			SS-10 23.5-25.0 18"R	WOH 1 1							
441.7	26.0		Dark gray and black organic clay, soft, dry	OH							qu=1.0**tsf
					SS-11 26.0-27.5 18"R	WOH 1 2					
			Medium stiff								Sand pack 28.0'-40.0' qu=1.5**tsf
438.2	29.5	▽		SS-12 28.5-30.0 18"R	0 2 3						
437.2	30.5		Gray silty clay, some coarse to fine sand, trace fine gravel, wet								Set screen (slot 0.010") 30.0'-40.0' qu=2.0**tsf
436.2	31.5		▽		SS-13 31.0-32.5 18"R	2 4 5					
433.7	34.0		Stiff								qu=2.0**tsf
				Brown coarse to fine gravel, trace coarse to medium sand, silt, medium dense, saturated	GP						
				SS-14 33.5-35.0 6"R	2 3 2						qu=NT
				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
CLIENT
PROJECT & NO.
LOCATION

B-MW-14-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Cinders, gravel, sand, silt, dry FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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								Sand pack 18.0'-30.0'
				SS-5 11.0-12.5 18"R	4 4 4						
				SS-6 13.5-15.0 16"R	4 3 4						
				SS-7 16.0-17.5 16"R	2 3 3						
				SS-8 18.5-20.0 18"R	3 3 1						
448.2	19.5		Black cinders								
			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.

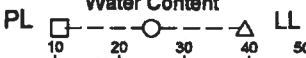
21053.070

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	PL  LL					NOTES & TEST RESULTS
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
447.7 447.2	20.0 20.5		▽ very loose, low plasticity, saturated OL						Set screen (slot 0.010") 20.0'-30.0' qu=NT		
			SS-9 21.0-22.5 18"R	1 0 0							
			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								qu=0.25**tsf
			SS-11 26.0-27.5 18"R	0 0 1							
438.7	29.0		SS-12 28.5-30.0 18"R	2 3 4					qu=1.25**tsf		
437.7	30.0		Gray and black organic clay, medium stiff, moist OH								
		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
 21.0

PATRICK ENGINEERING INC.

BORING NUMBER
CLIENT
PROJECT & NO.
LOCATION

B-MW-15-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

LOGGED BY MPG

GROUND ELEVATION 468.3

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
						10	20	30	40	50		
468.3	0.0		Black cinders, fine gravel, sand, silt, dry									Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
			FILL	SS-1 1.0-2.5								
				SS-2 3.5-5.0								
				SS-3 6.0-7.5								
				SS-4 8.5-10.0								
458.3	10.0		Black cinders, fine gravel, coarse sand, silt, dry									Sand pack 17.0'-30.0'
			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							
				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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21063.070**
 LOCATION **Powerton**

SHEET **2** OF **2**

LOGGED BY **MPG**
 GROUND ELEVATION **468.3**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	10	20	30	40		LL
						Unconfined Compressive Strength (TSF) *						
						1	2	3	4	5		
448.3	20.0		Gray fine sand, trace medium sand, loose, saturated SM								Set screen (slot 0.010") 20.0'-30.0' qu=NT	
				SS-9 21.0-22.5 18"R	1 1 1							
444.8	23.5			Gray silt, mottled black, some organics, soft, moist to wet OL								qu=0.75**tsf
					SS-10 23.5-25.0 18"R	1 2 2						
					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								qu=1.0**tsf	
				SS-12 28.5-30.0 18"R	1 3 2							
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
 ▼

GEOLOGIC LOG OF MW-16

(Page 1 of 1)

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

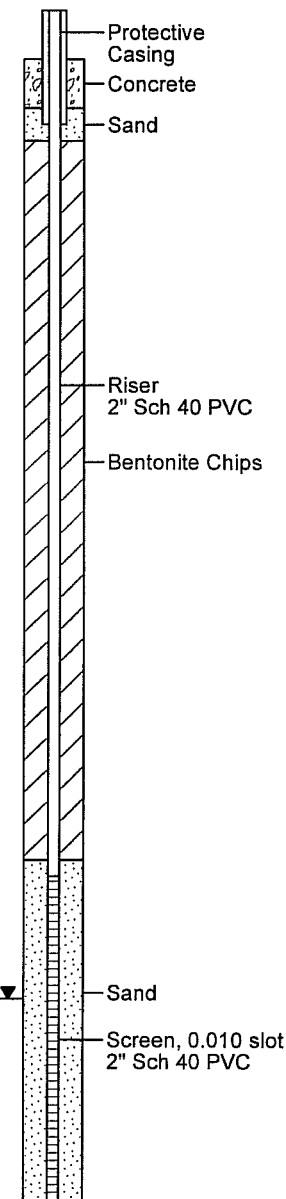
KPRG Project No. 18311.21

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

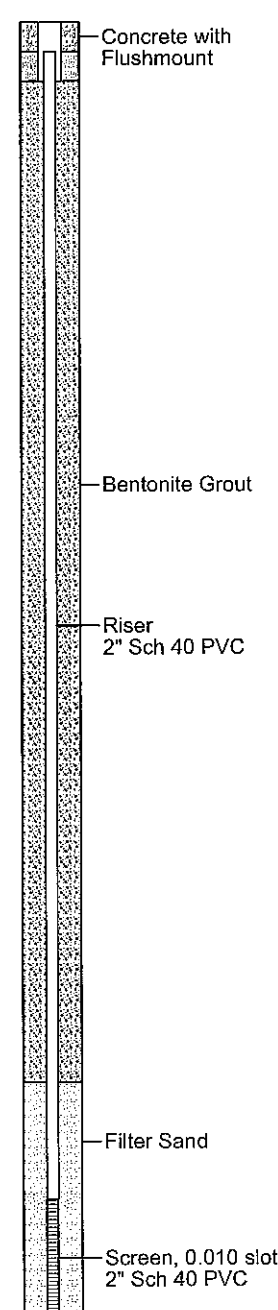
Total Boring Depth : 35 feet
 Well Bottom Depth : 35 feet
 Surface Elev. : 468.957 feet above MSL
 TOC Elev. : 471.564 feet above MSL
 Groundwater Elev. : 439.81
 Riser Material : 2" Sch 40 PVC
 Screen Material : 2" Sch 40 PVC, 0.010 slot
 Coordinate N : 40 32' 22.9" N
 Coordinate E : 89 40' 41.1" W
 Logged By : M. Wilson

Depth in Feet	Surf. Elev. 468.957	DESCRIPTION	PID	% Recovery	Well Diagram: MW-16
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			Well Diagram: MW-16
10	459	Tan medium to fine grained SAND with some gravel	0	60	
12	457				Well Diagram: MW-16
14	455		0		
16	453		0	70	Well Diagram: MW-16
18	451	- Gravel layer approximately 2" thick	0		
20	449		0	100	Well Diagram: MW-16
22	447				
24	445		0		Well Diagram: MW-16
26	443	- Thin layer of fine grained sand	0	100	
28	441	- Wet	0		Well Diagram: MW-16
30	439		0	60	
32	437				Well Diagram: MW-16
34	435		0		
36	433	End of boring at 35'			Well Diagram: MW-16
38	431				
40					Well Diagram: MW-16

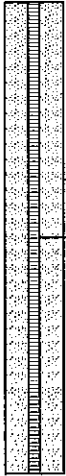
Well Diagram: MW-16



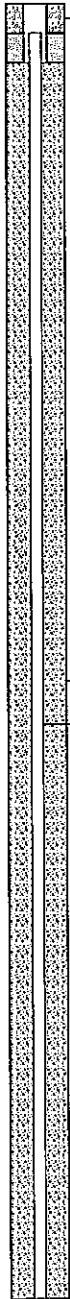
 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-17 (Page 1 of 2)		Total Boring Depth : 30.0 feet Well Bottom Depth : 30.0 feet Surface Elev. : xxx feet above MSL TOC Elev. : xxx feet above MSL Groundwater Elev. : xxx feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : Coordinate E : Logged By : P. Allenstein	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			
Depth in Feet	Surf. Elev. 575	DESCRIPTION		% RQD	% Recovery
0	575	Asphalt Roadway over sand, silt, gravel mix, brown, dry.			
1	574	SILTY SAND, fine to coarse, black, slightly moist, occ silty layers. - begin black with orange brown - some gray silt laminates			
2	573				
3	572				
4	571				
5	570				
6	569				
7	568				
8	567				
9	566				
10	565				
11	564				
12	563				
13	562				
14	561				
15	560				
16	559				
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:
 

 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-17 (Page 2 of 2)		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	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			
Depth in Feet	Surf. Elev. 575	DESCRIPTION		% RQD	% Recovery
22	553	SILTY SAND, black and dark gray, fine to meduim, wet.			
23	552				
24	551				
25	550	SILT and SAND, gray and black, wet.			
26	549				
27	548				
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 KPRC and Associates, Inc.		GEOLOGIC LOG OF MW-18 (Page 1 of 2)		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	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:
0	575	SILTY CLAY, brown, trace gravel, slightly moist.			 Concrete with Flushmount Bentonite Grout Riser 2" Sch 40 PVC
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					

KPRC ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-18 (Page 2 of 2)		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					
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.							
Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:				
22	553				Bentonite Grout Riser 2" Sch 40 PVC Filter Sand Screen, 0.010 slot 2" Sch 40 PVC				
23	552								
24	551								
25	550								
26	549								
27	548								
28	547								
29	546								
30	545	CLAY, gray, some black, moist.							
31	544	CLAY, dark gray, trace organics, moist.							
32	543								
33	542								
34	541								
35	540	CLAY, greenish gray, trace organics, moist.							
36	539								
37	538								
38	537	SILTY SAND, tan, some gravel, very moist.							
39	536								
40	535	End of Boring at 40 feet.							
41	534								
42	533								
43	532								
44									

GEOLOGIC LOG OF MW-19
 (Page 1 of 2)

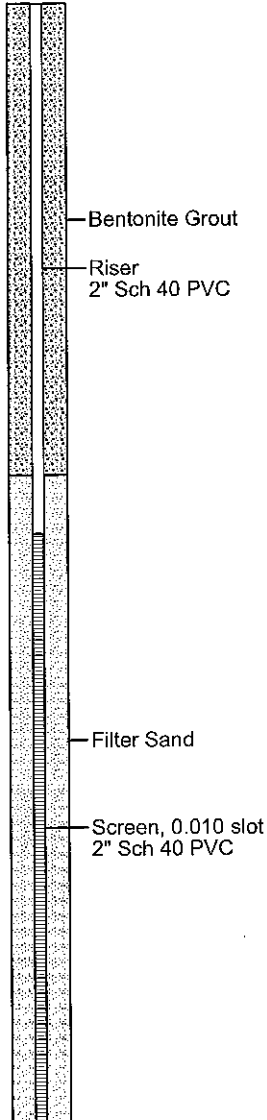
Midwest Generation, LLC
 Powerton Station
 Pekin, Illinois

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	Well Diagram:
0	575	SILTY SAND, black, fine to coarse, occasional clayey layers slightly moist.			
1	574				
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					

 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-19 (Page 2 of 2)		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	
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.			

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:
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	End of Boring at 41 feet.			
42	533				
43	532				
44					

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-20

(Page 1 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

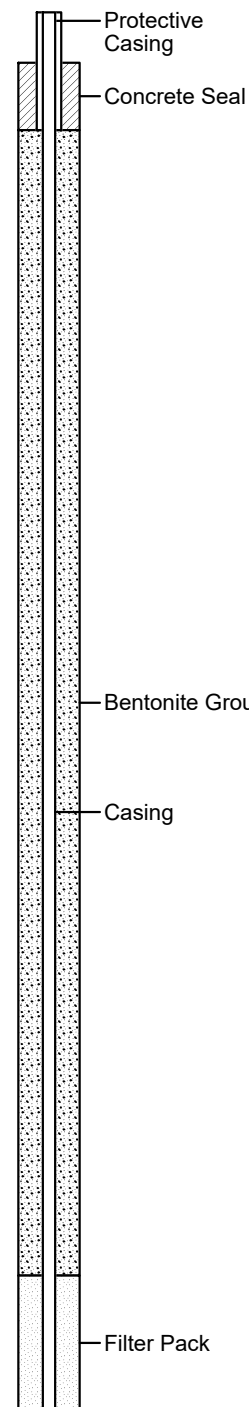
Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 30.0
Well Bottom Depth : 30.0
Surface Elevation : 466.43 ft. above MSL
Top of Casing Elev. : 468.95 ft. above MSL
Groundwater Elev. : 441.60 ft. above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466.5	DESCRIPTION	Recovery (in.)	REMARKS
0	466	CLAY with SAND and GRAVEL, brown, dark brown, top soil, dry.	24	
5	461	SAND and GRAVEL, coarse, brown, tan, dry.	30	
10	456	CLAY, trace SAND and GRAVEL, brown, dark brown, dry.	36	
15	451	CLAY, some SAND and GRAVEL, cinders and slag, dark brown, black, dry.	48	
20		SILTY CLAY with SAND and GRAVEL, black, gray, dry.		

Well: MW-20
Elev.: 468.95



K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-20

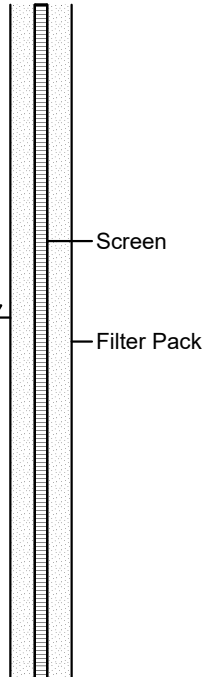
(Page 2 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 30.0
Well Bottom Depth : 30.0
Surface Elevation : 466.43 ft. above MSL
Top of Casing Elev. : 468.95 ft. above MSL
Groundwater Elev. : 441.60 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466.5	DESCRIPTION	Recovery (in.)	REMARKS	Well: MW-20 Elev.: 468.95
20	446	CLAYEY SILT, trace SAND and GRAVEL, black, gray, moist.	36		
25	441	SILT, trace SAND, organic with laminations, dark gray, black, wet.	42		
30	436	End of Boring at 30 feet.			
35	431				
40					

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-21

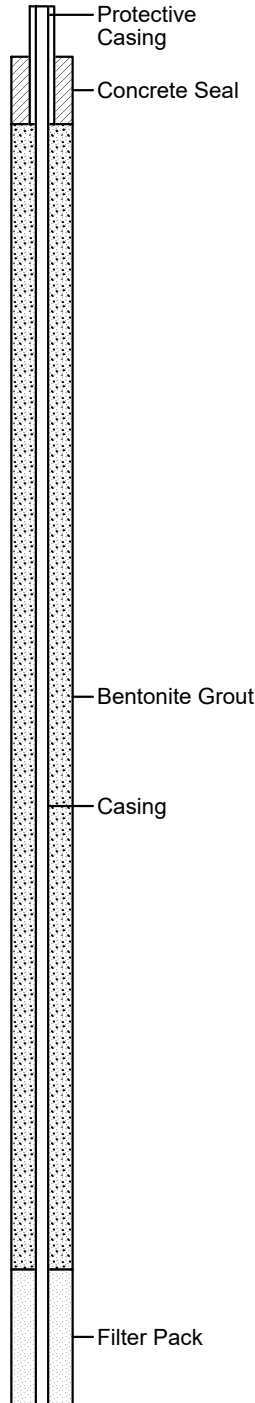
(Page 1 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 35.0
Well Bottom Depth : 30.0
Surface Elevation : 465.71 ft. above MSL
Top of Casing Elev. : 468.17 ft. above MSL
Groundwater Elev. : 440.65 ft. above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

Depth in Feet	Surf. Elev. 466	DESCRIPTION	Recovery (in.)	REMARKS
0	465.5	CLAY, black, dark brown, top soil, dry.	36	Well: MW-21 Elev.: 468.17 
		CLAY, dark brown, black cinders, dry.		
		SAND and GRAVEL, brown, black cinders, dry.		
		SAND and fine grained GRAVEL, brown, dry.		
5	460.5	CLAY with SAND and GRAVEL, black, dark brown, dry.	30	
10	455.5	SAND and GRAVEL, coarse, trace CLAY, brown, dry.	42	
		SILTY SAND, trace GRAVEL, brown, dry.	42	
15	450.5	CLAY, black, stiff, dry		
		SILT, trace SAND, black, gray, organic, moist		
20				

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GEOLOGIC LOG OF MW-21

(Page 2 of 2)

Midwest Generation, LLC
Powerton Station
Pekin, IL

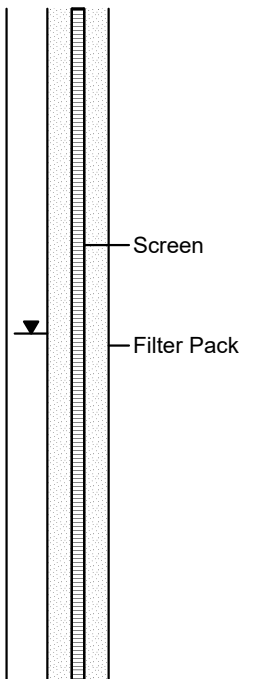
Project # 12313.5

Date Started : 03/11/21
Date Completed : 03/11/21
Drilling Method : 8 1/4 HSA
Drill Rig : Geoprobe
Driller Name/Co. : Matt / Cabeno Env. Serv.

Boring Depth : 35.0
Well Bottom Depth : 30.0
Surface Elevation : 465.71 ft. above MSL
Top of Casing Elev. : 468.17 ft. above MSL
Groundwater Elev. : 440.65 ft. above MSL
Riser Material : 2 " Sch 40 PVC
Screen Material : 2 " Sch 40 PVC, 0.01 slot
Coordinate N :
Coordinate E :
Logged By : M. Dolan

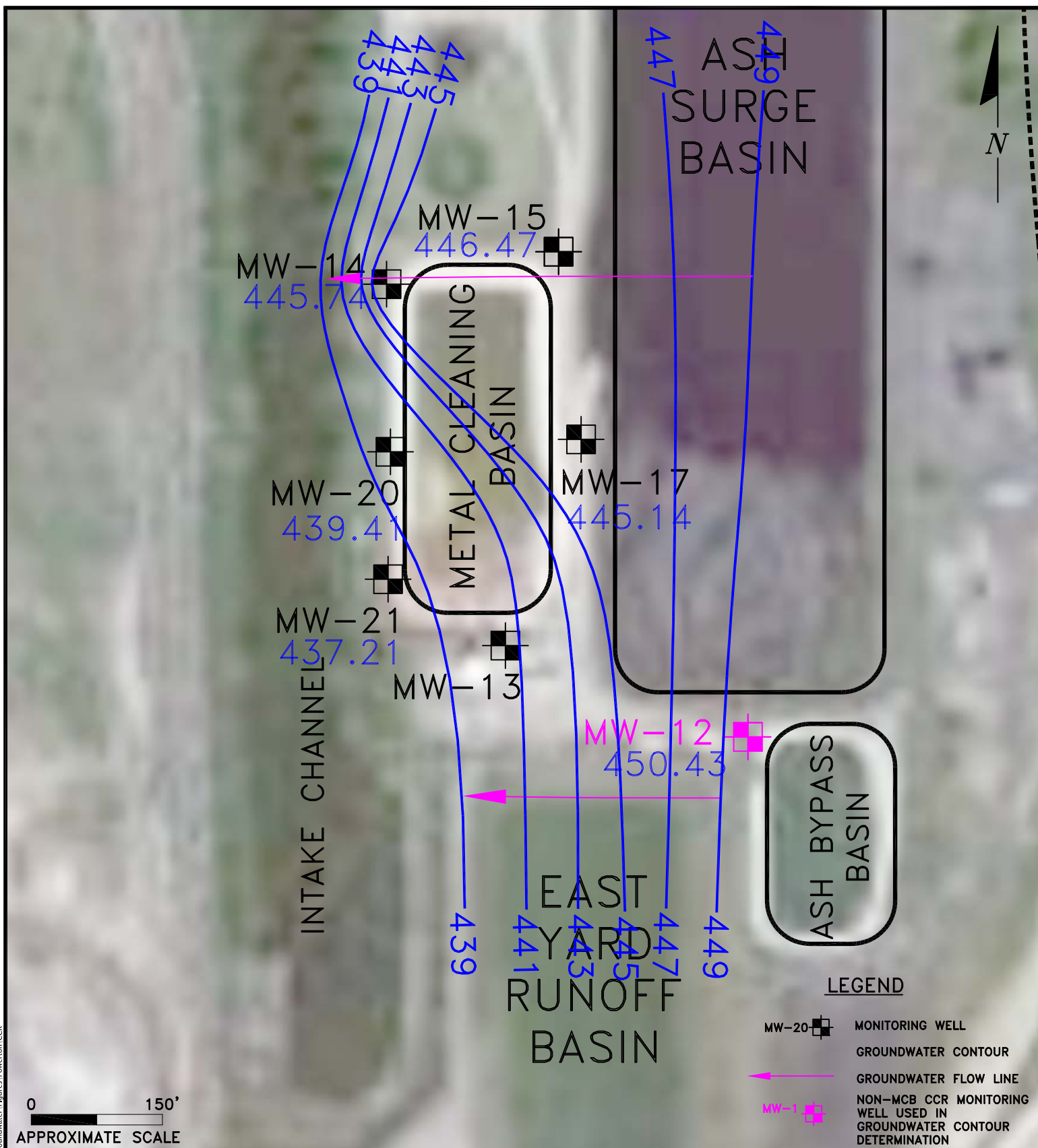
Depth in Feet	Surf. Elev. 466	DESCRIPTION	Recovery (in.)	REMARKS
20	445.5		60	
25	440.5		60	
30	435.5	SILT, trace very fine grained SAND, black, gray, organic, stiff, wet.	48	
35	430.5	CLAYEY SILT, trace very fine grained SAND, black, gray, organic, stiff, wet.		
		End of Boring at 35 feet.		
40				

Well: MW-21
Elev.: 468.17



ATTACHMENT 9-3
MONTHLY GROUNDWATER FLOW MAPS

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



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POTENTIOMETRIC MAP 05/2021

POWERTON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

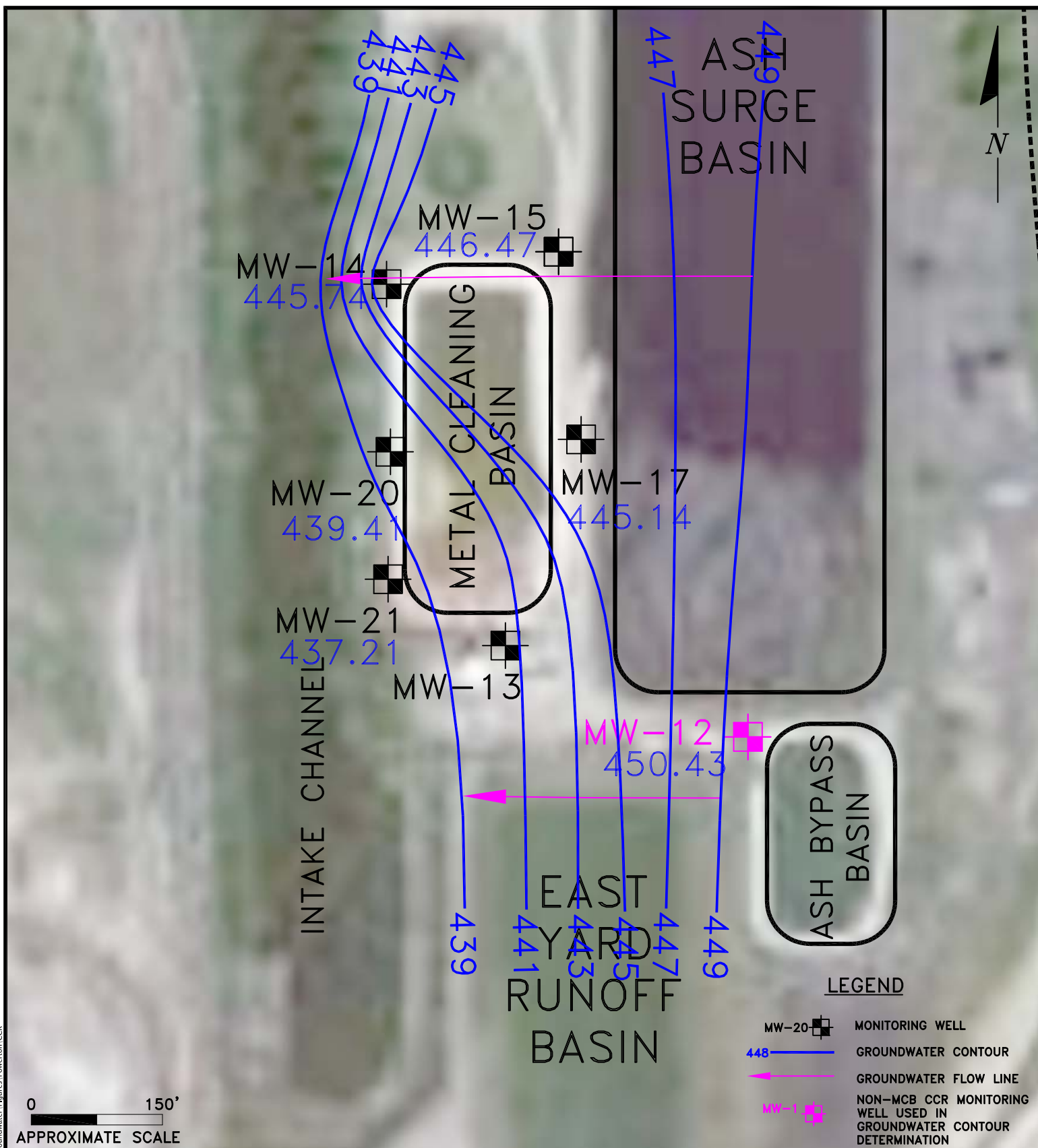
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



0 150'
APPROXIMATE SCALE

LEGEND

- MW-20 MONITORING WELL
- 448 GROUNDWATER CONTOUR
- GROUNDWATER FLOW LINE
- MW-12 NON-MCB CCR MONITORING WELL USED IN GROUNDWATER CONTOUR DETERMINATION

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POTENTIOMETRIC MAP 06/2021

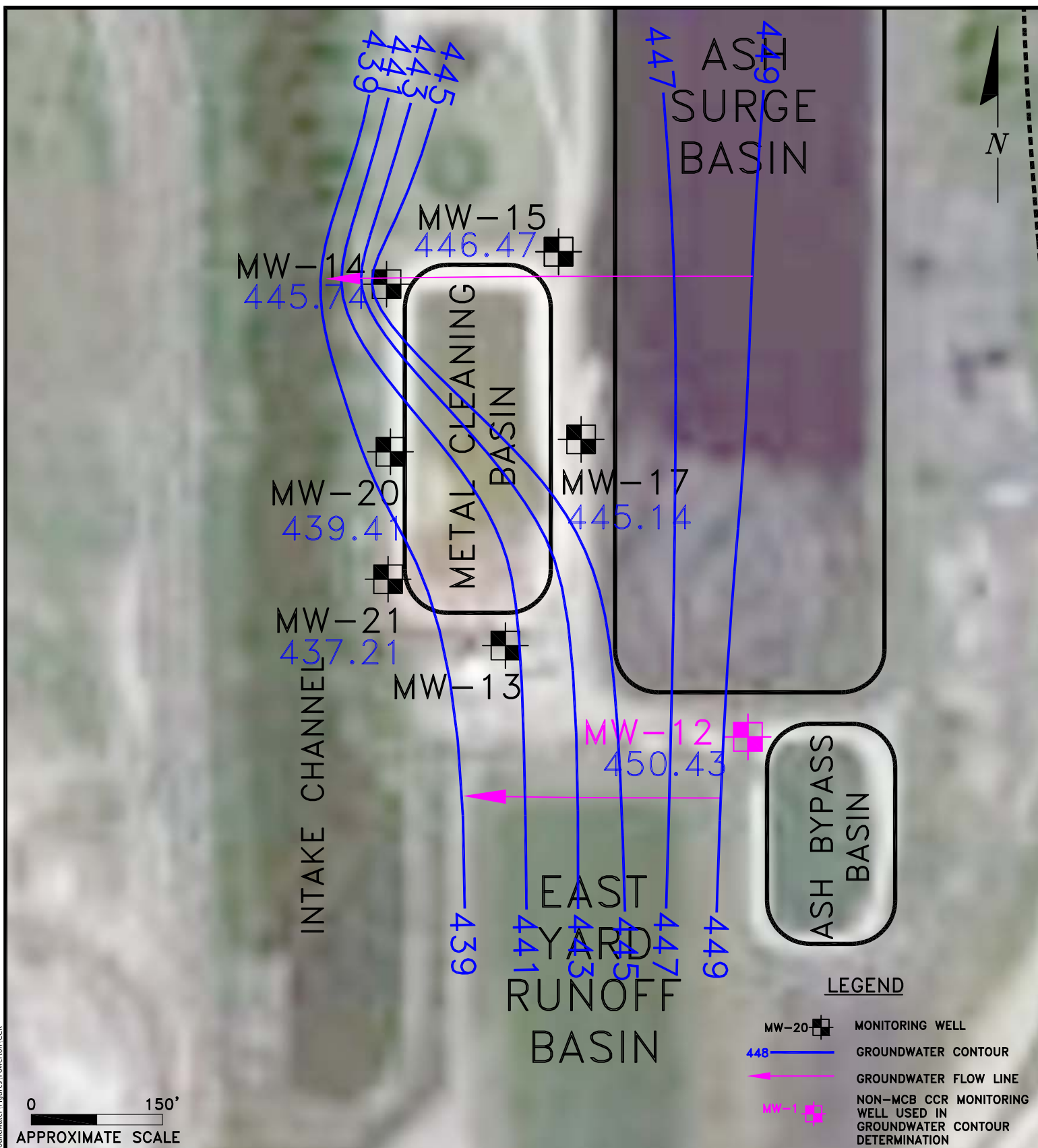
POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

Scale: 1" = 150' Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



0 150'
APPROXIMATE SCALE

LEGEND

- MW-20 MONITORING WELL
- 448 GROUNDWATER CONTOUR
- GROUNDWATER FLOW LINE
- MW-12 NON-MCB CCR MONITORING WELL USED IN GROUNDWATER CONTOUR DETERMINATION

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POTENTIOMETRIC MAP 07/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

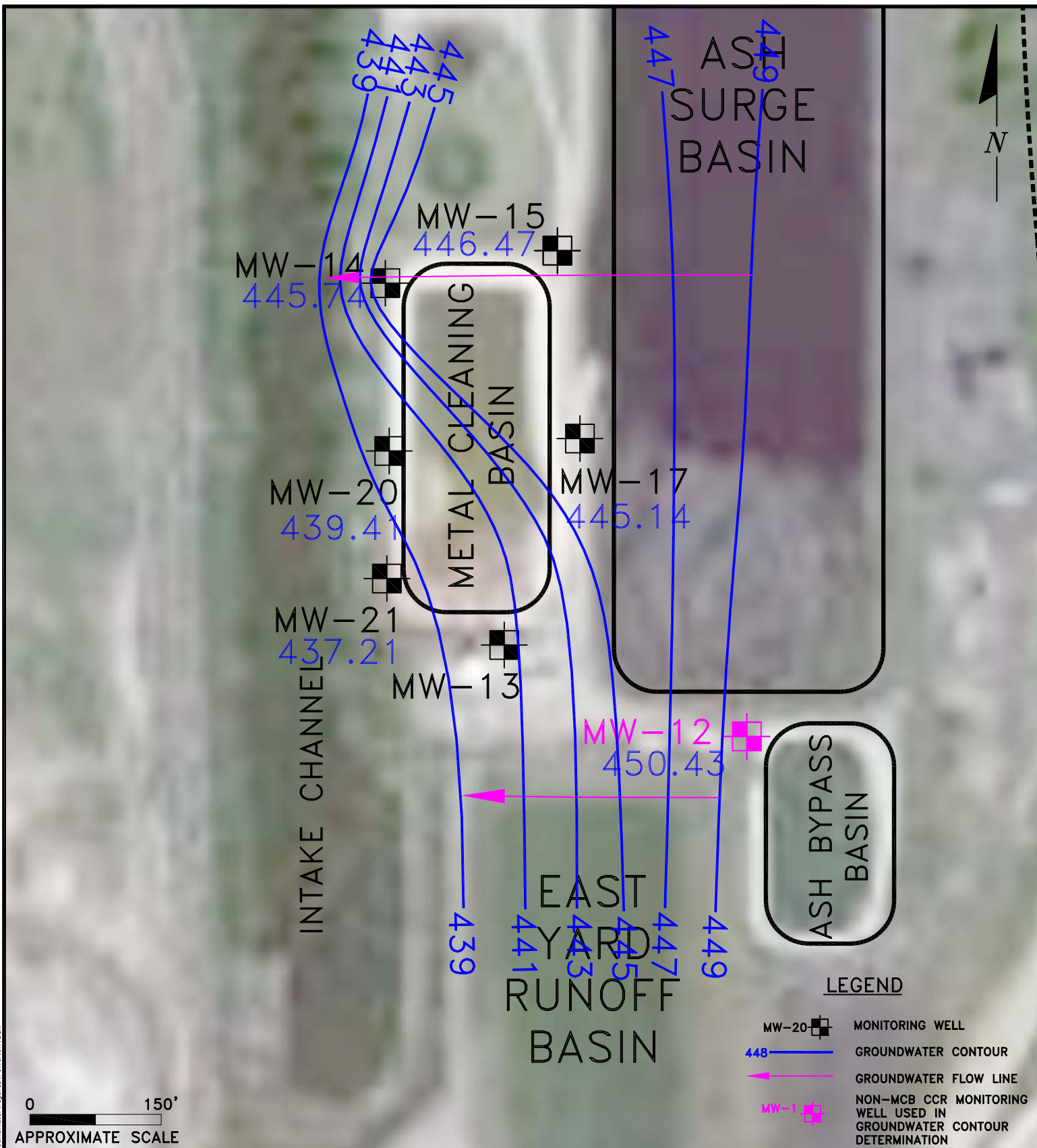
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



0 150'
APPROXIMATE SCALE

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POTENTIOMETRIC MAP 08/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

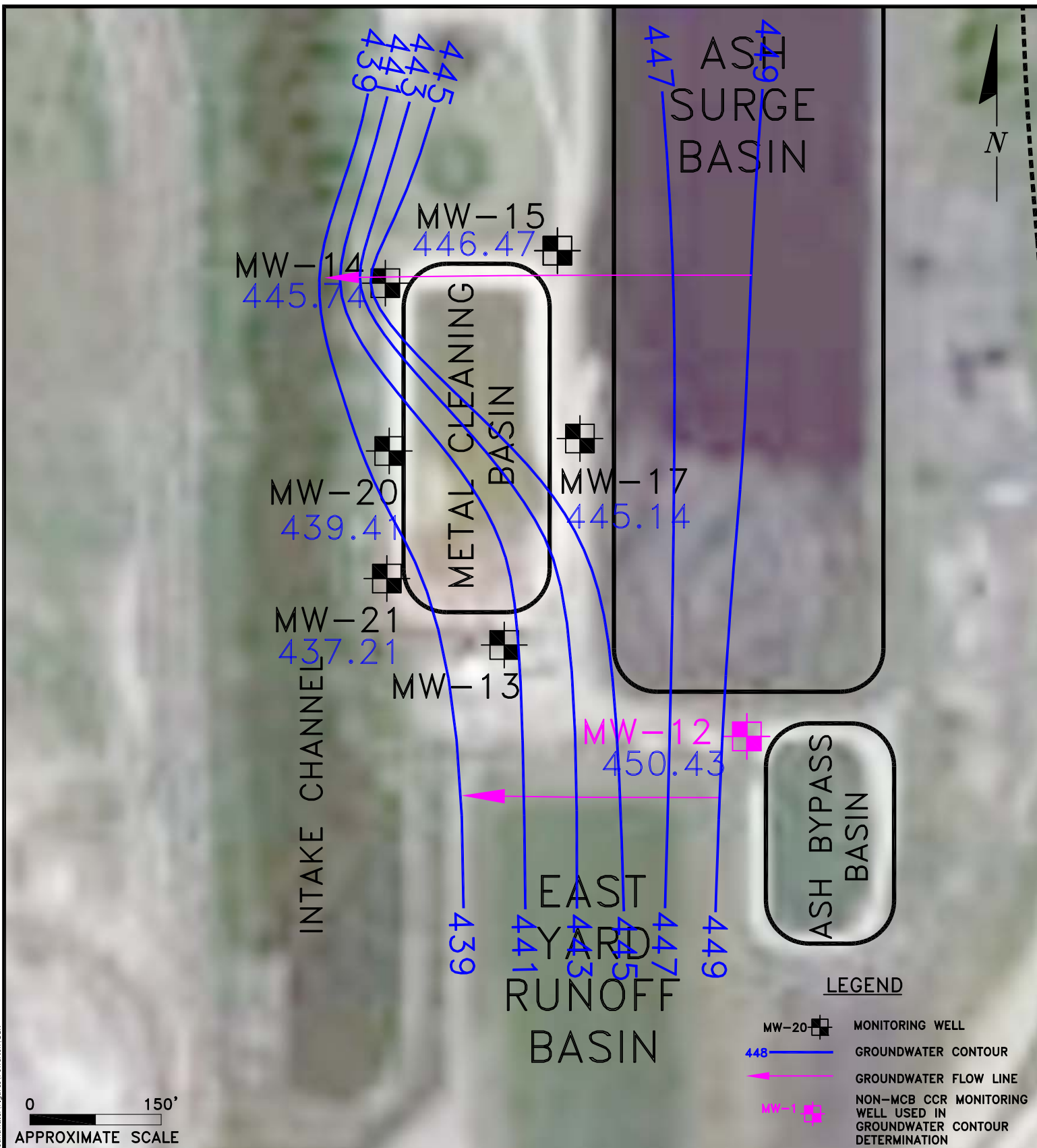
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



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POTENTIOMETRIC MAP 09/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

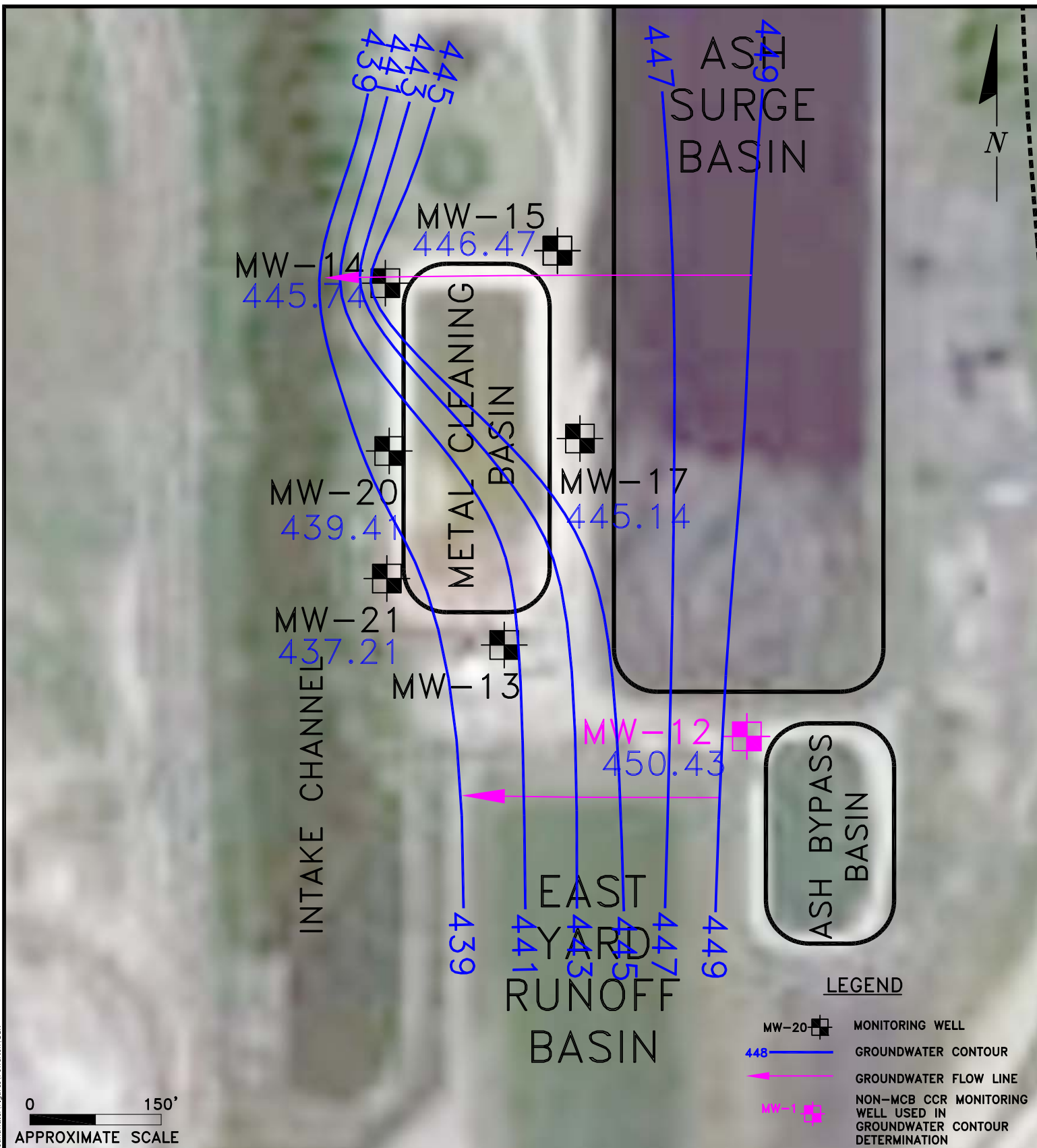
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



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POTENTIOMETRIC MAP 10/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

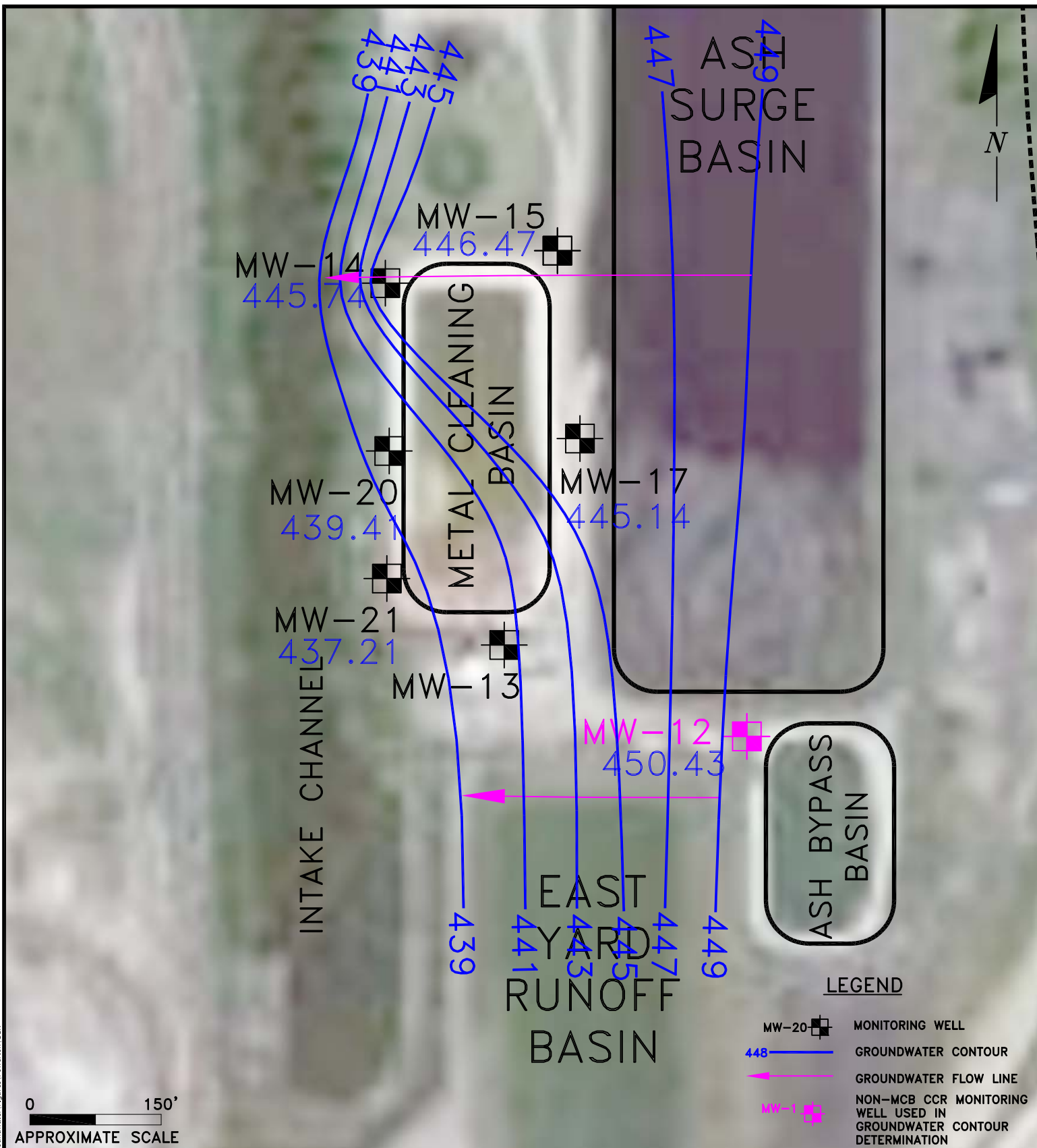
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

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POTENTIOMETRIC MAP 11/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

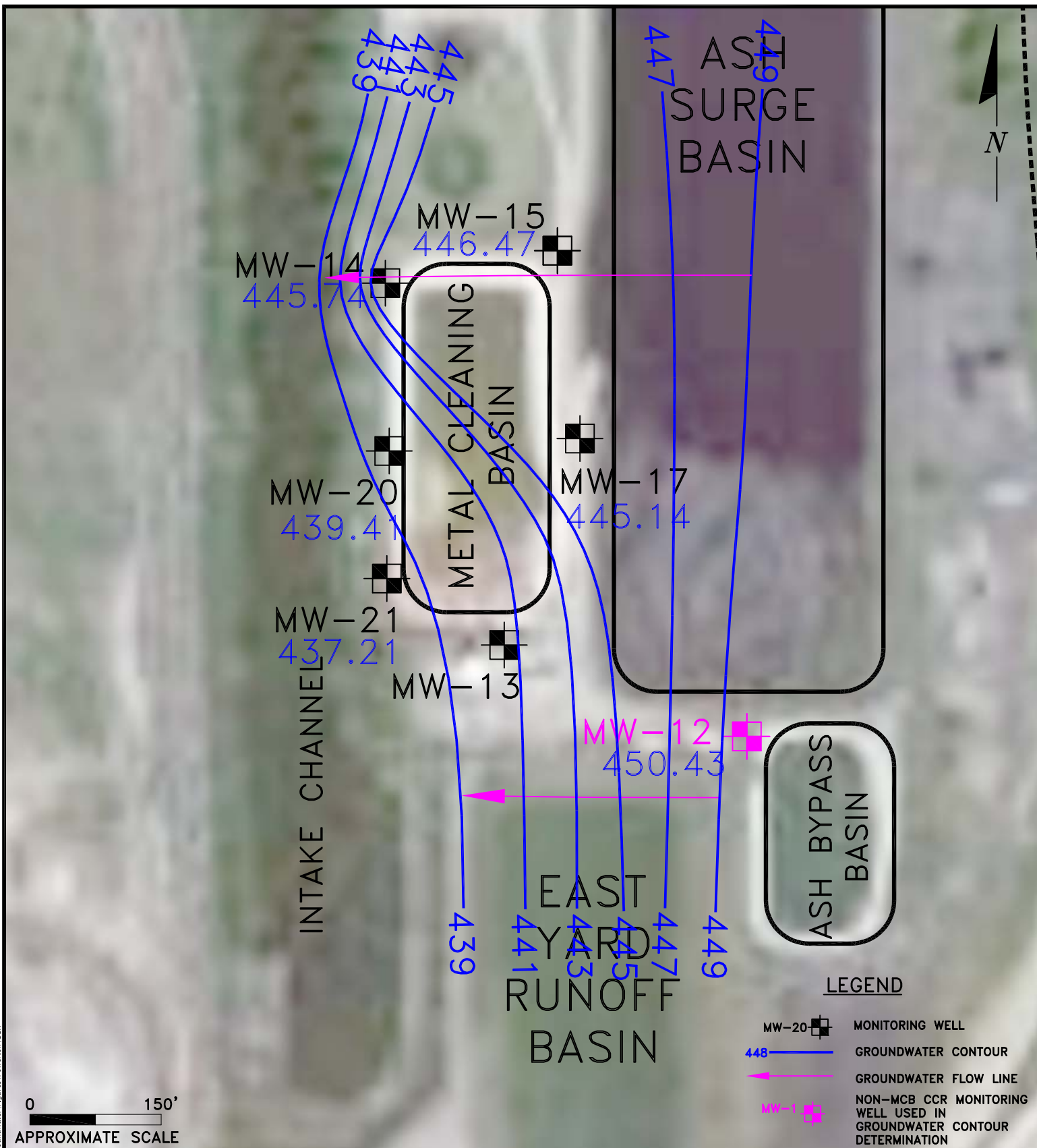
Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powertron CCR



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POTENTIOMETRIC MAP 12/2021

POWERTRON STATION METAL CLEANING BASIN
PEKIN, ILLINOIS

Scale: 1" = 150'

Date: January 20, 2022

KPRG Project No. 12313.5

ATTACHMENT 9-3

ATTACHMENT 9-4
HISTORICAL CCA GROUNDWATER DATA

Attachment 9-4. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Powerton Station, Pekin, IL.

[illegible][illegible][illegible]

Attachment 9-4. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Powerton Station, Pekin, IL.

[illegible][illegible][illegible]

Attachment 9-4. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Powerlon Station, Pekin, IL.

[illegible][illegible][illegible]

Attachment 9-4. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Powerton Station, Pekin

[illegible][illegible][illegible]

ATTACHMENT 9-5
CERTIFICATION OF GROUNDWATER MONITORING
WELL SYSTEM

CERTIFICATION
35 Ill. Adm. Code 845.630

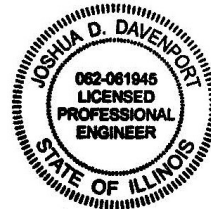
In accordance with Section 35 Ill. Adm. Code 845.630(g), I hereby certify based on review of the information contained within the Initial Operating Permit Application for Powerton Generating Station Metal Cleaning Basin dated March 31, 2022, the groundwater monitoring system has been designed and constructed 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; 4) Illinois Environmental Protection Agency (IEPA) approved the overall initial hydrogeologic assessment as part of a larger study.

Certified by: _____



Date: _____

3/31/22



Joshua Davenport, P.E.

Professional Engineer Registration No.: 062-061945

KPRG and Associates, Inc.

ATTACHMENT 9-6
PROPOSED CCR COMPLIANCE STATISTICAL
APPROACH AND CERTIFICATION



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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2.0 STATISTICAL METHOD SELECTION and BACKGROUND DATA EVALUATION	2
2.1 Outlier Testing	2
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2.4 Trend Testing	3
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2.7 Prediction Limit Calculation for Normally Distributed Data	4
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3.0 GROUNDWATER MONITORING	6
4.0 CERTIFICATION.....	8

FIGURE

Figure 1 – Monitoring Well Location Map

TABLE

Table 1 – Section 845.600 Parameters

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 SanitasTM 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 as 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:

$$95\% \text{ Prediction Limit} = \bar{x} + t_{1-0.05/m, n-1} S \sqrt{1 + \frac{1}{n}}$$

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 student's 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



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KPRG and Associates, inc.

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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 11-1
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: 

Title: Plant Manager

ATTACHMENT 11-2
PUBLIC MEETING GENERAL SUMMARY

**Midwest Generation, LLC
Powerton Generating Station
Ash Surge Basin Retrofit and Metal Cleaning Basin Retrofit
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 retrofits of Powerton Generating Station’s Ash Surge Basin and Metal Cleaning 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 two miles of the facility on March 23, 2023, which totaled 1,104 residential mailing addresses. The notice was also posted in 29 public locations within 10 miles of the facility boundary.

The public meetings for Powerton Generating Station’s Ash Surge Basin and Metal Cleaning Basin were held on April 24, 2023 from 6:00 p.m. to 8:00 p.m. and on April 25, 2023 from 10:00 a.m. to 12:00 p.m. The meetings were held in person. Two members of the public attended the April 24th meeting. Seven members of the public, including one who attended the previous meeting, attended the April 25th meeting. 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 meeting. All attendees requested a copy of the meeting summary and transmittal of their email address to the Agency to be added to the Agency’s listserv for the facility. All email addresses received will be transmitted to the Agency. After an introduction and approximate 30-minute presentation on the proposed retrofit construction plans, the public was given approximately 1.5 hours 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 Ash Surge Basin and Metal Cleaning Basin by removing the remaining material in the basin, retaining and decontaminating the existing geomembrane liner as an additional protective layer under the new composite liner system, and installing a new composite liner system and leachate collection and removal system.

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETING

Retrofit Design and Process

Questions were asked about the longevity of the retrofitted ponds. The HDPE geomembrane liner and geosynthetic clay liner materials proposed to be used in the retrofit plans are designed to meet the standards outlined by the U.S. Environmental Protection Agency and Illinois EPA in their respective CCR Rules. These liners are used in many environmental applications across the country and ongoing research estimates these geosynthetic materials, which will be covered, can last hundreds of years.

Questions were asked about the leachate collected after the retrofit and how it is treated. Leachate collected after the retrofit of the ponds will be collected, treated, and discharged via the Powerton Station's NPDES wastewater permit.

A question was asked about the retrofit timelines. The current plan is to retrofit the Metal Cleaning Basin first, followed by the Ash Surge Basin. While MWG will attempt to retrofit both the Ash Surge and Metal Cleaning Basins in parallel, construction cannot begin until permits are issued by the Illinois EPA, and limits on materials delivery and availability of contractors may prohibit this.

A question was asked about how the liner will be protected from damage during the decontamination and retrofit processes. There are two common methods that a contractor could use to remove material above the basins' existing liners: (1) traditional excavation and (2) hydro-excavation. Under a traditional excavation, the contractor could use front-end loaders, excavators, or other conventional excavation equipment with rubber-surfaced buckets, blades, etc. to protect the existing geomembrane liners as material is removed from the sideslopes and floors of the basins. Under a hydro-excavation, the contractor could use specialized equipment to apply pressurized water to break-up the existing materials and an industrial vacuum to remove the broken-up material, all while avoiding damage to the existing geomembrane liners. Ultimately, the means and methods used to decontaminate the basins' existing geomembrane liners will be determined by the contractor hired by MWG to retrofit the basins. Regardless of the actual means and methods implemented, the contractor will be responsible for taking all necessary precautions to avoid damaging the basins' existing geomembrane liners. In the rare instance where an existing liner is accidentally damaged, the contractor will be responsible for assessing the extent of the damage and patching the damaged area(s).

A question was asked about the size of the retrofitted basins. The footprints of the retrofitted basins will be the same as the current basins: the Ash Surge Basin is approximately 8.4 acres and the Metal Cleaning Basin approximately 2.3 acres in size. The overall footprints will not change.

A question was asked about ash handling during the retrofit process. Any ash that is removed from the pond during the retrofit construction process will be dewatered and sent off-site to a permitted landfill or beneficial use site.

A question was asked whether the material that underlies the current HDPE geomembrane liners of the ponds will be remediated during the retrofit process. The plan for retrofitting the Ash Surge and Metal Cleaning Basins 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 subgrade. The competency of the pond's existing HDPE geomembrane liners 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.

Groundwater Monitoring

Questions were asked about remediation plans for CCR constituents that may leak into groundwater. The Illinois CCR Rule outlines a corrective action process that would be implemented should groundwater monitoring identify a release of CCR constituents into groundwater. The process includes notification to the Illinois EPA, characterization of the nature and extent of the release, development of an assessment of corrective measures, public meetings, and submittal of a corrective action plan permit application. The corrective action plan must be approved by the Illinois EPA in the form of an issued permit. Once the permit is granted, corrective action would commence. Groundwater monitoring is conducted quarterly, as required by the Illinois CCR Rule.

Current Design

A question was asked about the separation distance between the groundwater and bottom of the ponds. The Metal Cleaning Basin's base is at least five feet above the upper limit of the site's uppermost aquifer. The Ash Surge Basin's base is within five feet of the upper limit of the site's uppermost aquifer, but there is no intermittent, recurring, or sustained hydraulic connection between any portion of the base of the Ash Surge Basin and the uppermost aquifer due to normal fluctuations in groundwater elevations. Therefore, both the Ash Surge Basin and Metal Cleaning Basin meet the Illinois CCR Rule's required separation between a CCR surface impoundment and the upper limit of the uppermost aquifer.

A question was asked about whether the sides of the ponds are lined. The sides of both ponds are currently lined with a 60-mil high density polyethylene (HDPE) liner and will also be lined with a composite liner system required by the Illinois CCR Rule once retrofitted.

Metal Cleaning Basin

A question was asked about an orange area visible on the overview map of the station slide and whether the color was indicative of acid mine drainage and high metals. The area in question was the south end of the Metal Cleaning Basin. Due to nature of the boiler wash water sluiced to the Metal Cleaning Basin, there are some metals in that wastewater; however, the water is treated via a wastewater treatment process to remove metals prior to discharge through the Station's NPDES permitted discharge. The clarifier solids are disposed in a permitted landfill or are beneficially reused.

A question was asked about beneficial use of ash in mine reclamation processes. The ash is sampled to ensure it meets the requirements and specifications of the end users.

Written Comments

The Central Illinois Heathy Community Alliance presented a letter addressed to MWG and Illinois EPA at the April 25th meeting, signed by Tracy Fox. With regard to the issues raised in that letter, MWG has no indication that soils beneath either basin are "damaged" and require remediation. Additionally, as stated above, ash that is removed from either basin during the retrofit process will be sent off-site to either a permitted landfill or beneficially reused. Midwest Generation, LLC is fully committed to complying with environmental laws and regulations.

Future

A question was asked about whether carbon capture sequestration was an option at the Powerton Station. MWG is not currently planning carbon capture sequestration at Powerton Station.

General concerns were raised about potential future impacts to the ponds due to climate change, such as groundwater level fluctuations and flooding, historic fill, and impacted soils under the basins. During the useful life of the impoundments and throughout the closure and post-closure care periods (if applicable), groundwater monitoring will continue, which includes monitoring and reporting the groundwater levels in the monitoring wells. Additionally, the impoundments will continue to be inspected by qualified staff and annually by a certified Professional Engineer. MWG has no evidence that groundwater levels around the impoundments at Powerton Station is rising, year-over-year.

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 Ash Surge Basin and the Metal Cleaning Basin 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.

Powerton Generating Station Public Meetings
Metal Cleaning Basin and Ash Surge Basin
April 24 & 25, 2023

Email Address	Name	General Summary	Listserv
annschreifels@gmail.com	Ann Schreifels	Yes	Yes
joblumen@yahoo.com	Joyce Blumenshine	Yes	Yes
bradley.wrighthulett@gmail.com	Bradley Wright-Hulett	Yes	Yes
jahchoices@gmail.com	Joyce Harat	Yes	Yes
moosersrus@yahoo.com	Jim & Bernie Humphrey	Yes	Yes

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

APPENDIX B

Application for Retrofit Construction Permit Application - Ash
Surge Basin July 26, 2023



Thomas J. Dehlin, P.E.

Project Engineer (Licensed in IL, KY, and WY)
(312) 269-6373
tdehlin@sargentlundy.com

July 26, 2023

Illinois Environmental Protection Agency
DWPC – Permits MC #15

Attn: Part 845 Coal Combustion Residual Rule Submittal

1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Powerton Ash Surge Basin Retrofit Construction Permit Application

To Whom It May Concern:

On behalf of Midwest Generation, LLC (MWG), Sargent & Lundy (S&L) respectfully submits the enclosed construction permit application to retrofit the Ash Surge Basin (Illinois EPA ID No. W1798010008-01) at MWG's Powerton Generating Station pursuant to 35 Ill. Adm. Code 845.770. The enclosed permit application has been prepared in accordance with 35 Ill. Adm. Code 845.220(a)–(b). As detailed in the application, MWG is proposing to retrofit the Ash Surge Basin with a new composite liner system and a new leachate collection system.

We look forward to working with the Illinois EPA on this project. Please contact me ((312) 269-6373 or tdehlin@sargentlundy.com) or Mr. Joseph Kotas at the Powerton Generating Station ((309) 477-5216 or Joseph.Kotas@nrg.com) with any questions or concerns regarding this permit application.

Best Regards,

A handwritten signature in black ink, appearing to read 'Th. Dehlin'.

Thomas J. Dehlin, P.E.

Enclosures:

1. Form CCR 1 – General Provisions
2. Form CCR 2CN – New Construction
3. Application for Retrofit Construction Permit

Form
CCR 1



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 1 – General Provisions

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:

Facility Name:

SECTION 1: FACILITY, OPERATOR, AND OWNER INFORMATION (35 Ill. Adm. Code 845.210(b))

Facility, Operator, and Owner Information	1.1	Facility Name		
		Powerton Generating Station		
	1.2	Illinois EPA CCR Permit Number (if applicable)		
	1.3	Facility Contact Information		
		Name (first and last)	Title	Phone Number
		Joseph Kotas	Environmental Specialist	309-477-5216
		Email address		
	Joseph.Kotas@nrg.com			
	1.4	Facility Mailing Address		
		Street or P.O. box		
		13082 East Manito Road		
		City or town	State	Zip Code
	Pekin			IL
1.5	Facility Location			
	Street, route number, or other specific identifier			
	13082 East Manito Road			
	County name	County code (if known)		
	Tazewell			
	City or town	State	Zip Code	
Pekin			IL	61554
1.6	Name of Owner/Operator			
	Midwest Generation, LLC			

Facility, Operator, and Owner Info	1.7	Owner/Operator Contact Information		
		Name (first and last) Todd Mundorf	Title Plant Manager	Phone Number 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 Princeton	State NJ	Zip Code 08540
SECTION 2: LEGAL DESCRIPTION (35 Ill. Adm. Code 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) N W 1/4 300.7 AC		
SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 Ill. Adm. Code 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.		
		W1798010008-01	☒	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description
			☐	Attached written description

		☐	Attached written description
		☐	Attached written description
		☐	Attached written description
		☐	Attached written description

SECTION 5: CHECKLIST AND CERTIFICATION STATEMENT

Checklist and Certification Statement	5.1	In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing.			
		Column 1		Column 2	
		Section 1: Facility, Operator, and Owner Information	☒	w/attachments	☒
		Section 2: Legal Description	☒	w/attachments	☐
		Section 3: Publicly Accessible Internet Site Requirement	☒	w/attachments	☐
		Section 4: Impoundment Identification	☒	w/attachments	☒
	5.2	Certification Statement			
		I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.			
	Name (print or type first and last name) of Owner/Operator		Official Title		
	Todd Mundorf		Plant Manager		
	Signature 		Date Signed 7/25/23		



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 2CN – New Construction

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:

Facility Name:

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

Design and Construction Plans (Construction History)	1.1	CCR surface impoundment name.
		Ash Surge Basin
	1.2	Identification number of the CCR surface impoundment (if one has been assigned by the Agency).
		W1798010008-01
	1.3	Describe the boundaries of the CCR surface impoundment. (35 Ill. Adm. Code 845.210 (c)).
		SEC 8 T24N R5W E 1/2 OF NE 1/4 (EXC RIVER) & E 1/2 OF SE 1/4 (EXC RIVER & EXC TRACT) 111.65 AC
	1.4	State the purpose for which the CCR surface impoundment is being used.
		The Ash Surge Basin is primarily used as a settling pond for bottom ash remaining in decant water from the facility's dewatering bins. The basin also manages other non-CCR waste streams related to power generation at the site.
	1.5	How long has the CCR surface impoundment been in operation?
		45 Years (Since 1978)
1.6	List the types of CCR that have been placed in the CCR surface impoundment.	
	Bottom Ash	
1.7	List the name of the watershed within which the CCR surface impoundment is located.	
	Pekin Lake-Illinois River Watershed	

Design and Construction Plans (Continued)	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?		
		28,834 acres		
	1.9	Check the corresponding boxes to indicate that you have attached the following:		
	☒	A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.		
	☒	A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR surface impoundment.		
	☒	A statement of the method of site preparation and construction of each zone of the CCR surface impoundment.		
	☒	A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.		
	☒	Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).		
	☒	A description of the type, purpose, and location of existing instrumentation.		
	☒	Area Capacity Curves for the CCR Impoundment.		
1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?			
	☐	Yes	☒	No
1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.			
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.		
		Bottom Ash		
	2.2	Have you attached a chemical analysis of each type of expected CCR?		
	☒	Yes		

Narrative Description (Cont.)	2.3	Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.		
	The Ash Surge Basin's maximum capacity is approximately 162,000 cubic yards.			
	2.4	The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.		
	18.8 million	GPD		dTn
	2.5	Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.		
	Approximately 4 Years (December 31, 2028)			
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	☐	No
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 States 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.		
	☒	A summary of the issues raised by the public during the public notification and public meetings.		
	☒	A summary of any revisions, determinations, or other considerations made in response to those issues raised by the public during the public notification and public meetings.		
	☒	A list of interested persons in attendance who would like to be added to the Agency's listserv for the facility.		
☒	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in erosion control and environmental remediation.			

			Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in the operation of heavy equipment and excavation.
SECTION 5: GROUNDWATER MONITORING PROGRAM			
Groundwater	5.1	Indicate that you have attached the following components of a new groundwater monitoring program or any modifications to an existing groundwater monitoring program by checking the corresponding boxes:	
	☒	A hydrogeologic site investigation meeting the requirements of 35 III. Adm. Code 845.620, if applicable.	
	☒	Design and construction plans of a groundwater monitoring system meeting the requirements of 35 III. Adm. Code 845.630.	
	☒	A proposed groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by 35 III. Adm. Code 845.640 and 35 III. Adm. Code 845.650.	
SECTION 6: PLANS AND SPECIFICATIONS			
Plans and Specifications	6.1	Indicate that you have attached plans and specifications that demonstrate the proposed CCR surface impoundment will meet the location standards in the following sections by checking the corresponding boxes:	
	☒	35 III. Adm. Code 845.300 (Placement Above the Uppermost Aquifer)	
	☒	35 III. Adm. Code 845.310 (Wetlands)	
	☒	35 III. Adm. Code 845.320 (Fault areas)	
	☒	35 III. Adm. Code 845.330 (Seismic impact zones)	
	☒	35 III. Adm. Code 845.340 (Unstable areas and floodplains)	
	6.2	Indicate that you have attached plans and specifications that demonstrate the proposed CCR surface impoundment will meet the following design criteria by checking the corresponding boxes:	
	☒	The CCR surface impoundment will have a liner meeting the liner requirements of 35 III. Adm. Code 845.400(b) or (c).	
	☒	The CCR surface impoundment will have a leachate collection system meeting the requirements of 35 III. Adm. Code 845.420.	
	☒	The CCR surface impoundment, if not incised, will be constructed with slope protection, as required by 35 III. Adm. Code 845.430.	
	6.3	Indicate that you have attached the following plans by checking the corresponding boxes:	
	☒	CCR fugitive dust control plan, as specified in 35 III. Adm. Code 845.500(b).	
	☒	Preliminary written closure plan, as specified in 35 III. Adm. Code 845.720(a).	
☒	Initial written post-closure care plan, as specified in 35 III. Adm. Code 845.780(d), if applicable.		

MWVG

Midwest Generation, LLC

Powerton Generating Station
Ash Surge Basin
(IEPA ID No. W1798010008-01)

Application for Retrofit Construction Permit

Revision 0

July 26, 2023

Issue Purpose: Permit

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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Attachment 11-1	Owner Certification
Attachment 11-2	Public Meeting General Summary

INTRODUCTION

Midwest Generation, LLC (MWG) currently operates the Powerton Generating Station (“Powerton” or the “Station”), a coal-fired steam electric generating station located in Pekin, Illinois. The Station’s address is 13082 East Manito Rd, Pekin, IL 61554. The Station consists of four coal-fired boilers and two electric generating units, Units 5 and 6, with an approximate nameplate capacity of 1,785 megawatts (MW). As part of electric power generating operations, bottom ash, a coal combustion residual (CCR) from the Station’s boilers, is sluiced to a set of two dewatering bins (one dedicated pair per unit) which mechanically promote sedimentation of the suspended bottom ash particles in the sluice water. Decant water from each pair of dewatering bins, which still contains some bottom ash particles, then overflows into a concrete trench that directs the effluent into a CCR surface impoundment for additional sedimentation. Currently, decant water from the Station’s dewatering bins is being sent to the Station’s Ash Surge Basin.

Pursuant to § 845.220 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code), MWG is submitting this application to the Illinois Environmental Protection Agency (Illinois EPA) for a construction permit to retrofit Powerton’s Ash Surge Basin with a new composite liner system and a new leachate collection and removal system so that it may be placed back into service to manage CCR effluent from the Station’s dewatering bins and other non-CCR waste streams from electric power generating operations. The purpose of this report and all attachments hereto is to demonstrate that the design, construction, and operation of the retrofitted Ash Surge Basin will comply with the Illinois Pollution Control Board’s “Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments,” which are codified in Part 845 to the aforementioned 35 Ill. Adm. Code. Accordingly, this report and all attachments hereto provide the documents and information required for a construction permit application to retrofit an existing CCR surface impoundment as specified by 35 Ill. Adm. Code 845.220(a)–(b).

1.0 HISTORY OF CONSTRUCTION (845.220(A)(1))

The history of construction for the Ash Surge Basin as specified by 35 Ill. Adm. Code 845.220(a)(1) is presented in Sections 1.1 through 1.13.

1.1 CCR SURFACE IMPOUNDMENT IDENTIFYING INFORMATION

The Ash Surge Basin is operated by Midwest Generation, LLC, whose address is 804 Carnegie Center, Princeton, NJ, 08540. The Ash Surge Basin's Illinois EPA identification number is W1798010008-01.

1.2 PURPOSE OF THE CCR SURFACE IMPOUNDMENT

The Ash Surge Basin is used as the primary settling pond for bottom ash remaining in decant water from Powerton's dewatering bins and for other process water related to power generation at the site. After it has been retrofitted with a new composite liner system and a new leachate collection and removal system, the Ash Surge Basin will be used for this same purpose.

1.3 CCR SURFACE IMPOUNDMENT SERVICE HISTORY

The Ash Surge Basin was originally constructed circa 1978 and has been operating since that time.

1.4 TYPES OF CCR IN THE SURFACE IMPOUNDMENT

The Ash Surge Basin accepts bottom ash remaining in decant water from Powerton's dewatering bins. The chemical constituents that make up the Station's bottom ash are discussed in detail in Section 2.1.

1.5 NAME & SIZE OF SURROUNDING WATERSHED

The Ash Surge Basin is located within the Pekin Lake-Illinois River watershed (U.S. Geological Survey 12-Digit Hydrologic Unit Code 071300030304), which is approximately 28,834 acres (USGS, 2021). This watershed is located within the larger Lower Illinois watershed.

It should be noted that the surface water runoff for the Ash Surge Basin is limited to the area within the embankment crests because they are constructed with elevated embankments in relation to the surrounding ground surface.

1.6 DESCRIPTION OF CCR SURFACE IMPOUNDMENT FOUNDATION MATERIALS

1.6.1 PHYSICAL PROPERTIES OF FOUNDATION MATERIALS

The following descriptions of the physical properties of the Ash Surge Basin's foundation materials are taken from the history of construction prepared by Geosyntec Consultants (Geosyntec) for the basin in 2016 (Geosyntec, 2016a).

The physical properties of the foundation materials in the vicinity of the Ash Surge Basin generally consist of interlaying sandy and clayey units. Soil borings performed in 2005 as part of a site investigation by KPRG and Associates, Inc. (KPRG) 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 Ash Surge Basin that identified a layer of very hard lean clay below the above-mentioned poorly graded sand and gravel. Finally, no abutments are present.

1.6.2 ENGINEERING PROPERTIES OF FOUNDATION MATERIALS

The following descriptions of the engineering properties of the Ash Surge Basin's foundation materials are taken from the initial structural stability and safety factor assessments prepared by Geosyntec for the basin in 2016 (Geosyntec, 2016b).

The foundation materials for the Ash Surge Basin were determined to be clay or sand as indicated in Section 1.6.1; the engineering properties for these materials are presented in Table 1.6-1 **Error! Reference source not found.** The properties were determined from site investigations, published correlations, and laboratory testing of samples collected during the site investigations referenced in Section 1.6.1.

Table 1.6-1 – Engineering Properties of Foundation Materials

Material	Unit Weight (pcf)	Drained Friction Angle (degrees)	Effective Cohesion (psf)	Undrained Shear Strength (psf)
Clay	115	32	25	600
Sand	125	32	0	--

The very hard lean clay mentioned in Section 1.6.1 that underlies the poorly graded sand and gravel did not have engineering properties determined for it. This was because of its depth below ground surface in relation to the basins and its negligible contribution to the slope stability analysis (Geosyntec, 2016b).

1.7 DESCRIPTION OF CONSTRUCTION MATERIALS, METHODS, AND DATES

The following descriptions of the historical construction materials, methods, and dates for the Ash Surge Basin are based on the construction plans prepared by (1) NUS Corporation in 1978 for the basin's original construction and by (2) Natural Resource Technology (NRT) in 2013 for re-lining the basin. Both sets of construction plans are provided in Attachment 1-1 and Attachment 1-2, respectively. It should be noted that as-built drawings for the original construction of the Ash Surge Basin were not available detailing the actual methods and materials used to construct the basin circa 1978.

1.7.1 PHYSICAL & ENGINEERING PROPERTIES OF CONSTRUCTION MATERIALS

Based on the original construction plans for the Ash Surge Basin prepared by NUS Corporation in 1978, the basin's embankments were constructed using compacted fill. Engineering properties for the compacted fill were estimated by Geosyntec as shown in Table 1.7-1 for use in the Ash Surge Basin's initial safety factor assessment (Geosyntec, 2016b). These estimated engineering properties were based on site investigations, published data, and laboratory testing of the Ash Surge Basin's embankment materials.

Table 1.7-1 – Engineering Properties of Embankment Materials

Material	Unit Weight (pcf)	Drained Friction Angle (degrees)	Effective Cohesion (psf)
Embankment Fill	125	35	25

1.7.2 CONSTRUCTION METHODS

Based on the 1978 original construction plans, the existing grade where the Ash Surge Basin is located was leveled, and the basin's embankments were constructed with compacted fill. The top of the embankment was designed to be approximately 20 feet wide with a gravel-surfaced access road on top. The interior embankments were designed with slopes of 3-horizontal to 1-vertical (3H:1V), while the exterior slopes were designed at 3H:1V or shallower.

Originally, the Ash Surge Basin was lined with a Hypalon® liner along the basin floor and interior slopes. The bottom of the basin and the lower portion of the embankments were also designed with a 12-inch-thick Poz-O-Pac liner that was to be installed in two 6-inch lifts. In 2013, the Hypalon® liner on the embankments and the Poz-O-Pac liner near the outlet weir were removed (the rest of the Poz-O-Pac liner remained), and a new high-density polyethylene (HDPE) geomembrane liner was placed on the embankments and the outlet weir.

The HDPE geomembrane liner was continued from the embankments and placed on the base of the ASB over the existing Poz-O-Pac liner. Based on the as-built drawings created during the liner replacement in 2013, the interior side slopes were determined to be inclined at approximately 4H:1V.

1.7.3 CONSTRUCTION DATES

Exact dates for construction of the Ash Surge Basin's embankments, original Hypalon® and Poz-O-Pac liner system, and appurtenant structures are unknown; however, construction drawings were approved for construction in 1978. As previously stated, a new 60-mil HDPE geomembrane liner was installed in 2013 over the original liner system along the base of the Ash Surge Basin.

1.8 DETAILED DIMENSIONAL DRAWINGS

The original construction plans for the Ash Surge Basin prepared by NUS Corporation in 1978 are provided in Attachment 1-1. Meanwhile, the as-built drawings for replacing the Ash Surge Basin's liner prepared by NRT in 2014 (documenting the re-lining work completed in 2013), are provided in Attachment 1-2.

1.9 INSTRUMENTATION

A water level monitoring system with an ultrasonic level detector in the pump house sump north of the Ash Surge Basin is used to control the pumps that maintain the operational water level in the Ash Surge Basin. However, this instrumentation does not determine the water level in the Ash Surge Basin. 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 retrofitted Ash Surge Basin is provided in Attachment 1-4.

1.11 SPILLWAY AND DIVERSION DESIGN FEATURE CAPACITIES AND CALCULATIONS

The Ash Surge Basin has a concrete spillway near the northeastern corner of the basin. The spillway was constructed of two 4.5-foot-wide concrete box culverts beneath the perimeter access road. A concrete apron is located east of the box culvert, and riprap is located downstream of the apron. Although no calculations for the original design of this emergency spillway structure are available, the Ash Surge Basin has operated properly without any issues.

1.12 SURVEILLANCE, MAINTENANCE, & REPAIR CONSTRUCTION SPECIFICATIONS

Technical specifications for the Ash Surge Basin liner replacement project performed in 2013 are provided in Attachment 1-3.

1.13 RECORD OF STRUCTURAL INSTABILITY

There is no record or knowledge of structural instability associated with the Ash Surge Basin.

2.0 NARRATIVE DESCRIPTION OF THE FACILITY (845.220(A)(2))

2.1 CCR TYPES & CHEMICAL ANALYSES

Bottom ash is currently being managed in the Ash Surge Basin and will continue to be managed in the basin after it has been retrofitted with a new composite liner system and a new leachate collection and removal system. A sample of the CCR present in the Ash Surge Basin was sampled and analyzed for the parameters listed in 35 Ill. Adm. Code 845.600(a) except for total dissolved solids. The results of those analyses are presented in Table 2.1-1, and the total laboratory data package is provided in Attachment 2-1.

**Table 2.1-1 – Chemical Constituents of CCR to be
Managed in Powerton Ash Surge Basin¹**

Parameter	CCR Sample ² (06-23-2021)	Parameter	CCR Sample ² (06-23-2021)
Antimony	< 8.6	Cobalt	< 11
Arsenic	2.2	Fluoride	4.7
Barium	1,800	Lead	5.5
Beryllium	0.90	Lithium	12
Boron	46	Mercury	0.094
Cadmium	< 0.17	Molybdenum	1.0
Calcium	39,000	Selenium	< 0.86
Chloride	88	Sulfate	230
Chromium	16	Thallium	1.2

Notes:

1. Reproduced from Table 2-1 in KPRG, 2021a.
2. All results are in milligrams per kilogram (mg/kg).

2.2 MAXIMUM CAPACITY

The Ash Surge Basin's current maximum capacity is approximately 162,000 cubic yards.

2.3 WASTE STREAMS

Powerton currently sends bottom ash and miscellaneous non-CCR waste streams to the Ash Surge Basin and will continue to send these same wastestreams to the basin after it has been retrofitted. These waste streams and their corresponding average flow rates are listed in Table 2.3-1 and are shown on the Station's

process flow diagram provided in Attachment 2-2. These waste streams are all treated for suspended solids removal prior to being discharged to the Illinois River in accordance with the Station's NPDES Permit No. IL0002232.

Table 2.3-1 – Future Inflows into Powerton Ash Surge Basin

Waste Stream	Description	Average Flow, MGD (Type)
Unit 5 & 6 Dewatering Bin Effluent	Effluent from the Unit 5 and 6 dewatering bins containing suspended bottom ash particles.	10.9 (Typical)
Unit 5 and 6 Slag Tank Overflow	Overflow water from the boiler slag tanks. Include wastewater from: - Dust extractors in the coal tripper room, and - Washdown of the tail end and tripper rooms.	6.2 (Typical)
East Yard Runoff Basin Overflow	Overflow water from the Station's East Yard Runoff Basin. In addition to runoff from the eastern portion of the Station's property, includes water from: - Roof and yard drains in the areas of former Units 1, 2, 3, and 4; - Boiler room sumps, roof drains, and building drains; - Scrubber and limestone building area drains; - Condensate storage tank overflow; - Washdown of the trona mill; - Trona mill roof drains; and - Fan bay and unloading area drains.	1.3 (Intermittent)
Makeup Treatment Plant Effluent	Wastewater generated by the Station for treating makeup water prior to use in plant processes. Includes: - Demineralizer sand filter backwash, - Demineralizer regenerant, - Reverse osmosis (RO) reject wastewater, and - RO cleaning wastewater.	0.4 (Typical)
Metal Cleaning Waste Treatment System Effluent	Effluent from the Station's Metal Cleaning Waste Treatment System, which treats gas-side boiler cleaning waste overflow from the Metal Cleaning Basin.	0.04 (Intermittent)

Source: Sargent & Lundy (2021).

2.4 OPERATING LIFE

The Ash Surge Basin is currently anticipated to receive the CCR and non-CCR waste streams listed in Table 2.3-1 until December 31, 2028.

2.5 ON-SITE TRANSPORTATION PLAN

The Powerton Generating Station is a secure facility. The property boundary is fenced in with two gates. The main gate has a guard house with full time security. This will be the typical vehicle access to the Ash Surge Basin using the main plant road. Visitors will be required to sign in and out with the guard personnel. The second gate will be used for large vehicles to access the Ash Surge Basin. This gate is a slide gate with a key card just east of the main gate.

Upon approval of this construction permit application, the Ash Surge Basin will be retrofitted with a new composite liner system and a new leachate collection system. During the retrofit construction activities, access to the facility will still be controlled via the two aforementioned gates. As needed, road intersections are traffic-controlled with stop signs. The speed limit on the property is typically 10 miles per hour.

The Ash Surge Basin will be accessed using the existing roads on the property. These roads are shown in Figure 2 in Attachment 2-3. The main road that leads from the main gate ultimately leads to the southwest corner of the Ash Surge Basin at the eastern end of the facility's property. Meanwhile, the plant road utilized by large vehicles ultimately leads to the southeast corner of the Ash Surge Basin. Asphalt roads along the basin's southern and western embankments will allow vehicles to reach the basin's access ramp along the basin's western embankment. These roads will be used by construction personnel to bring materials and equipment required to retrofit the Ash Surge Basin. Larger construction equipment may utilize the Ash Surge Basin's full perimeter road to navigate around the Station's CCR surface impoundments back south to the heavy equipment gate. Such equipment will also have either backup alarms or spotters as they are backing up near the Ash Surge Basin.

Transportation access to the Ash Surge Basin will not be required during normal day-to-day operations after the Ash Surge Basin has been retrofitted and placed back into service. Station personnel will use the access roads shown in Figure 2 (Attachment 2-3) during weekly inspections of the basin to ensure no issues arise. On a quarterly basis, groundwater sampling will be performed at the monitoring wells surrounding the Ash Surge Basin, during which time these roads will be used to access the wells.

3.0 SITE LOCATION MAP (845.220(A)(3))

A site location map on the most recent U.S. Geological Survey (USGS) quadrangle of the area from the 7 ½ minute topographic series is provided in Attachment 3. This map includes details regarding the facility and adjacent properties boundaries extending 1000 meters, surface waters, the prevailing wind direction, and the limits of all 100-year floodplains. Alongside this, 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 also shown on this map.

4.0 SITE PLAN MAP (845.220(A)(4))

Site plan maps providing the information required by 845.220(a)(4) are included in various attachments. Figures 4-1 and 4-2 in Attachment 4 show the entire Powerton Generating Station property (Figure 4-1) and a plan view showing Units 5 and 6, the locations of all existing CCR surface impoundments, and facility roads (Figure 4-2). Transportation routes from the Station's main gates to the CCR surface impoundments are shown on the aforementioned transportation plan in Figure 2. The boundaries of the Station's CCR surface impoundments and the locations of their existing groundwater monitoring wells are shown on Figure 9-1 in Attachment 9. Finally, cross sections near / through the Station's CCR surface impoundments are shown on Figures 9-2 through 9-7 in Attachment 9.

5.0 DESCRIPTION OF PROPOSED RETROFIT (845.220(A)(5))

The proposed construction plans and specifications for retrofitting the Ash Surge Basin are provided in Attachment 5-1. MWG intends for the retrofit work to be performed by a General Work (GW) Contractor and its subcontractors, while an independent, third-party Construction Quality Assurance (CQA) Contractor will be responsible for assuring the Ash Surge Basin is retrofitted in accordance with the proposed construction plans and specifications. The technical specifications for the CQA work are provided in Attachment 5-2.

In accordance with the proposed construction plans and specifications, MWG plans to retrofit the Ash Surge Basin with a new composite liner system and a new leachate collection and removal system by executing the following sequential steps:

1. Removing the CCR from the basin and transporting the material to a beneficial-use facility or a permitted disposal facility in accordance with current and historic Station maintenance procedures for the Ash Surge Basin;
2. Obtaining a construction permit from the Illinois EPA for retrofitting the Ash Surge Basin;
3. Removing the gravel warning and sand cushion layers over the existing geomembrane liner from the basin and transporting the soil materials to a permitted disposal facility;
4. Decontaminating the basin's existing geomembrane liner for re-use as a supplemental liner in the retrofitted basin, including submittal of visual inspection documentation and analytical testing results to demonstrate the existing liner is not contaminated with CCR constituents in accordance with 35 Ill. Adm. Code 845.770(a)(4);
5. Decontaminating the basin's appurtenant structures (*e.g.*, inlet trough and apron, outlet structures, piping);
6. Placing structural fill within the basin floor to establish the slopes for the new leachate collection and removal system and to support the new composite liner system;
7. Installing a composite liner system consisting of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL); and
8. Installing a leachate collection and removal system consisting of a drainage geocomposite, leachate collection pipe, and submersible sump pump;
9. Installing a filter layer over the leachate collection and removal system; and
10. Installing a protective warning layer over the filter layer.

5.1 CCR REMOVAL & DECONTAMINATION

After temporarily ceasing all flows into the Ash Surge Basin, MWG will remove the ash stored above the granular protective layers covering the Ash Surge Basin's existing geomembrane liner in accordance with the Station's usual cleaning and maintenance practices.

Upon approval of the retrofit construction permit application, the retrofit activities will begin with removal of the granular protective layers covering the Ash Surge Basin's existing geomembrane liner: a 6-in.-thick gravel warning layer and a 12-in.-thick sand cushion layer. MWG will also remove an 18-inch-thick layer gravel warning layer above the basin's existing geomembrane liner between the basin's concrete weir wall and discharge pipe. These materials will be carefully excavated, loaded onto trucks, and transported off-site for disposal at a permitted disposal facility. Because these materials are likely to contain CCR, they will be handled and hauled off-site in accordance with 35 Ill. Adm. Code 845.740(c), which includes specifications for proper manifests for each transported truckload, a transportation plan, on-site fugitive dust controls, signage and public notices, and managing stormwater to prevent contamination of surface water and groundwater.

After the existing granular protective layers in the Ash Surge Basin have been removed, the basin's existing HDPE geomembrane liner will be decontaminated so that it can be re-used as a supplemental liner under the new composite liner system being installed. The basin's inlet trough and apron, outlet structures and associated piping, etc. will also be decontaminated. At a minimum, decontamination procedures will include pressure washing of the geomembrane liner and pond appurtenances in a systematic manner to remove all CCR and CCR residue. Following decontamination, the existing geomembrane liner will be visually inspected, and an electrical leak location survey will be conducted to ensure the liner is competent. Analytical tests will also be conducted in accordance Note 4.C.III on Drawing POW-ASB-CSK-004 (see Attachment 5-1) to demonstrate that the liner is not contaminated with CCR constituents.

5.2 STRUCTURAL FILL

After the existing granular protective layers and riprap have been removed and the Ash Surge Basin's existing HDPE geomembrane liner and appurtenances have been decontaminated, structural fill will be placed, compacted, and graded along the relatively flat basin floor to establish a minimum slope of three percent towards the location of the new leachate collection pipe being installed near the center of the basin. All earthwork activities associated with placing, compacting, and grading structural fill along the basin floor will be done in a manner to prevent tearing, ripping, or otherwise damaging the Ash Surge Basin's existing HDPE geomembrane liner.

5.3 COMPOSITE LINER SYSTEM

After the structural fill has been placed over the basin's existing HDPE geomembrane liner, the Ash Surge Basin's new composite liner system will be installed. The proposed new composite liner system for the Ash Surge Basin consists of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL). The liquid flow rate through the GCL component will be less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec in accordance with 35 Ill. Adm. Code 845.400(c)(2).

The GCL panels will be delivered to the project site by the GCL manufacturer in rolls. The GCL panels will be deployed directly over the recently-installed structural fill material parallel to the slope towards the leachate collection trench (*i.e.*, perpendicular to the slope elevation contours shown on the construction plans). Adjacent panels will be overlapped by a minimum of six inches along longitudinal seams and by a minimum of 24 inches along end seams. Seaming will be performed by pouring dry granular bentonite along the overlap zone in accordance with the GCL manufacturer's recommendations. Temporary anchoring, such as sand bags, will be placed along the edges of the exposed GCL panels to prevent uplift of the panels by wind during installation of the GCL.

As panels of GCL are deployed, placed, and seamed, panels of the upper HDPE geomembrane liner will be placed over the installed GCL panels. Similar to the GCL panels, the HDPE geomembrane liner panels will be delivered to the project site by the geomembrane manufacturer in rolls. The panels will be deployed directly over and in the same orientation as the installed GCL panels (*i.e.*, parallel to the slope towards the leachate collection trench). Adjacent panels will be overlapped by a minimum of three to four inches prior to being seamed via double wedge fusion welding or extrusion fillet welding, depending on the geomembrane manufacturer's recommendations.

Both composite liner system components will be secured along the crests of the Ash Surge Basin's embankments by either (1) placing fill material over horizontal run-outs of the composite liner components or (2) placing both components in an anchor trench. The horizontal run-outs will be at least 15 feet long and covered with 18 inches of fill material, while the anchor trenches will be approximately two feet deep and will be backfilled to anchor the geosynthetic components of the Ash Surge Basin's new composite liner system and leachate collection and removal system in place (*i.e.*, GCL, HDPE geomembrane liner, and drainage geocomposite). The backfill soil placed over horizontal run-outs and in anchor trenches will be properly compacted to prevent the geosynthetic components from pulling out of the anchor trenches or under the backfill placed over the horizontal run-outs.

As the composite liner system is being installed, field CQA inspections and tests will be performed in accordance with the retrofit construction plans and specifications provided in Attachments 5-1 and 5-2.

5.4 LEACHATE COLLECTION & REMOVAL SYSTEM

As areas of the Ash Surge Basin are lined with the new composite liner system, the new leachate collection and removal system (LCRS) components will be installed. The two primary components of the proposed LCRS are (1) a drainage geocomposite and (2) a perforated leachate collection pipe. The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core. The transmissivity of the drainage geocomposite will be at least 6×10^{-4} m²/sec pursuant to 35 Ill. Adm. Code 845.420(a)(B). Meanwhile, the perforated leachate collection pipe will be installed in the leachate collection trench along the middle of the basin and will ultimately convey collected

leachate to a discharge pipe at the northern end of the retrofitted Ash Surge Basin. A wye branch in the leachate collection pipe will also be installed and lead to a non-perforated riser pipe in the northeastern quadrant of the basin, where a wheeled, submersible pump will be installed. The Station will use this pump to dewater the Ash Surge Basin during periodic cleanings, at the time of closure, and as needed during the post-closure care period.

Similar to the GCL and HDPE geomembrane liner, the drainage geocomposite panels will be delivered to the project site by the corresponding manufacturer in rolls. The panels will be deployed directly over the new composite liner system. Adjacent panels will be overlapped by a minimum of four inches and will be joined using self-locking straps on 1-foot centers along end seams, 5-foot centers along longitudinal seams on the basin slopes, and 10-foot centers along longitudinal seams on the basin floor. The drainage geocomposite will also be secured with the GCL and HDPE geomembrane liner along the crests of the Ash Surge Basin's embankments, either under backfill placed over horizontal run-outs or in anchor trenches.

As previously stated, the 6-inch diameter perforated leachate collection pipe will be installed in a leachate collection trench along the center of the basin floor above the new composite liner system. To preclude the pipe's perforations from clogging, the pipe will be installed in and supported by a bedding layer of free-draining, coarse aggregate material.

As the leachate collection and removal system is being installed, field CQA inspections and tests will be performed in accordance with the retrofit construction plans and specifications provided in Attachment 5-1 and 5-2.

5.5 SAND FILTER & PROTECTIVE WARNING LAYERS

After the new LCRS components are installed in the Ash Surge Basin, a sand filter layer will be installed above the new LCRS to prevent CCR and non-CCR sediments from clogging the LCRS. This filter layer will consist of sand imported from an offsite borrow source conforming to Gradations FA 1 or FA 2 pursuant to the Illinois Department of Transportation's (IDOT) Standard Specifications for Road and Bridge Construction. The material will be carefully placed and graded within the basin area to preclude damage to the new LCRS and composite liner system components. Finally, the sand filter layer will have a hydraulic conductivity of at least 1×10^{-5} cm/sec pursuant to 35 Ill. Adm. Code 845.420(a)(2).

In addition, pursuant 35 Ill. Adm. Code 845.420(a)(8), a protective warning layer will be installed over the sand filter layer to provide a means of deflecting the force of CCR pumped into the retrofitted Ash Surge Basin. Along the floor of the retrofitted Ash Surge Basin, this uppermost layer will be comprised of coarse aggregate materials conforming to IDOT Gradation CA 6 to provide a working surface for operators removing CCR from the basin; it will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's side slopes, the protective warning layer will consist of

riprap on a gravel bedding layer to protect the sand filter layer from erosion. Like the sand filter layer, all protective warning layer materials will be carefully placed and graded within the Ash Surge Basin to preclude damage to the basin's new LCRS and composite liner system.

6.0 FACILITY COMPONENT PLANS & SPECIFICATIONS (845.220(A)(6))

The Powerton Generating Station is a coal-fired steam electric generating station that burns coal to generate electricity. The facility's boundaries are shown on Figure 4-1 in Attachment 4. The Station consists of four coal-fired boilers and two electric generating units (Units 5 and 6) as shown on Figure 4-2 in Attachment 4. Fly ash and bottom ash are both generated in the boilers as byproducts of burning coal. The fly ash is captured by electrostatic precipitators before the material escapes the boiler exhaust stacks, is pneumatically conveyed to on-site storage silos, and is then ultimately deposited into trucks and hauled off-site. Meanwhile, bottom ash from the bottom of the boilers falls directly into slag tanks where it is quenched with water and subsequently sluiced to a set of two dewatering bins (one dedicated pair per electric generating unit). The dewatering bins mechanically promote sedimentation of the suspended bottom ash particles in the sluice water.

The Station's bottom ash-handling components are shown on Figure 4-2. Per the figure, bottom ash sluice piping from Unit 5 emanates from the north end of the boiler building and heads east above ground for approximately 900 feet where the piping terminates at the two dewatering bins for Unit 5. Meanwhile, bottom ash sluice piping from Unit 6 emanates from the south end of the boiler building and heads east above ground for approximately 1,100 feet, where the piping terminates at the two dewatering bins for Unit 6. Each dewatering bin has a decant pipe where treated overflow water drains into a concrete trench that heads northward towards the Ash Surge Basin and Bypass Basin. The dewatering bin overflow, which still contains some suspended CCR particles, then flows into the basin that is in service at the time for additional sedimentation. Flow into each basin is controlled by a dedicated controlled gate per basin.

Only one basin operates at any given time, with the larger Ash Surge Basin functioning as the Station's primary basin for precipitating CCR particles still suspended in the overflow water from the dewatering bins. Effluent from the dewatering bins enters the Ash Surge Basin through a distribution trough at the southern-most end of the basin. Upon entering the pond, the ash particles still suspended in the ash transport water settle to the pond floor as the wastewater migrates towards the basin outlet structure at the opposite end (i.e., northern-most end of the basin). Treated water is then discharged through a reinforced concrete pipe into a sump underneath the pump station located north of the Ash Surge Basin. Water is then pumped to the Service Water Basin located northwest of the Ash Surge Basin and is then ultimately discharged to the Illinois River through NPDES-permitted Outfall 001. This process is illustrated on drawing POW-CSK-PFD-001 in Attachment 2-2 which is a process flow diagram (PFD) that shows how Powerton currently manages the wastestreams produced by its coal-fired steam electric generating process.

Historically, when the Ash Surge Basin was being cleaned to recover the ash particles stored therein, overflow from the dewatering bins would be diverted to the smaller Bypass Basin. Like the Ash Surge Basin, the Bypass Basin is used to promote settling of the ash particles that remain in suspension in the dewatering bin effluent. When operating, treated water from the Bypass Basin flows over a weir wall at the basin's southeastern corner into a reinforced concrete pipe that then conveys the water to the aforementioned pump station sump.

7.0 RETROFIT CONSTRUCTION STANDARDS (845.220(B)(1)–(3))

This section demonstrates the retrofitted Ash Surge Basin will meet the location, liner, leachate collection and removal system, slope protection, and CCR fugitive dust control standards promulgated by 35 Ill. Adm. Code Part 845.

7.1 LOCATION STANDARDS

7.1.1 PLACEMENT ABOVE THE UPPERMOST AQUIFER

Per the demonstration submitted with MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), which is included in Attachment 7-1, the upper limit of the uppermost aquifer under the Ash Surge Basin is at El. 449.00 feet above mean sea level (amsl) (KPRG, 2021b). Per Drawing POW-ASB-CSK-006 in Attachment 5-1, the base of the Ash Surge Basin's new composite liner system will be at El. 450.50 feet amsl. Therefore, the base of the retrofitted Ash Surge Basin will not be separated by more than five feet from the upper limit of the uppermost aquifer. A comparison of groundwater elevation data collected between November 2015 and May 2021 from the Ash Surge Basin's groundwater monitoring well network to the base of the retrofitted Ash Surge Basin's new composite liner system indicates there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the retrofitted Ash Surge Basin and the uppermost aquifer due to normal fluctuations in groundwater elevations. Thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.300(a).

7.1.2 WETLANDS

As demonstrated in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), the Ash Surge Basin is not located in mapped wetlands. This conclusion is based on the corresponding demonstration Geosyntec performed for the Ash Surge Basin in October 2018 (Geosyntec, 2018a), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Ash Surge Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Ash Surge Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.310(a).

7.1.3 FAULT AREAS

As demonstrated in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), the Ash Surge Basin is not located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time. This conclusion is based on the corresponding demonstration Geosyntec performed for the Ash Surge Basin in October 2018 (Geosyntec, 2018b), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Ash Surge Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Ash Surge Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.320(a).

7.1.4 SEISMIC IMPACT ZONES

As demonstrated in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), the Ash Surge Basin is not located within a seismic impact zone as defined by 35 Ill. Adm. Code 845.120. This conclusion is based on the corresponding demonstration Geosyntec performed for the Ash Surge Basin in October 2018 (Geosyntec, 2018c), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Ash Surge Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Ash Surge Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.330(a).

7.1.5 UNSTABLE AREAS

As demonstrated in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), the Ash Surge Basin is not located in an unstable area. This conclusion is based on the corresponding demonstration Geosyntec performed for the Ash Surge Basin in October 2018 (Geosyntec, 2018d), which is included in Attachment 7-1.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Ash Surge Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Ash Surge Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.340(a).

7.1.6 FLOODPLAINS

As demonstrated in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), the Ash Surge Basin is not located in a floodplain according to the National Flood Hazard Layer FIRMette Map No. 17179C0175E prepared by the Federal Emergency Management Agency (FEMA, 2017). This map is included in Attachment 7-2.

Per the proposed construction plans provided in Attachment 5-1, the new composite liner system and new LCRS are being installed within the existing limits of the Ash Surge Basin, and no lateral expansions are planned for the basin's existing embankments. Therefore, the demonstration provided in the Ash Surge Basin's initial operating permit application remains valid and, thus, the location of the retrofitted Ash Surge Basin complies with 35 Ill. Adm. Code 845.340(c).

7.2 LINER DESIGN CRITERIA

As discussed in Section 5.3, the Ash Surge Basin will be retrofitted with a composite liner system consisting of a 60-mil HDPE geomembrane liner over a geosynthetic clay liner. As demonstrated in the Alternative Composite Liner Design Certification provided in Attachment 7-3, the design of this new composite liner system meets the requirements for an alternative composite liner system pursuant to 35 Ill. Adm. Code 845.400(c).

7.3 LEACHATE COLLECTION SYSTEM DESIGN CRITERIA

As discussed in Section 5.4, the Ash Surge Basin will be retrofitted with a new leachate collection and removal system (LCRS) consisting of a drainage geocomposite and a leachate collection pipe that will be used to ultimately pump collected leachate out of the basin. As demonstrated in the Leachate Collection System Design Certification provided in Attachment 7-4, the design of this new LCRS complies with 35 Ill. Adm. Code 845.420.

7.4 SLOPE PROTECTION DESIGN CRITERIA

7.4.1 INTERIOR SLOPES

Per Detail 008-02, "Typical Slope Transition Detail," on Drawing POW-ASB-CSK-008 in Attachment 5-1, a 6-inch-thick layer of riprap (IDOT Gradation No. RR 2) will be placed along the interior slopes of the Ash Surge Basin's embankments. This riprap layer will be supported by an underlying, 6-inch-thick bedding layer of coarse aggregate material (IDOT Gradation No. CA 16). This form of slope protection represents an engineered cover; will extend along the entire slope; and will provide protection against surface erosion, wave action, and adverse effects of rapid drawdown. Therefore, the retrofit construction of the Ash Surge Basin's interior slopes complies with 35 Ill. Adm. Code 845.430.

7.4.2 EXTERIOR SLOPES

As documented in MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a), slope protection for the basin's exterior slopes consists of either the HDPE geomembrane liner of an adjacent surface impoundment or vegetative cover. Portions of the western and southern exterior slopes are interior slopes for the Metal Cleaning Basin and Bypass Basin, respectively, which are both lined with an HDPE geomembrane liner. Meanwhile, the remaining exterior slopes have grassy vegetation. The form of protection provided for each slope extends along the entire face of the given slope and provides protection against surface erosion, wave action, and adverse effects of rapid drawdown. Therefore, the existing construction of the Ash Surge Basin's exterior slopes comply with 35 Ill. Adm. Code 845.430.

Per the design drawings provided in Attachment 5-1, no lateral expansions are planned for the basin's existing embankments. Therefore, the downstream slopes of the Ash Surge Basin will remain unchanged, including the existing slope protection measures. Thus, the protection measures for the retrofitted Ash Surge Basin's exterior slopes will comply with 35 Ill. Adm. Code 845.430.

7.5 CCR FUGITIVE DUST CONTROL

The Station will continue to control CCR fugitive dust at the retrofitted Ash Surge Basin in accordance with its "CCR Compliance Fugitive Dust Control Plan" (KPRG, 2021c), which also covers the Station's Bypass Basin, Former Ash Basin, and Metal Cleaning Basin. This plan is included in Attachment 7-5.

8.0 RETROFIT, CLOSURE, & POST-CLOSURE CARE PLANS (845.770(C)(2) & 845.220(B)(4)–(5))

8.1 WRITTEN RETROFIT PLAN

MWG's written retrofit plan describing the steps necessary to retrofit the Ash Surge Basin has been prepared in accordance with 35 Ill. Adm. Code 845.770(c) and is included in Attachment 8-1.

8.2 PRELIMINARY WRITTEN CLOSURE PLAN

MWG currently intends to close the retrofitted Ash Surge Basin by removing CCR and CCR-mixed materials remaining in the basin at the time of closure and decontaminating affected areas in accordance with 35 Ill. Adm. Code 845.740(a). The preliminary written closure plan describing the steps necessary to close the retrofitted Ash Surge Basin in this manner has been prepared in accordance with 35 Ill. Adm. Code 845.720(a) and is included in Attachment 8-2.

8.3 POST-CLOSURE CARE PLAN

Because MWG intends to close the retrofitted Ash Surge Basin by removal of CCR in accordance with 35 Ill. Adm. Code 845.740(a), the post-closure care requirements promulgated by 35 Ill. Adm. Code 845.780 are not applicable to the retrofitted Ash Surge Basin. However, pursuant to 35 Ill. Adm. Code 845.740(b), MWG will continue groundwater monitoring under 35 Ill. Adm. Code Part 845 Subpart F for a minimum of three years after the basin has been closed.

9.0 GROUNDWATER MONITORING PROGRAM (845.220(A)(7))

To monitor the groundwater at the retrofitted Ash Surge Basin site, MWG plans to continue using the existing combined groundwater monitoring well network that was established for the Ash Surge Basin and the Bypass Basin. The details of this groundwater monitoring program are provided in Section 9.0 of MWG's initial operating permit application for the Ash Surge Basin that was submitted to the Illinois EPA in October 2021 (KPRG, 2021a). In accordance with 35 Ill. Adm. Code 845.220(a)(7), the details of this groundwater monitoring program are reproduced in this section. Where used in this section, "subject CCR surface impoundments" refers to the Station's Ash Surge Basin, Bypass Basin, and Former Ash Basin.

9.1 HYDROGEOLOGIC SITE CHARACTERIZATION

The following subsections provide information on the geology and hydrogeology of the site as required under 35 Ill. Adm. Code 845.620(b). Referenced tables and figures are provided in Attachment 9-0.

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 Plains 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 (USDA, 1996).

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 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 CCR 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 below ground surface (bgs), depending on the location of the specific well. The boring logs indicate limestone was encountered from approximately 99 to 103 bgs 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 (from KPRG, 2021a). The nearest natural surface water body is the Lost Creek which bends around the eastern edge of the Former Ash Basin 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 surface impoundments. 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 combined CCR monitoring well network for the Ash Surge Basin and Bypass Basin consists of monitoring wells MW-01 (upgradient), MW-08, MW-09 (upgradient), MW-11, MW-12, MW-15, MW-17, MW-18 and MW-19 (upgradient). 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. Table 9-2 (from KPRG, 2021a) 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 Ash Surge Basin and Bypass Basin (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). Hydrographs of water levels recorded at these monitoring wells are provided in 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 9-10 through 9-17. The maps include groundwater elevation data from all wells in the area, including the specific CCR monitoring wells associated with the Ash Surge Basin and Bypass Basin. 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 9-4 (from KPRG, 2021a) 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:

$$V_s = \frac{Kdh}{n_e dl}$$

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 monitoring wells MW-2, -5, -8, -9, and -10 from slug tests. The geometric mean of the test data for these wells was approximately 350 feet per day (ft/d; 4.05×10^{-3} ft/sec) for each well (Patrick Engineering 2011). The slug test data were reviewed as part of a groundwater modeling study, and the data were re-analyzed 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 (1.39×10^{-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 1.39×10^{-3} ft/sec was used for the sandy unit in Table 9-4 (from KPRG, 2021a) as discussed above. The average hydraulic conductivities of 6.38×10^{-7} ft/sec (silt/clay unit) in Table 9-4 (from KPRG, 2021a) 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 (1.16×10^{-7} to 1.16×10^{-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 subject CCR surface impoundments is considered as Class I Potable Resource Groundwater in accordance with 35 Ill. Adm. Code 620.210. It is noted, however, that a Groundwater Management Zone (GMZ) and an Environmental Land Use Control ("ELUC") have been established where the subject CCR surface impoundments are located as part of a Compliance Commitment Agreement (CCA) between MWG and the 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 9-19. The GMZ and ELUC occupy the same extent of the Powerton property.

A survey of all potable water sources within a 2,500-foot radius of the 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 preparing the initial operating permit application for the Ash Surge Basin pursuant to 35 Ill. Adm. Code 845.230(d), 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 9-19. 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 CCR surface impoundments. There were eight wells identified on the Station's 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 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 subject CCR surface impoundments and are separated from those units by the Station's Intake

Channel and Discharge Channel. They are regularly sampled and analyzed for potable water constituents. The sampling results consistently have been in compliance 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 CCR 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 Old Intake Canal, 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 subject CCR surface impoundments and anticipated flow discharge boundaries. Also, 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 Ash Surge Basin dating back to December 2010. However, the parameter list was slightly different from that specified in 35 Ill. Adm. Code 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.

In addition to 35 Ill. Adm. Code Part 845, the Ash Surge Basin is also subject to the federal regulations for CCR groundwater monitoring networks under 40 CFR Part 257 Subpart D, "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments", also referred to herein as the (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 35 Ill. Adm. Code Part 845, quarterly groundwater monitoring for the full list of parameters specified in 35 Ill. Adm. Code 845.600, which includes all parameters in the Federal CCR Rule Appendix III/IV, has continued. This data is provided in Table 9-5 (from KPRG, 2021a) for the combined Ash Surge Basin and Bypass Basin groundwater monitoring well network. 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 Tables 9-7 (from KPRG, 2021a) for the Ash Surge Basin and Bypass Basin.

9.2 GROUNDWATER MONITORING SYSTEM DESIGN & CONSTRUCTION PLANS

A comprehensive monitoring well network that includes other basins in the vicinity of the Ash Surge Basin and Bypass Basin was established in 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. Two separate groundwater monitoring networks have been established, including the combined network for the Ash Surge Basin and the Bypass Basin:

- Upgradient / Background Wells: MW-01, MW-09, MW-19
- Downgradient Monitoring Wells: MW-08, MW-11, MW-12, MW-15, MW-17, and MW-18

Groundwater data from the upgradient wells will be evaluated to provide a statistically representative upgradient water quality for the Ash Surge Basin and Bypass Basin prior to that water passing beneath the regulated units. The proposed monitoring well networks will be utilized for determining whether potential leakage from the regulated units 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 35 Ill. Adm. Code 845.630(g), Attachment 9-4 includes an Illinois licensed Professional Engineer certification of the above-defined monitoring system.

9.3 GROUNDWATER SAMPLING & ANALYSIS PROGRAM

9.3.1 SAMPLE FREQUENCY

The Ash Surge Basin and Bypass Basin are 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 35 Ill. Adm. Code 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 35 Ill. Adm. Code 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 compliance with 35 Ill. Adm. Code Part 845. The 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 35 Ill. Adm. Code Part 845. 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 35 Ill. Adm. Code 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 35 Ill. Adm. Code Part 845, 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 remaining active life of the Ash Surge Basin and the post-closure care period or, if closure is by removal, then in accordance with monitoring frequency requirements under 35 Ill. Adm Code 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 35 Ill. Adm. Code 845.650(b)(4), the owner can petition Illinois EPA to shift the monitoring frequency to semi-annual.

9.3.2 SAMPLING PREPARATION & 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, and 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.

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 downhole) 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, & SHIPMENT

Since measurement of total recoverable metals is required by 35 Ill. Adm. Code Part 845, 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 9-9 (from KPRG, 2021a) 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 Table 9-9 (from KPRG, 2021a). 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 35 Ill. Adm. Code 845.600(a)(1) for that compound which are also provided in Table 9-9 (from KPRG, 2021a).

9.3.7 QUALITY ASSURANCE & QUALITY CONTROL

9.3.7.1 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.

9.3.7.2 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 35 Ill. Adm. Code 845.640(f) is provided in Attachment 9-5 along with a certification of the plan by an Illinois licensed Professional Engineer.

10.0 PROFESSIONAL ENGINEER CERTIFICATION (845.220(A)(8))

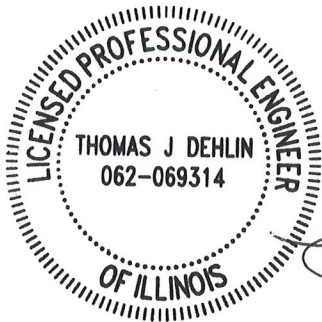
I hereby certify that:

- This retrofit construction permit application meets the requirements of 35 Ill. Adm. Code 845.220(a) and 845.220(b),
- This retrofit construction permit application was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 26, 2023

Seal:



Th. Dehlin

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 35 Ill. Adm. Code 845.240 is included in Attachment 11-1. Meanwhile, the following information is included in Attachment 11-2:

- A summary of the issues and questions raised by the public during the meetings;
- A summary of revisions, determinations, and other considerations made in response to those issues and questions; and
- A list of interested persons who attended the public meetings and would like to be added to the Illinois EPA's listserv for the facility.

12.0 REFERENCES

FEMA. (2017.) "Flood Insurance Rate Map, Tazewell County, Illinois and Incorporated Areas." Map No. 17179C0175E. Panel No. 175. Effective February 17.

Geosyntec. (2016a.) "History of Construction, Ash Surge Basin and Bypass Basin, Powerton Station." October.

Geosyntec. (2016b.) "Structural Stability and Factor of Safety Assessment, Ash Surge Basin and Bypass Basin, Powerton Station." October.

Geosyntec. (2018a.) "Wetlands Location Restrictions, Ash Surge and Bypass Basins, Powerton Station." October.

Geosyntec. (2018b.) "Fault Areas Location Restrictions, Ash Surge and Bypass Basins, Powerton Station." October.

Geosyntec. (2018c.) "Seismic Impact Zones Location Restrictions, Ash Surge and Bypass Basins, Powerton Station." October.

Geosyntec. (2018d.) "Unstable Areas Location Restrictions, Ash Surge and Bypass Basins, Powerton Station." October.

KPRG. (2021a.) "Application for Initial Operating Permit, Powerton Generating Station, Midwest Generation, LLC, Pekin, Illinois." October 29.

KPRG. (2021b.) "Placement Above the Uppermost Aquifer Location Restriction, Ash Surge Basin, Powerton Generating Station." September.

KPRG. (2021c.) "CCR Compliance Fugitive Dust Control Plan, Powerton Generating Station, Midwest Generation, LLC, Pekin, Illinois." October 19.

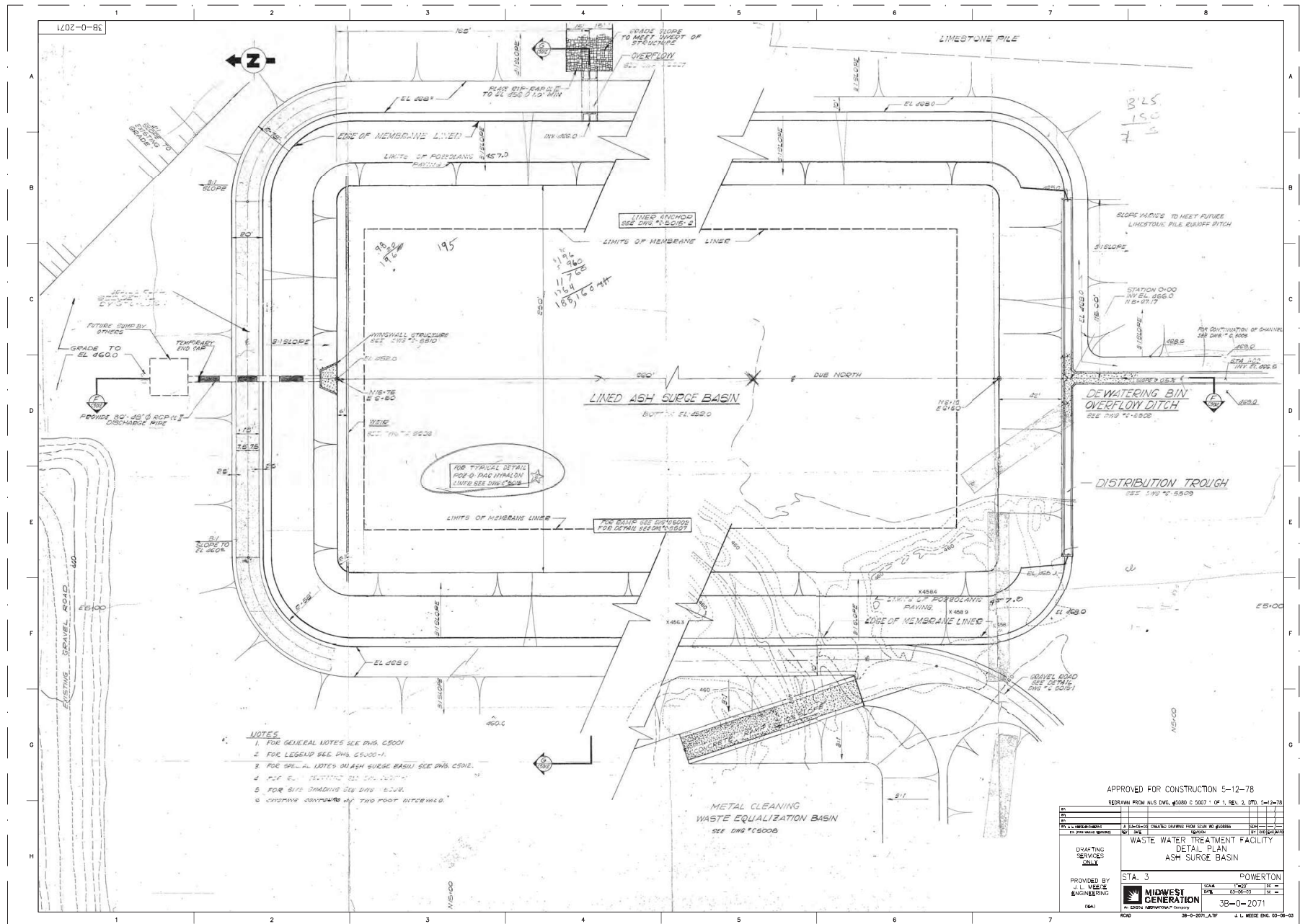
Patrick Engineering. (2011.) "Hydrogeologic Assessment Report, Powerton Generating Station, Pekin, Illinois." Patrick Project No. 21053.070. February.

Sargent & Lundy. (2020.) "Powerton Generating Station, Demonstration for a Site-Specific Alternative Deadline to Initiate Closure." Report SL-015574. November 30.

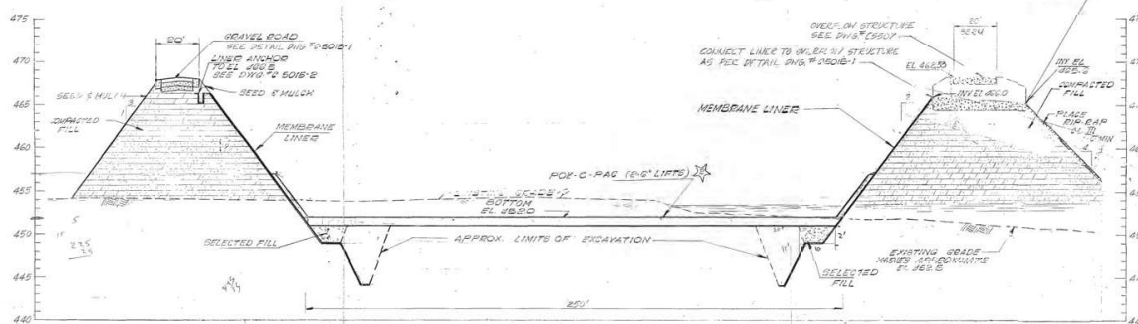
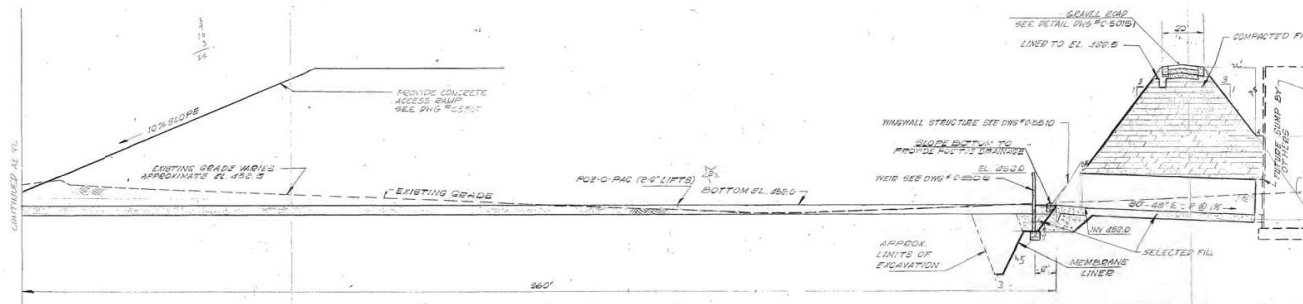
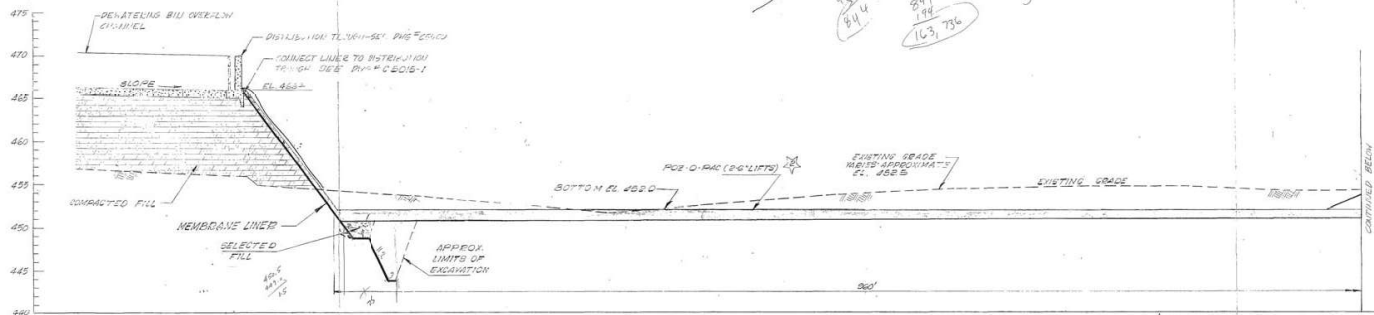
USDA. (1996.) "Soil Survey of Tazewell County, Illinois." August.

USGS. (2021.) "Science in Your Watershed: Locate your Stream Site by 12-digit HUC."
https://water.usgs.gov/wsc/a_api/wbd/subwatershed07/071300030304.html. Accessed June 23, 2022.

ATTACHMENT 1-1
1978 ORIGINAL CONSTRUCTION DRAWINGS



5202-0-B1



NOTES

1. SEE DETAIL DWS # C-500-1.
2. FOR LEGEND SEE DWS # C-500-1.
3. CONTRACTOR TO DETERMINE CONSTRUCTION AREA TO EL. 445.0 BY APPROVED METHODS PRIOR TO MAJOR CONSTRUCTION.
4. FOR ROAD SECTIONS SEE DWS # C-500-1.
5. FOR SITE GRADING SEE DWS # C-500-1.

FOR TYPICAL DETAILS
SEE DWS # C-500-1

APPROVED FOR CONSTRUCTION 5-12-78

DESIGNED BY: J. L. WEEGE, INC. DRAWN BY: J. L. WEEGE, INC. CHECKED BY: J. L. WEEGE, INC. DATE: 5-12-78

NO.	DESCRIPTION	DATE	BY	CHECKED
1	DESIGNED	5-12-78	J. L. WEEGE	J. L. WEEGE
2	DRAWN	5-12-78	J. L. WEEGE	J. L. WEEGE
3	CHECKED	5-12-78	J. L. WEEGE	J. L. WEEGE
4	APPROVED	5-12-78	J. L. WEEGE	J. L. WEEGE

PROVIDED BY: J. L. WEEGE, INC. ENGINEERING

STA. 3 POWERTON

SCALE: HORIZ. 1"=20' VERT. 1"=5'

3B-D-2075

3B-D-2075-A17F

3B-D-2075

3B-D-2075

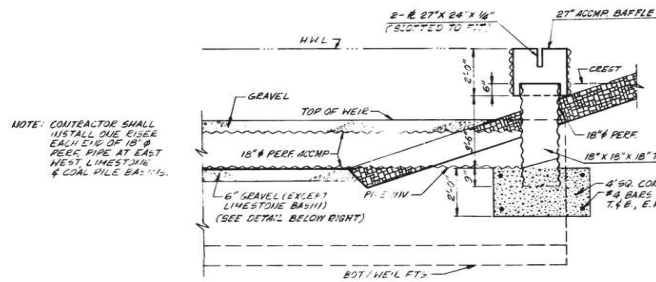
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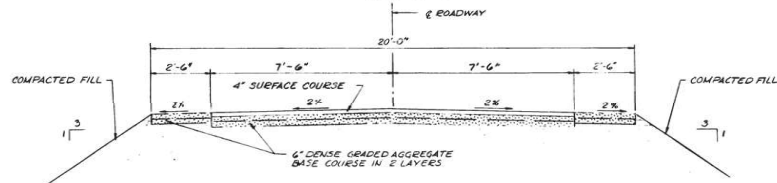
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3. LINED DITCH Baffle Detail	3
4. LINED DITCH Baffle Detail	4
5. LINED DITCH Baffle Detail	5
6. LINED DITCH Baffle Detail	6
7. LINED DITCH Baffle Detail	7
8. LINED DITCH Baffle Detail	8
9. LINED DITCH Baffle Detail	9
10. LINED DITCH Baffle Detail	10
11. LINED DITCH Baffle Detail	11
12. LINED DITCH Baffle Detail	12
13. LINED DITCH Baffle Detail	13
14. LINED DITCH Baffle Detail	14
15. LINED DITCH Baffle Detail	15
16. LINED DITCH Baffle Detail	16
17. LINED DITCH Baffle Detail	17
18. LINED DITCH Baffle Detail	18
19. LINED DITCH Baffle Detail	19
20. LINED DITCH Baffle Detail	20



★ TYP. SECTION - RISER & BAFFLE FOR PERF PIPE

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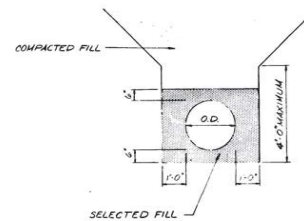


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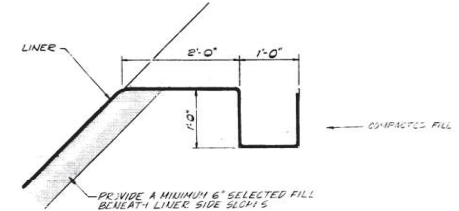
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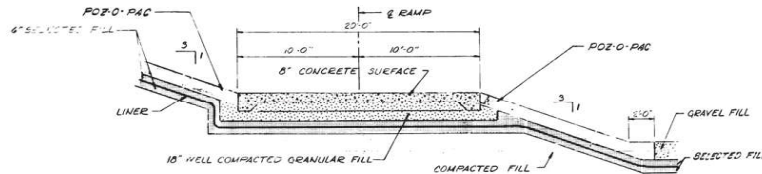
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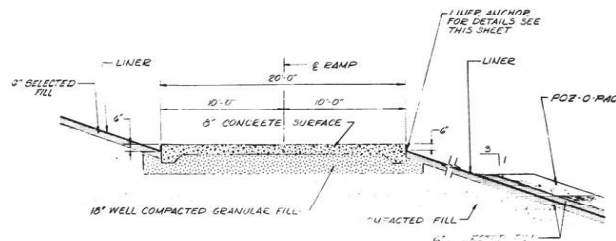


LINER ANCHOR DETAILS

NO SCALE

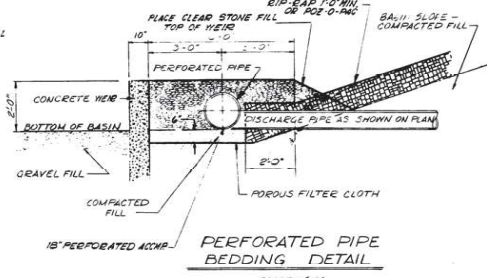


TYPICAL CONCRETE RAMP SECTION LINER BELOW RAMP



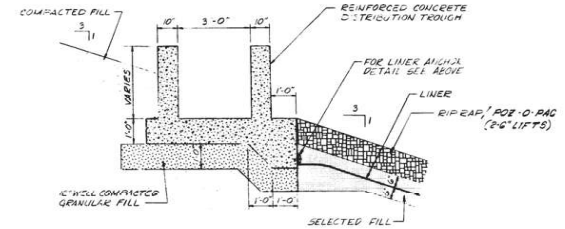
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SCALE: 1/4" = 1'-0"



PERFORATED PIPE BEDDING DETAIL

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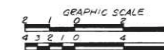


LINER ANCHORAGE FOR DISTRIBUTION TROUGH

SCALE: 1/4" = 1'-0"

NOTES:

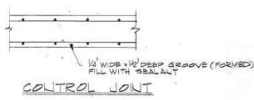
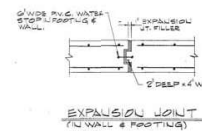
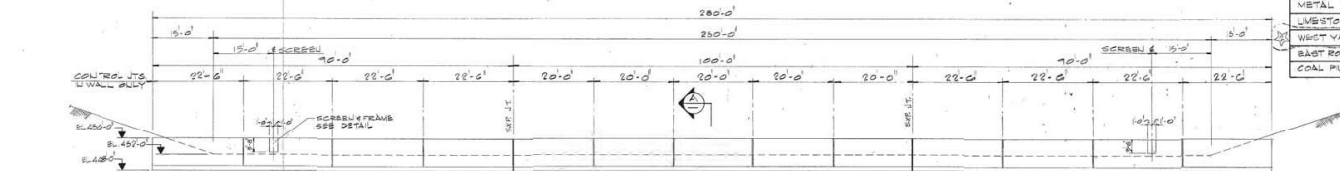
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2. FOR LEGEND SEE DWG. 2-5000-1



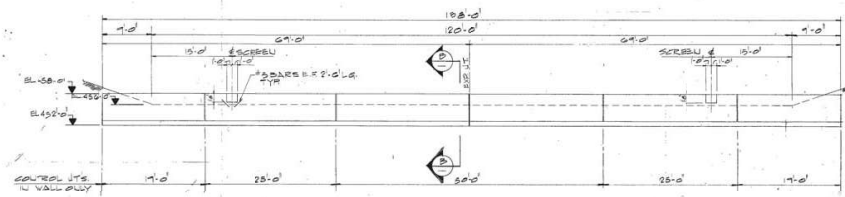
Sudhanu P. H. H.	
APPROVED FOR CONSTRUCTION	
COMMONWEALTH EDISON COMPANY WASTE WATER TREATMENT FACILITIES POWERTON	
MISCELLANEOUS SECTIONS & DETAILS	
DESIGN: P. H. H.	DATE: 12/14/78
CHECKED: P. H. H.	DATE: 12/14/78
APPROVED: P. H. H.	DATE: 12/14/78
CONTRACT: 602467	CECO OWN. NO.
RECORDING NO.	NO.
NUS CORPORATION	
5080 C 5015	
ROCKVILLE, MD.	
SHEET: 1 OF 8	

6802-0-B1

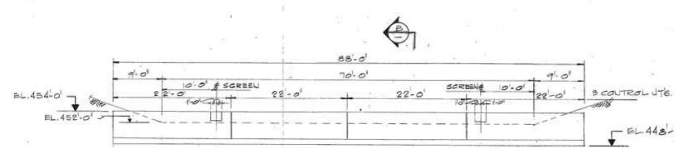
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ASH SURGE BASIN	5080 C 5007
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WEST YARD BASIN	5080 C 5010
EAST ROOF YARD BASIN	5080 C 5011
COAL PILE	5080 C 5012



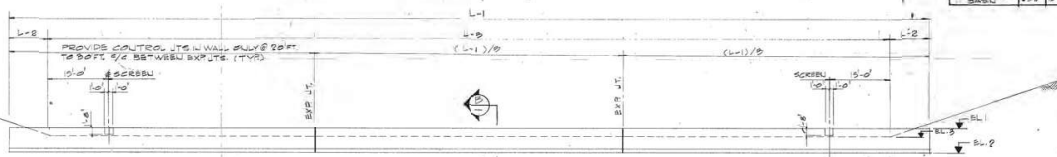
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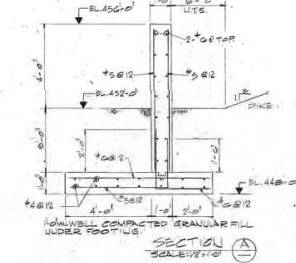
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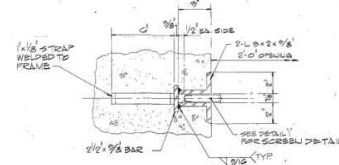
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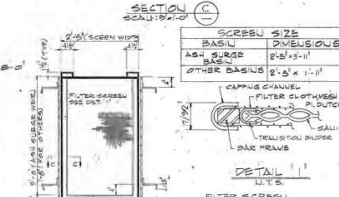
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WEST YARD BASIN
EAST ROOF YARD BASIN
COAL PILE BASIN
SCALE: 1/8\"/>



ASH SURGE BASIN WEIR
SCALE: 1/8\"/>



NOTES: ALL EXPOSED STEEL TO BE GALVANIZED



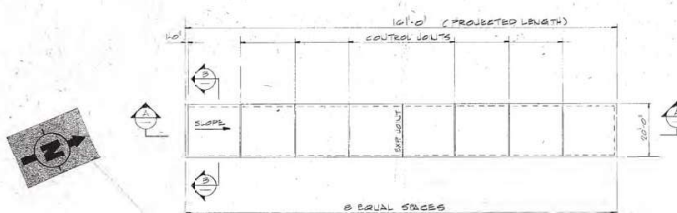
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NOTES:
1. FOR GENERAL NOTES SEE DWG. C 501

WEIR TABLE					
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METAL CLEANING	100	100	100	100	100
LIVESTOCK BASIN	100	100	100	100	100
WEST YARD BASIN	100	100	100	100	100
EAST ROOF YARD BASIN	100	100	100	100	100
COAL PILE BASIN	100	100	100	100	100

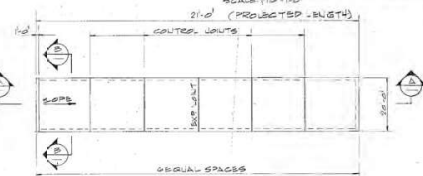
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PROVIDED BY J. L. WEESE ENGINEERING (SEA)	STA. 3 POWERTON WASTE WATER TREATMENT FACILITY SLUDGE WEIRS SECTIONS & DETAILS 38-0-2088-1A1F 1. L. WEESE ENG. 03-06-03

0602-0-B1



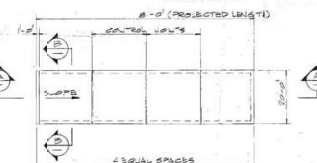
PLAN

RAMP FOR ASH SURGE BASIN (REF DWG 5000 C5002)



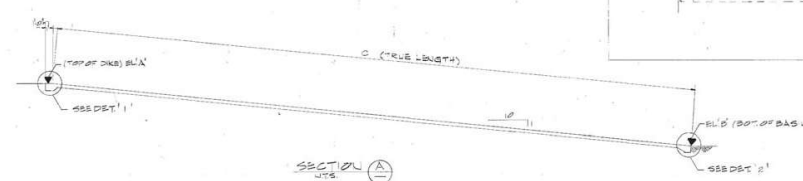
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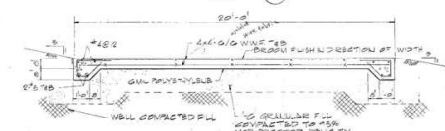


PLAN

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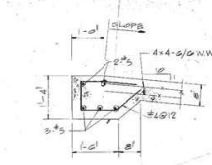
SECTION A



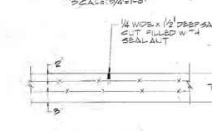
SECTION B

TYPICAL RAMP
(FOR OTHER DETAILS SEE DWG C5015 SHT.1)

RAMP DATA			
TYPE OF RAMP	WIDE	DEPT	REMARKS
LIMESTONE RAMP	460'0"	450'0"	80'4"
METAL CLEANING RAMP	468'0"	450'0"	80'4"
ASH SURGE BASIN	468'0"	450'0"	80'4"



DETAIL 1

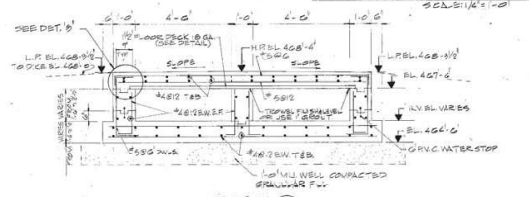


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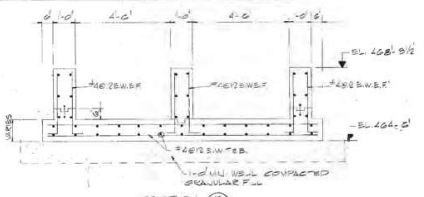


SECTION C

ASH SURGE BASIN OVERFLOW STRUCTURE (REF DWG 5000 C5007)

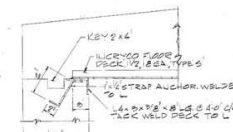


SECTION D



SECTION E

NOTES:
1. FOR OTHER NOTES SEE DWG C5007



DETAIL 1

APPROVED FOR CONSTRUCTION

4/17/78

DESIGNED BY: [Signature] DATE: 4/17/78

CHECKED BY: [Signature] DATE: 4/17/78

DRAWN BY: [Signature] DATE: 4/17/78

PROVIDED BY: [Signature] DATE: 4/17/78

WASTE WATER TREATMENT FACILITY
RAMPS & ASH SURGE BASIN
OVERFLOW STRUCTURE

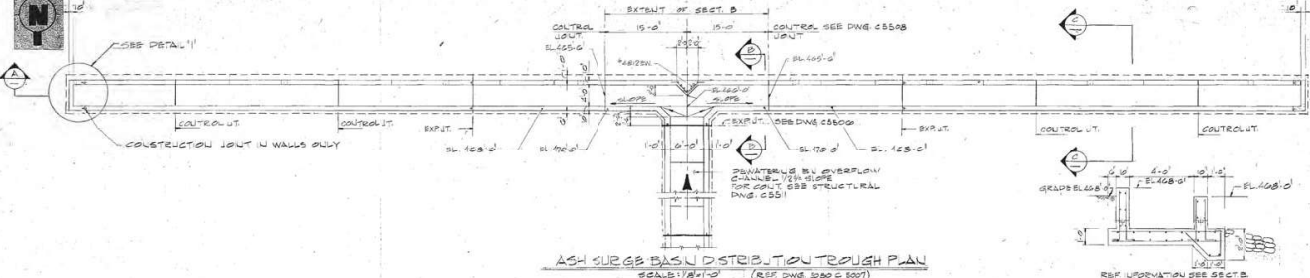
STA. 3 POWERTON

MIDWEST GENERATION

3B-D-2090

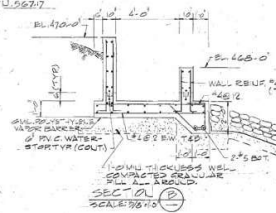
3B-D-2090-A17F 1 L. WEEB ENG. 03-06-03

18-0-0-2092

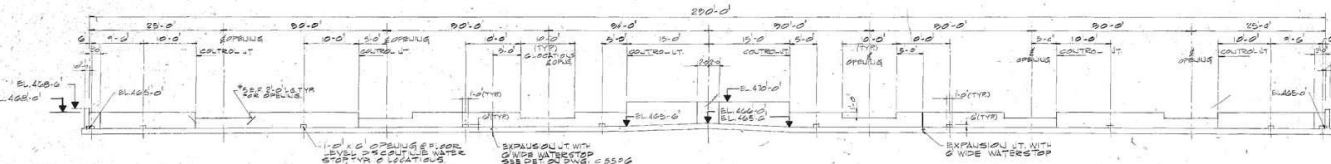


ASH SURGE BASIN DISTRIBUTION TROUGH PLAN
SCALE: 1/8"=1'-0" (REF. DWG. 38-0-0-2007)

12
11
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2
1



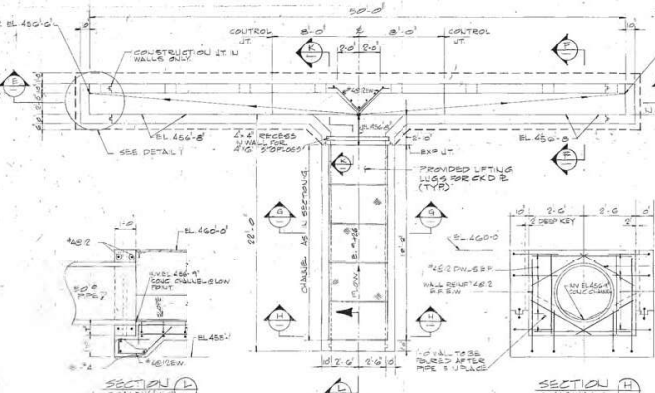
SECTION A
SCALE: 1/8"=1'-0"



LIMESTONE BASIN DISTRIBUTION TROUGH PLAN
SCALE: 1/8"=1'-0" (REF. DWG. 38-0-0-2008)



KEY PLAN



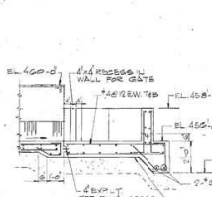
SECTION B
SCALE: 1/8"=1'-0"



SECTION C
SCALE: 1/8"=1'-0"

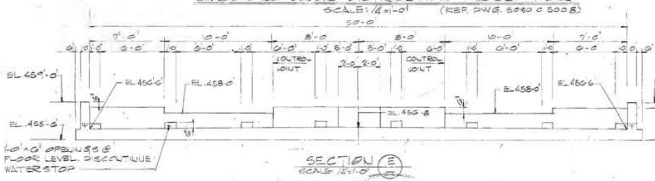


SECTION D
SCALE: 1/8"=1'-0"

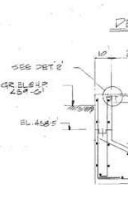


SECTION E
SCALE: 1/8"=1'-0"

NOTES
1. FOR GENERAL NOTES SEE DWG. C5501



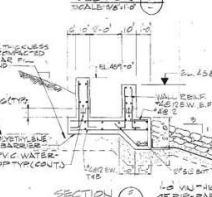
SECTION F
SCALE: 1/8"=1'-0"



SECTION G
SCALE: 1/8"=1'-0"



SECTION H
SCALE: 1/8"=1'-0"



SECTION I
SCALE: 1/8"=1'-0"

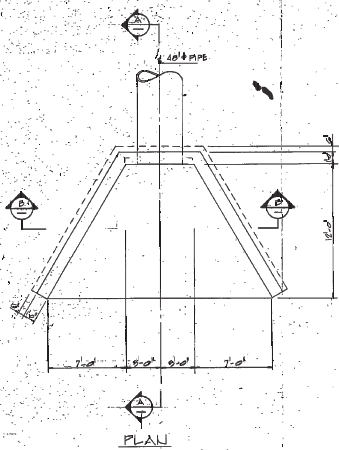


PROJECT	WASTE WATER TREATMENT FACILITY
DESCRIPTION	ASH SURGE BASIN & LIMESTONE BASIN
DIST. TROUGHS	SECTIONS & DET.

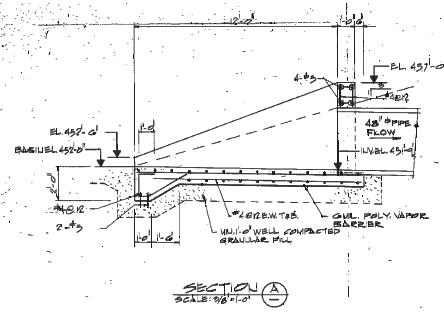
PROVIDED BY: ALL WEST ENGINEERING
DRAWN BY: J. L. WEDGE
CHECKED BY: J. L. WEDGE
DATE: 03-06-03

STA. 3 POWERTON
MIDWEST GENERATION
38-0-0-2092

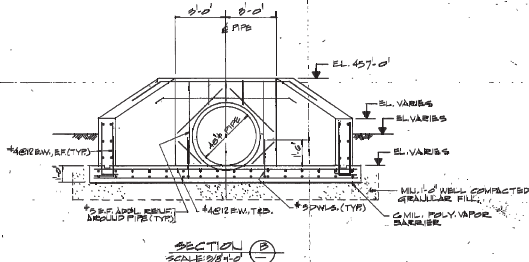
38-0-2093



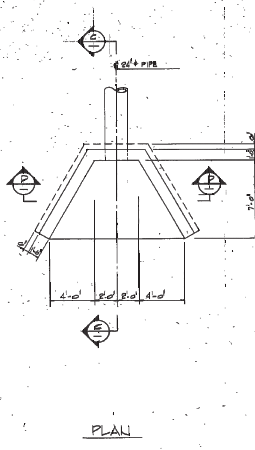
ASH SURGE BASIN WING WALL FOR 48" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5007)



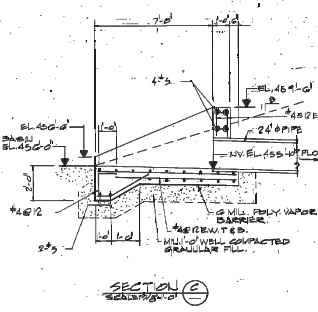
SECTION A
SCALE: 3/8" = 1'-0"



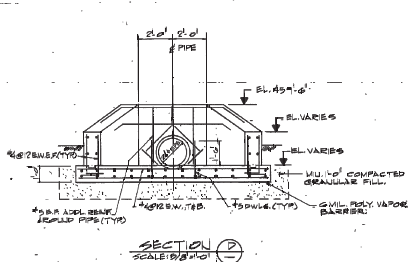
SECTION B
SCALE: 3/8" = 1'-0"



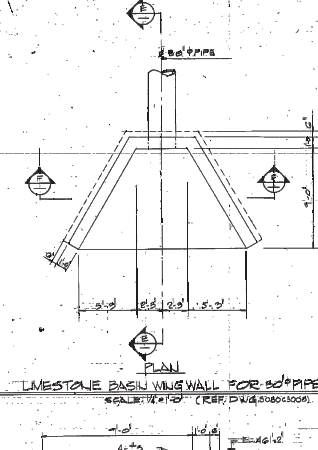
METAL CLEANING BASIN WING WALL FOR 24" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5008)



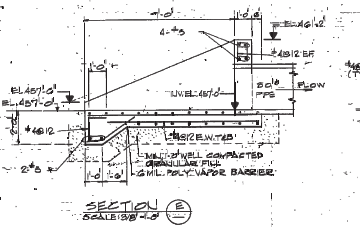
SECTION C
SCALE: 3/8" = 1'-0"



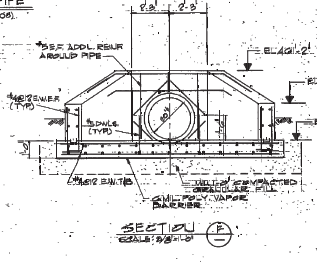
SECTION D
SCALE: 3/8" = 1'-0"



LIMESTONE BASIN WING WALL FOR 30" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5009)

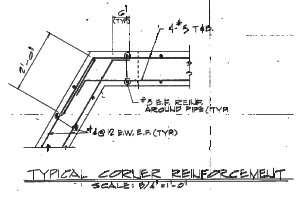


SECTION E
SCALE: 3/8" = 1'-0"



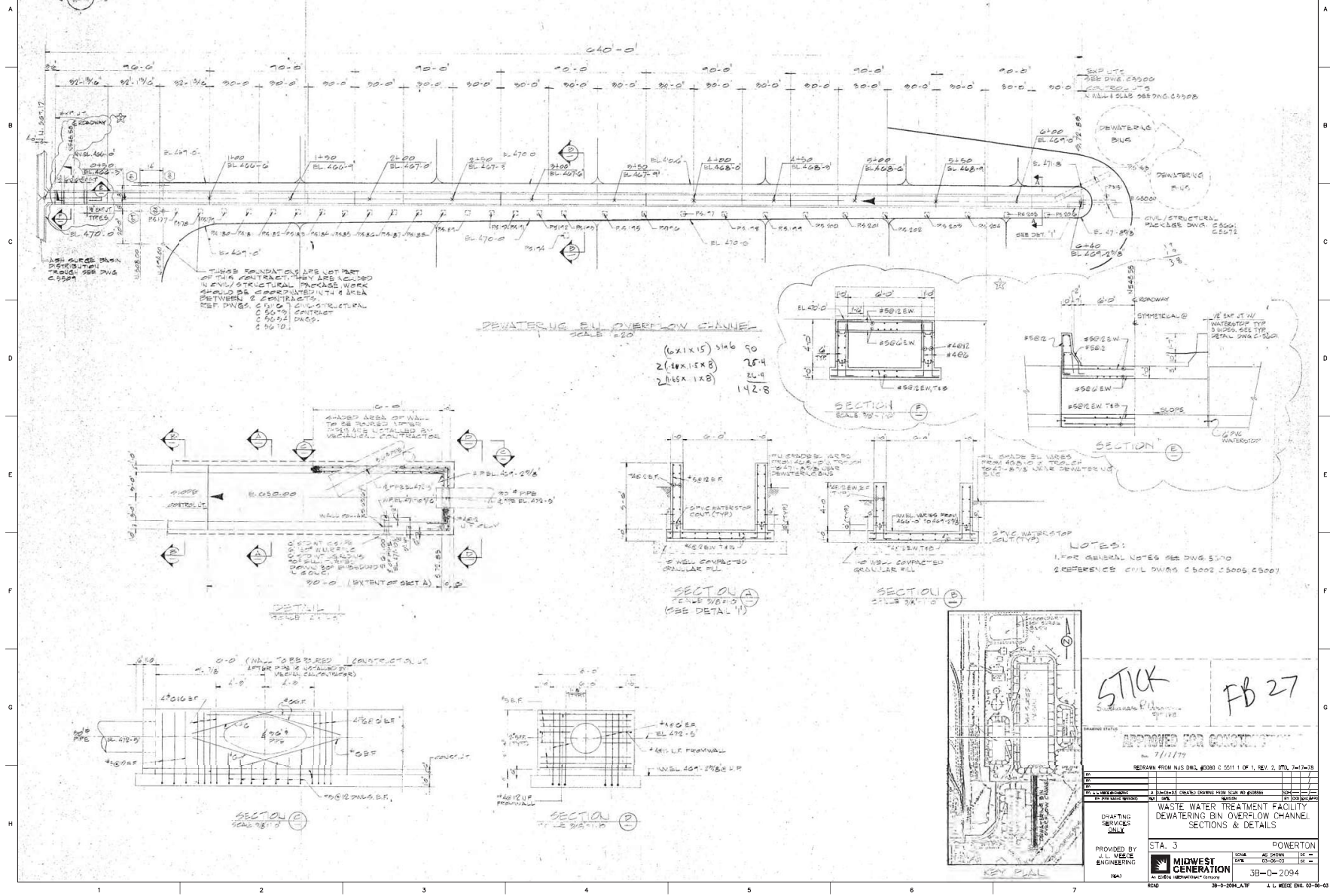
SECTION F
SCALE: 3/8" = 1'-0"

NOTES:
1. FOR GENERAL NOTES SEE DWG. C 5501.



TYPICAL CORNER REINFORCEMENT
SCALE: 1/2" = 1'-0"

APPROVED FOR CONSTRUCTION 4/19/14	
WASTE WATER TREATMENT FACILITY WING WALL PLANS SECTIONS & DETAILS	
STATION: 3 POWER TON	SCALE: AS SHOWN DATE: 03-28-14
PROVIDED BY: J.L. MEDE ENGINEERING	MIDWEST GENERATION 38-0-2093



STICK FB 2-

DRAWING STATUS: APPROVED FOR CONSTRUCTION

REDRAWN FROM NUS DM3, 65060 C 5511 1 OF 1, REV. 2, UTD.

2017			
2018			

REV				
REV	01	01-01-01	CREATED DRAWING FROM SCAN NO. 01000001	SC

EN (PER NAME NUMBER)	DATE	LOCATION	BY
	WASTE WATER TREATMENT PLANT		

DRAFTING

SERVICES ONLY

CH	1	DOWN
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PROVIDED BY	STA. 3	POW
1. NAME		SCALE AS SHOWN

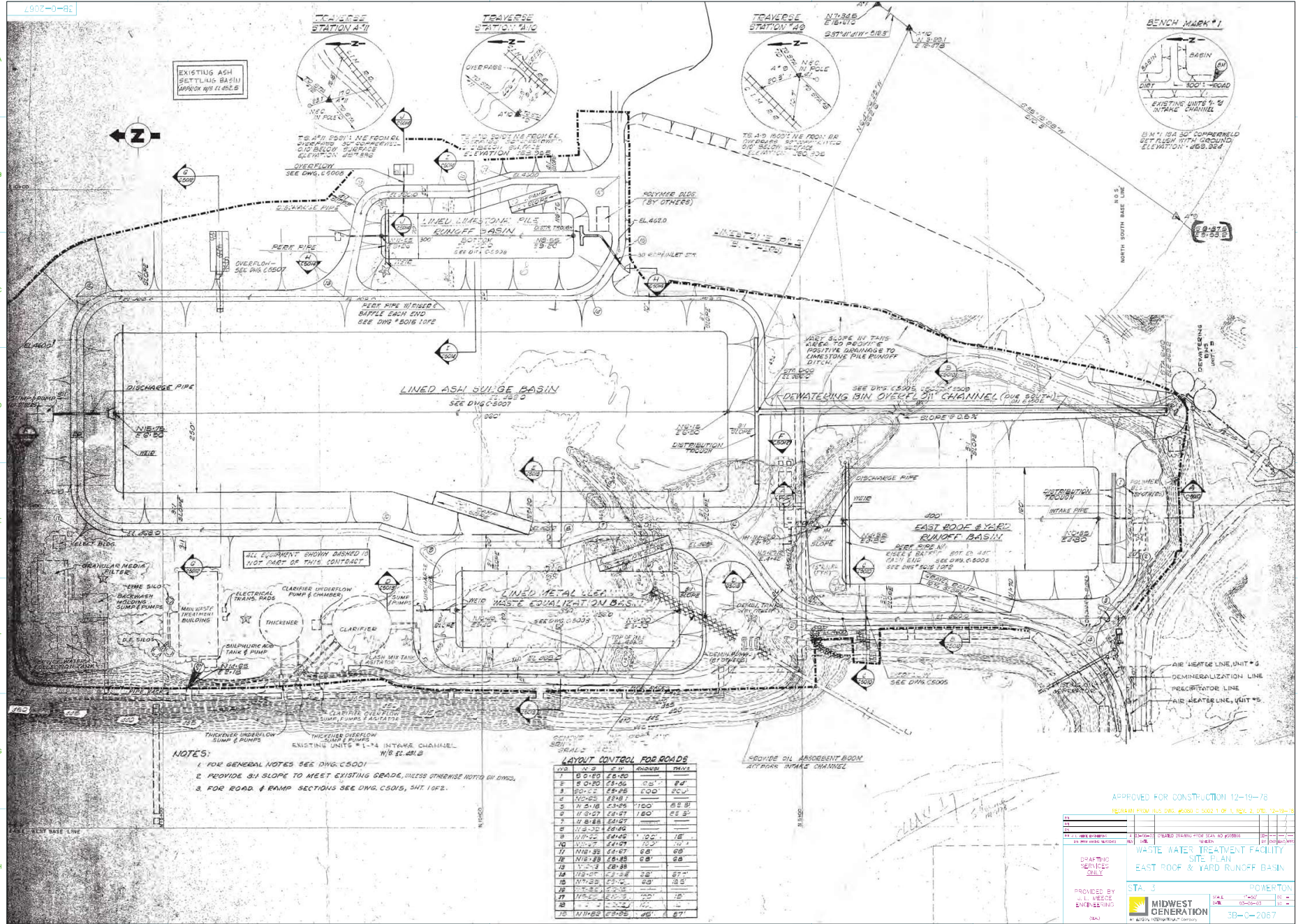
ENGINEERING MIDWEST GENERATION DATE 03-06-03

McGraw-Hill

RCAD 38-0-2094_A.TF J. L. WEEC

_____ 2 _____ 3 _____ 4 _____ 5

L902-0-92



APPROVED FOR CONSTRUCTION 12-19-78

PREPARED FROM THIS DRAWING BY J.L. MEECE, DATE 12-19-78

WASTE WATER TREATMENT FACILITY
STATION #1
EAST ROOF & YARD RUNOFF BASIN

PROVIDED BY: J.L. MEECE
 ENGINEERING: J.L. MEECE
 SCALE: 1"=40'-0"

DATE: 12-19-78
 SHEET: 3B-C-2067

APPROVED FOR CONSTRUCTION 12-19-78
 J.L. MEECE, ENG. 03-06

ATTACHMENT 1-2
2013 LINER REPLACEMENT DRAWINGS

Jul 17, 2014 12:56pm PLOTTED BY: ddaudo SAVED BY: ddaudo
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MAGES: Y: \\ACADData\Projects\19\1985\source\Pekin_040089E6_geo.jpg
NAMEFS:

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21132TS-03
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21132C010-03
C020	LINER SUBGRADE PREPARATION	D21132C020-03
C021	GEOMEMBRANE PANEL LAYOUT	D21132C021-00
C030	WARNING LAYER PLAN	D21132C030-03
C031	DETAILS AND SECTIONS	D21132C031-03
C032	DETAILS AND SECTIONS	D21132C032-03



RECORD DRAWING LEGEND

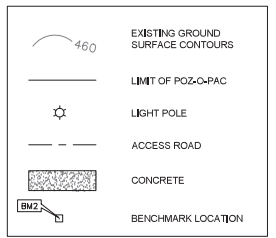
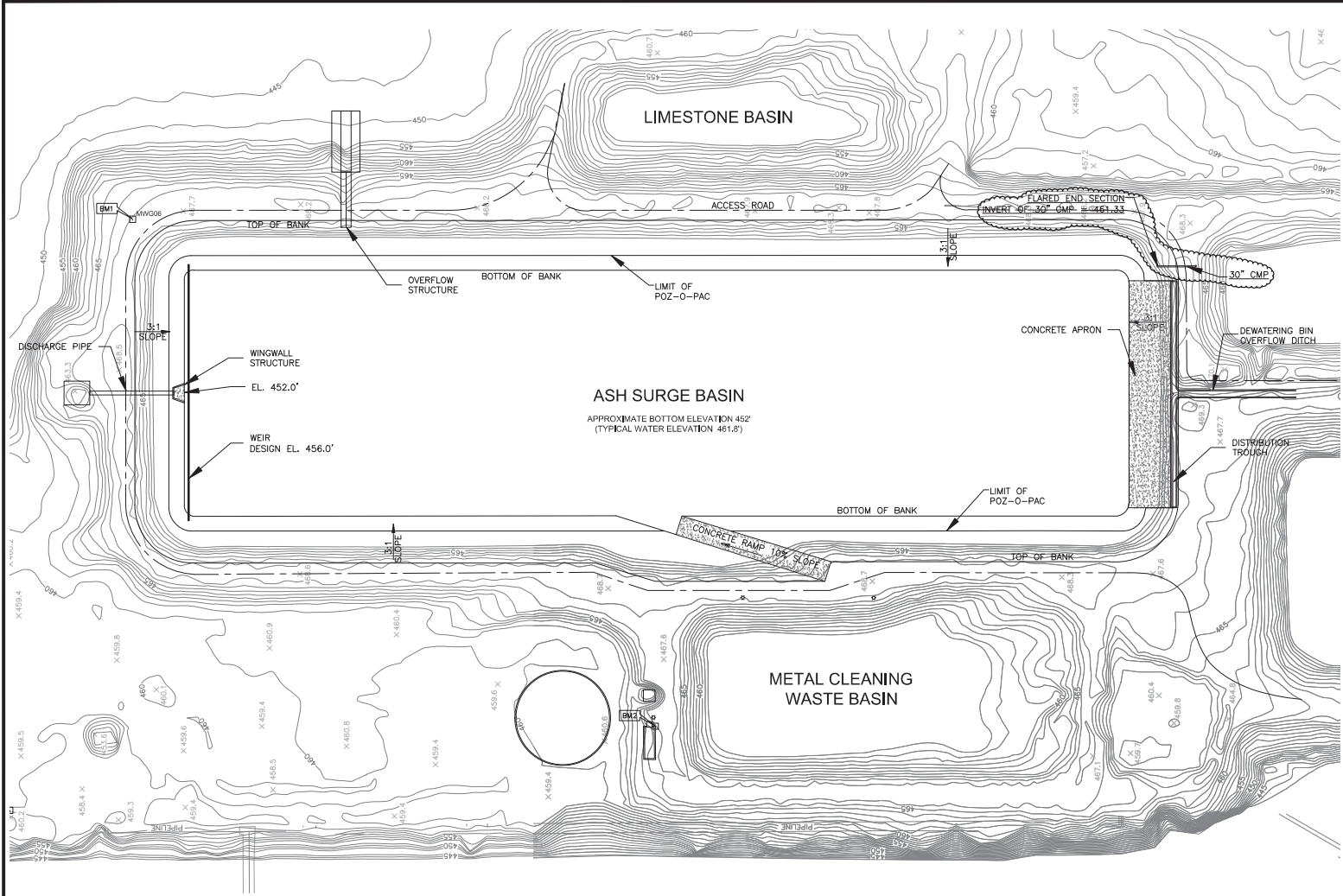
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<u>PRE-CONSTRUCTION</u>	UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CROSSED OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION



JULY 2014

JULY 2014		PROJECT NO. 2113-304-000-REB		TITLE SHEET	
1.	ISSUED FOR RECORD DOCUMENTATION	09/09/14	EDT	ASH SURGE BASIN LINER REPLACEMENT DOCUMENTATION	
2.	ISSUED FOR CONSTRUCTION	09/09/13	HMS	POWER ON GENERATING STATION	
3.	ISSUED FOR BID	09/09/13	EDT	PEKIN, ILLINOIS	
4.	ISSUED FOR PERMIT	07/15/13	HMS	DRAWING NO. D2-11375-000	
5.	REVISION	DATE	APPRO BY	SHEET NO. 15	
				REFERENCE: HMS 011513	

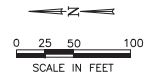
11/12/2014 12:57PM, PLOTTED BY: diana, SAVED BY: diana
C:\Users\jgordon\Documents\11-12-2014\PowerGen\ASH SURGE BASIN\RECORD.DWG (11/12/2014 12:57:00) - 03.dwg C010
NAME: JGORDON



NOTES:
1. SITE BENCHMARK 1 (BMG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.08 FEET (NGVD 29).

CONTRACTOR NOTES:
1. ACCUMULATED ASH, SLOTTED SCREEN, AND DEBRIS TO BE REMOVED BY CONTRACTOR, AS DIRECTED BY OWNER.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83 FEET.
VERTICAL DATUM:
PLANT DATUM



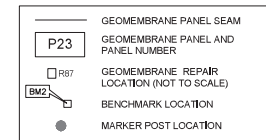
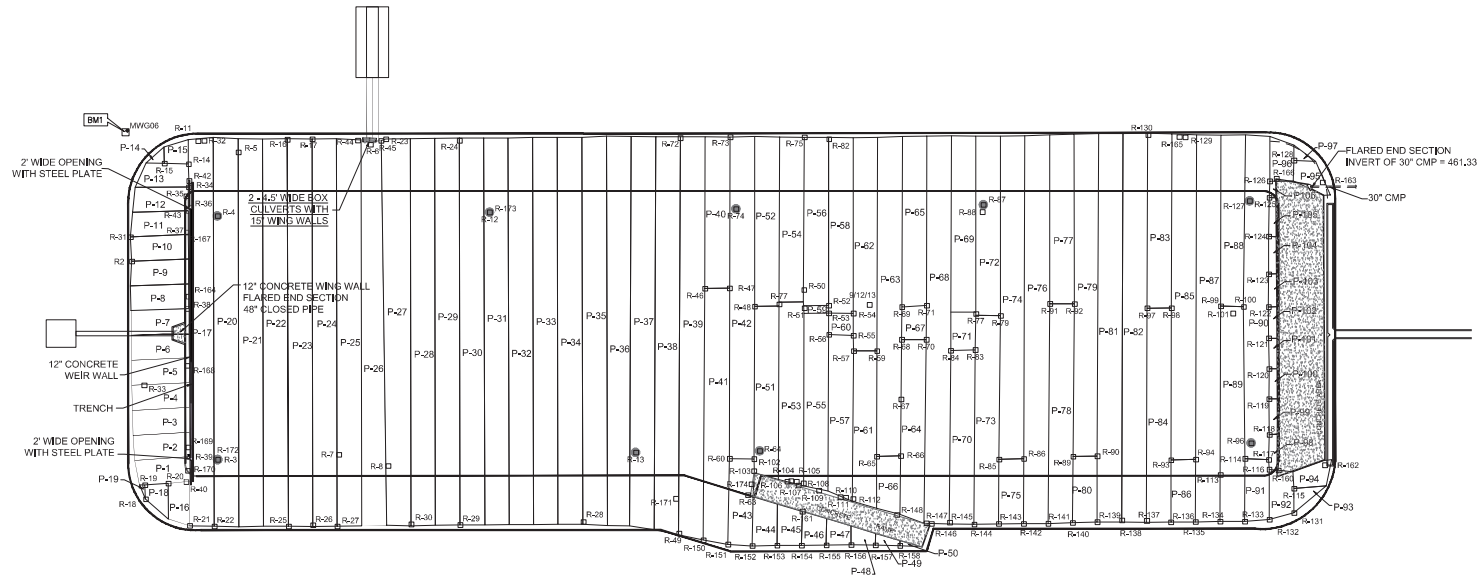
SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 38-0-2071, DATED 5-12-78.
3. LOCATION OF 30\"/>

5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
2.	ISSUED FOR CONSTRUCTION	09/18/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION		DATE	APPROD BY:



PROJECT NO. 2113.2	PRE-CONSTRUCTION SITE CONDITIONS ASH SURGE BASIN LINER REPLACEMENT POWERTRON GENERATING STATION MIDWEST GENERATION PEKIN, ILLINOIS	
DRAWN BY: RLH 01/14/13		
CHECKED BY: HMS 01/14/13	DRAWING NO: 0211320210-03	
APPROVED BY: HMS 01/15/13		
REFERENCE:		SHEET NO. C010

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V:\Projects\2013\2013-09-03\11-18-2014\PowerGen\Station\Station\RECCORD DWG\20130202-00.dwg C021
NAME: JRR



- NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 468.79 FEET (NGVD 29).
 2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).



HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83 FEET.
VERTICAL DATUM:
PLANT DATUM

SOURCE NOTES:

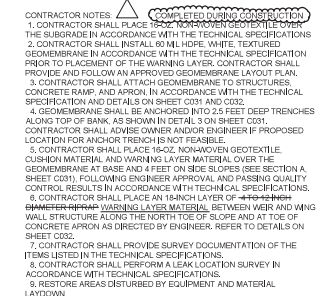
1. THIS DRAWING WAS DEVELOPED FROM SURVEY DATA BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

5.			
4.			
3.			
2.			
1.			
ISSUED FOR RECORD DOCUMENTATION		07/17/14	EJT
REVISION		DATE	APPROD BY



PROJECT NO.	2113.2
DRAWN BY:	RLH 030614
CHECKED BY:	JRR 030614
APPROVED BY:	EJT 07/17/14

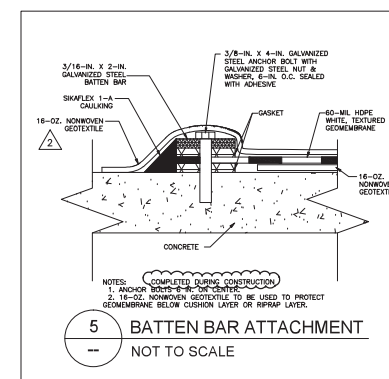
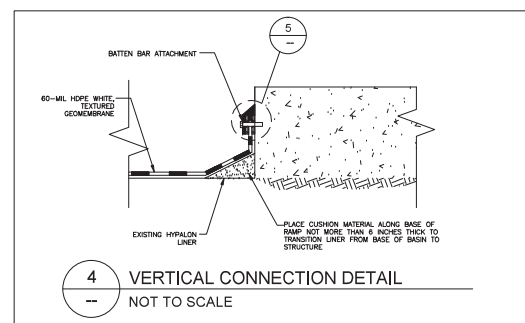
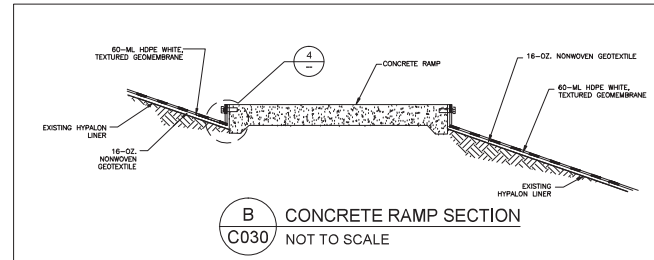
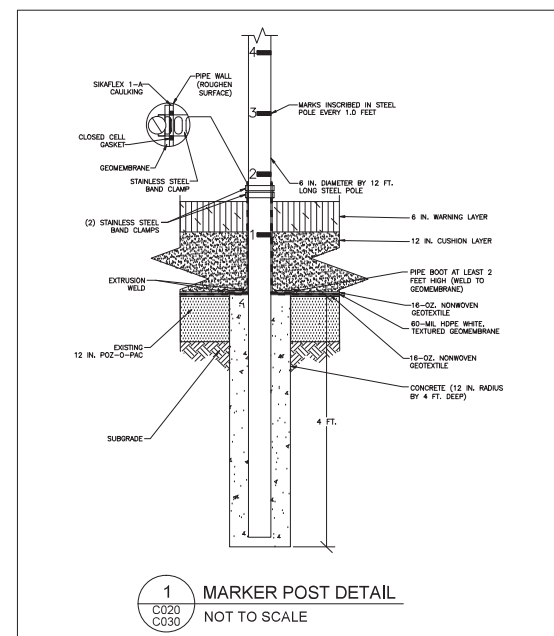
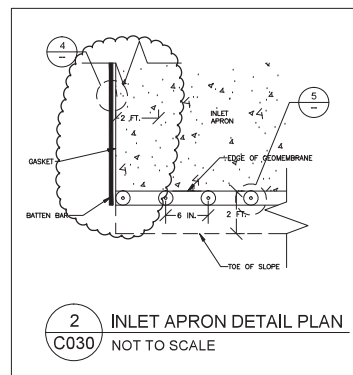
GEOMEMBRANE PANEL LAYOUT	
ASH SURGE BASIN LINER REPLACEMENT POWERTON GENERATING STATION MIDWEST GENERATION PEKIN, ILLINOIS	
DRAWING NO. 021130202-00	SHEET NO. C021
REFERENCE:	



SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080811, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 38-Q-2071, DATED 5-12-78.
3. FINAL SURFACE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED OCTOBER 8, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

6.				 NATURAL RESOURCE TECHNOLOGY	PROJECT NO. 2113.28020MERCON	WARNING LAYER PLAN ASH SURGE BASIN LINER REPLACEMENT POWERTON GENERATING STATION MIDWEST GENERATION PEKIN, ILLINOIS	DRAWING NO. 02113.020030-03 07/19/2016	SHEET NO. C030
4.					DRAWN BY RLH 01/15/13			
3.	ISSUED FOR RECORD DOCUMENTATION	07/18/14	EJT		CHECKED BY HMS 01/15/13			
2.	ISSUED FOR CONSTRUCTION	09/18/13	HMS					
1.	ISSUED FOR ID	03/28/13	EJT					
0.	ISSUED FOR PERMIT	01/15/13	HMS					
REVISION.	DATE.	APPD. BY						

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 REFERENCES:



6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APPROVED BY:

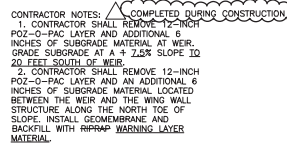


PROJECT NO:	2113.2/POWER/CON
DRAWN BY:	RLH 01/14/13
CHECKED BY:	HMS 01/14/13
APPROVED BY:	HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

SHEET NO.	C031
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6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APP'D BY:



PROJECT NO. 2113.2/POWER/CON
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

SHEET NO.
C032

ATTACHMENT 1-3
2013 LINER REPLACEMENT SPECIFICATIONS

SECTION 02600

HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

- A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

- A. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- B. ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
- C. ASTM D6392 – Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
- D. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.
- E. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
- F. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.
- G. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

- A. Geomembrane Installer: hired by Contractor responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.
- B. Geomembrane Manufacturer: hired by Geomembrane Installer to provide HDPE geomembrane.
- C. Leak Location Contractor: hired by Contractor and responsible for locating potential holes in the installed geomembrane using electrical methods.
- D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, 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.

- E. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.
- F. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.
- G. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than 100ft².
- H. Patch: Unit area of a geomembrane that will be seamed in the field that is less than 100ft².
- I. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.
 - 2. Geomembrane Installer:
 - a. 5 years of continuous experience in installation of HDPE geomembrane.
 - b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.
 - c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.
 - d. Geomembrane Installers that are qualified and approved by Engineer are listed below:
 - i. Clean Air and Water Systems
Dousman, WI
Brain McKeown
262-965-4366
 - 3. Leak Location Contractor:
 - a. 3 years of continuous experience in performing leak location surveys using electrical methods.

- b. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.
- c. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.
- d. Leak Location Contractors that are qualified and approved by Engineer are listed below:
 - i. Leak Location Services, Inc.
San Antonio, TX
210-408-1241
 - ii. Or other approved by Owner and/or Engineer.

B. Quality Assurance Program:

- 1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.
- 2. The Owner and/or Engineer may document geomembrane installation including panel placement, seaming, pre-qualification seam testing, non-destructive seam and repair testing, repair size and locations, and weather conditions.
- 3. The Owner may engage and pay for the services of Engineer and QA Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals:

- 1. Raw Materials:
 - a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.
 - b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.
 - c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.
- 2. Geomembrane Manufacturer's Certification:
 - a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).

3. Geomembrane Manufacturer Production Information:
 - a. Corporate background information indicating compliance with qualification requirements.
 - b. Quality control plan for manufacturing.
 - c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e., mill certificates).
 4. Contractor shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, chemical composition of the filaments and other pertinent information to fully describe the geotextile.
 5. Geomembrane Installer's Seaming Personnel
 - a. Training completed by personnel.
 - b. Seaming experience for each personnel.
 6. Geomembrane Installer's Information:
 - a. Corporate background information indicating compliance with qualification requirements.
 - b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.
 - c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.
 - d. Installation quality control plan.
 7. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.
- B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals
1. Leak Location Contractor's Work Plan:

- a. Corporate background information indicating compliance with qualification requirements.
 - b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.
 - c. Resumes of personnel performing leak location survey, along with pertinent experience information.
 - d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.
 - e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.
 - f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.
- C. During installation, submit the following to the Owner and/or Engineer:
 - 1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.
 - 2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.
- D. Within 10 days of geomembrane installation completion, submit the following to Owner and/or Engineer:
 - 1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.
 - 2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.
 - 3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.
- E. The Owner and/or Engineer will review and inspect geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.
- F. The Owner and/or Engineer will provide written final acceptance of the geomembrane installation after completion of the leak location survey. Written conditional

geomembrane installation acceptance can be provided to the Contractor prior to completion of the leak location survey when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.
 2. All installation quality assurance/control documentation has been completed and submitted to the Owner and/or Engineer.
 3. Verification of the adequacy of all field seams, repairs and associated testing is complete.
- G. Within 14 days of completion of the leak location survey, submit final written report (per ASTM D 7007) of the leak location survey provided by Leak Location Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Owner and/or Engineer.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Engineer.
2. Store geomembrane rolls to ensure adequate protection against exposure to the following:
 - a. Equipment;
 - b. Strong oxidizing chemicals, acids, or bases;
 - c. Flames, including welding sparks;
 - d. Temperatures in excess of 160 deg. F;
 - e. Dust;
 - f. Ultraviolet radiation (i.e. sunlight); and
 - g. Inclement weather.
3. Whenever possible, provide a 6-inch minimum air space between rolls.
4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Geotextile to be used for cushioning between subgrade and geomembrane shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd ²	16	ASTM D5261	MARV
Puncture Strength	lb	170	ASTM D4833	MARV
Trapezoid Tear	lb	145	ASTM D4533	MARV
Grab Tensile Strength	lb	370	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

- B. Geotextile to be used for separation between geomembrane and cushion material shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd ²	12	ASTM D5261	MARV
Apparent Opening Size	US Sieve	100	ASTM D4751	MARV
Puncture Strength	lb	210	ASTM D4833	MARV
Trapezoid Tear	lb	125	ASTM D4533	MARV
Grab Tensile Strength	lb	320	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

C. High Density Polyethylene (HDPE) White Textured Geomembrane

1. HDPE geomembrane shall be white, textured (both sides), 60-mil product approved by the Owner and/or Engineer.
2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:
 - a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program

and submitted to the Owner and/or Engineer with the written conformance certification.

- b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.
- c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.
- d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Owner and/or Engineer.
- e. Geomembrane Manufacturer that are qualified and approved by Engineer are listed below:
 - i. GSE
Houston, TX
800 435 2008

- 3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

D. Seaming Apparatus

- 1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.
- 2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

E. Field Test Equipment

- 1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.
- 2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.
- 3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.
- 4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

- A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Owner and/or Engineer. Nonconforming material shall either be retested at the direction of the Owner and/or Engineer or removed from site and replaced at Contractor's expense.
- B. Conformance Test Methods
 - 1. Samples will be located and collected by the Owner and/or Engineer at a rate of one sample per 100,000 square feet of geomembrane delivered to site.
 - 2. One sample will be obtained from each geomembrane production batch delivered to the site.
 - 3. Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.
 - 4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.
 - 5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.
- C. Role of Testing Laboratories
 - 1. The Owner and/or Engineer will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Engineer will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.
 - 2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Owner and/or Engineer.
 - 3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in GRI GM 13. Results shall not be substituted for quality assurance testing described herein.
- D. Procedures for Determining Conformance Test Failures
 - 1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Owner and/or Engineer. Two additional tests (retests)

shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Owner and/or Engineer reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Owner and/or Engineer may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.
3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

- A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.
- B. The following topics relating to geomembrane installation shall be addressed:
 1. Responsibilities of each party.
 2. Lines of authority and communication.
 3. Methods for documenting, reporting and distributing documents and reports.
 4. Procedures for packaging and storing archive samples.
 5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.
 6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.
 7. Procedures and responsibilities for preparation and submittal of as-built drawings.
 8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.
10. Deployment techniques including allowable subgrade for geomembrane.
11. Procedures for covering of the geomembrane to prevent damage.
12. Plan for minimizing wrinkles in the geomembrane.
13. Measurement and payment schedules.
14. Site health and safety procedures/protocols.

3.02 SUBGRADE INSPECTION AND REPAIR

- A. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Owner and/or Engineer and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Owner and/or Engineer with written acceptance of subgrade surface over which 16 oz non woven geotextile and geomembrane is deployed (Part 1.05C) for each day of deployment.

3.03 GEOMEMBRANE LINER DEPLOYMENT

- A. Geomembrane Installer shall deploy 16-oz non woven geotextile following applicable certifications/quality control certificates listed in Subsection 1.05 of this section and approved by the Owner and/or Engineer. Any 16-oz non woven geotextile placed prior to approval by the Owner and/or Engineer shall be at the sole risk of the Contractor. If geotextile installed prior to approval by the Owner and/or Engineer does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.
- B. 60 mil HDPE geomembrane will be deployed following installation of 16-oz non woven geotextile and applicable certifications/quality control certificates listed in Subsection 1.05 of this section according to submitted panel layout drawing as approved by the Owner and/or Engineer. The Owner and/or Engineer is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.
- C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.
- D. Geomembrane shall not be deployed if:

1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Owner and/or Engineer.
 2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.
 3. Winds are excessive as determined by Geomembrane Installer in agreement with the Owner and/or Engineer.
 4. The Owner and/or Engineer will have the authority to suspend work during such conditions.
- E. The Geomembrane Installer shall be responsible for conformance with the following requirements:
1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 8 psi . Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.
 2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).
 3. Method of deployment does not damage geomembrane.
 4. Method of deployment minimizes wrinkles.
 5. Temporary loading or anchoring does not damage geomembrane.
 6. Direct contact with geomembrane is minimized.
- F. Geomembrane Installer shall place 16-oz non woven geotextile on the geomembrane at the base of the basin and at least 4 feet up side slopes, as indicated on Contract Drawings. Geomembrane Installer shall cover the batten bar attachments with the 16-oz non woven geotextile.
- G. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

- A. Seam Layout
1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.
 2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

B. Seaming Processes/Equipment

1. Approved processes for field seaming (panel to panel) are extrusion or hot wedge fusion-type seam methods. No other processes can be used without prior written authorization from the Owner and/or Engineer. Only equipment which has been specifically approved by make and model shall be used, if applicable.
2. The Geomembrane Installer will meet the following requirements regarding use, availability, and cleaning of welding equipment at job site:
 - a. Intersecting hot wedge seams shall be patched using extrusion welding process.
 - b. Electric generator for equipment shall be placed on a smooth base such that no damage occurs to geomembrane. A smooth insulating plate or fabric shall be placed beneath hot equipment after usage.
3. The Geomembrane Installer shall keep records for performance and testing of all seams.

C. Seaming Requirements/Procedures

1. Weather Conditions - Range of weather conditions under which geomembrane seaming can be performed are as follows:
 - a. Unless otherwise authorized in writing by Owner and/or Engineer, no seaming shall be attempted or performed at an ambient temperature below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C).
 - b. Between ambient temperatures of 32 degrees F (0 degrees C) and 41 degrees F (5 degrees C), seaming shall follow GRI GM9 cold weather seaming guidelines. Pre-qualification seams shall be produced to determine appropriate seaming parameters and for Engineer's approval.
 - c. Above 41 degrees F (5 degrees C), no special conditions will be required.
 - d. Geomembrane shall be dry and protected from wind.
 - e. Seaming shall not be performed during any precipitation event.
 - f. Seaming shall not be performed in areas where ponded water has collected below surface of geomembrane.
2. If the Geomembrane Installer chooses to use methods which may allow seaming at ambient temperatures below 41 degrees F or above 104 degrees F, the Geomembrane Installer shall demonstrate and submit certification to Owner and/or Engineer that methods and techniques used to perform seaming produce seams that are equivalent to seams produced at temperatures above 41 degrees F and below 104 degrees F. The Owner and/or Engineer may deny approval for use of the proposed technique regardless of demonstration results.
3. Overlapping - Geomembrane panels shall have finished overlap as follows:
 - a. Minimum of 6 inches for thermal fusion welding.

- b. Insufficient overlap will be considered a failed seam.
- 4. Pre-qualification tests for geomembrane fusion welding shall be conducted by a minimum of 2 pre-qualification seams conducted per day per welding machine by each seaming technician performing welding with that machine. At least one test shall be performed at the start of each work day, with tests at intervals of no greater than 5 hours and additional pre-qualification tests following work interruptions, weather changes, changes to machine settings, or as directed by the Owner and/or Engineer. Pre-qualification seams shall be made under the same conditions as the actual seams.
 - a. Pre-qualification seam samples shall be 5 feet long by 1-foot wide (minimum) after seaming, with seam centered along its length. Each pre-qualification seam shall be labeled with the date, geomembrane temperature, seaming unit identifier, seam number or test location, technician performing the test seam and description of testing results.
 - b. Seam overlap shall be in accordance with Subsection 3.04(C)(3).
 - c. Pre-qualification seams shall be inspected for proper squeeze-out, footprint pressure, and general appearance.
 - d. Four specimens, each 1-inch in length, shall be cut from opposite ends of the pre-qualification seam sample by the Geomembrane Installer. The remainder of pre-qualification seam shall be retained by the Owner and/or Engineer and may be submitted for laboratory testing.
 - e. The Geomembrane Installer shall complete two shear tests and two peel tests in accordance with GRI GM 19.
 - f. Pre-qualification seams failed by inspection or testing may be retested at request of the Geomembrane Installer. If the second pre-qualification seam fails, then the seaming apparatus or seaming technique shall be disqualified from use until two consecutive, satisfactory pre-qualification seams are obtained.
- 5. Seam Preparation
 - a. Prior to seaming, seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
 - b. Seams shall be aligned so as to minimize number of wrinkles and fishmouths.
- 6. General Seaming Procedures

- a. Fishmouths or wrinkles at seam overlaps shall be cut along ridge of the wrinkle to achieve a flat overlap. Cut fishmouths or wrinkles shall be repaired, and/or patched in accordance with Part 3.07.
- b. Seaming shall extend to the outside edge of geomembrane panels including material placed in anchor trenches.
- c. The intersecting thermal fusion seams shall be patched using the extrusion welding process.

3.05 NON-DESTRUCTIVE TESTING

- A. Each field seam shall be non-destructively tested over its entire length by the Installer. Testing shall be conducted as field seaming progresses, not at completion of all seams, unless specifically agreed to by the Owner and/or Engineer in writing.
- B. Vacuum Testing – shall be performed in accordance with ASTM D5641.
- C. Air Pressure Testing – shall be performed in accordance with ASTM D5820, and GRI GM 6, Pressurized Air Channel Test for Dual Seamed Geomembranes.
- D. Each seam tested non-destructively shall be marked with the date of the test, name of the testing technician, length of the seam, test method and results. The same shall also be recorded by the Owner and/or Engineer on the appropriate CQA documentation.
- E. Non-Destructive Seam Test Failures
 - 1. Seams failing non-destructive testing shall be repaired by the Geomembrane Installer according to Part 3.07. Seams shall be non-destructively retested. If the seam defect cannot be located, the entire section of seam affected shall be repaired and retested.

3.06 ELECTRONIC LEAK LOCATION SURVEY

- A. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.
- B. Contractor shall ensure that the cushion and warning layers, and 12 oz non woven geotextile above and 16 oz non woven geotextile below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of the cushion layer, warning layer and subgrade is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.
- C. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.
- D. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

- E. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.
- F. After the warning layer is placed, conduct a leak location survey on the warning layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.
- G. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.
- H. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.
- I. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.07 of this Section.

3.07 DEFECTS AND REPAIRS

- A. The geomembrane shall be examined by the Geomembrane Installer and the Owner and/or Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.
- B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:
 - 1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;
 - 2. Capping - used to repair large lengths of failed seams; and
 - 3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Owner and/or Engineer.
- C. Patches or caps.
 - 1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.
 - 2. Round corners of patch and/or cap (suggest 3-inch radius).

3. Repair procedures, equipment, materials, and techniques will be approved by the Owner and/or Engineer prior to repair.
 4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.
- D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.
- E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Owner and/or Engineer.
- F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.
- G. The Owner and/or Engineer will document repairs, repair testing, and retesting results.
- H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.08 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

- A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:
1. Use minimum 2-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.
 2. Use standard welding procedures to seam the geomembrane boot or weld strip to the geomembrane.
 3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.09 SURVEY DOCUMENTATION

- A. Prior to covering the geomembrane, the Geomembrane Installer shall provide the Contractor, Owner and/or Engineer with 24-hour notification to conduct a survey. The Contractor shall survey the location of all seams (panel corners acceptable), and repairs. The Contractor shall provide survey data to the Owner and/or Engineer within two

working day of survey completion and in accordance with Section 01050, Field Engineering and Survey.

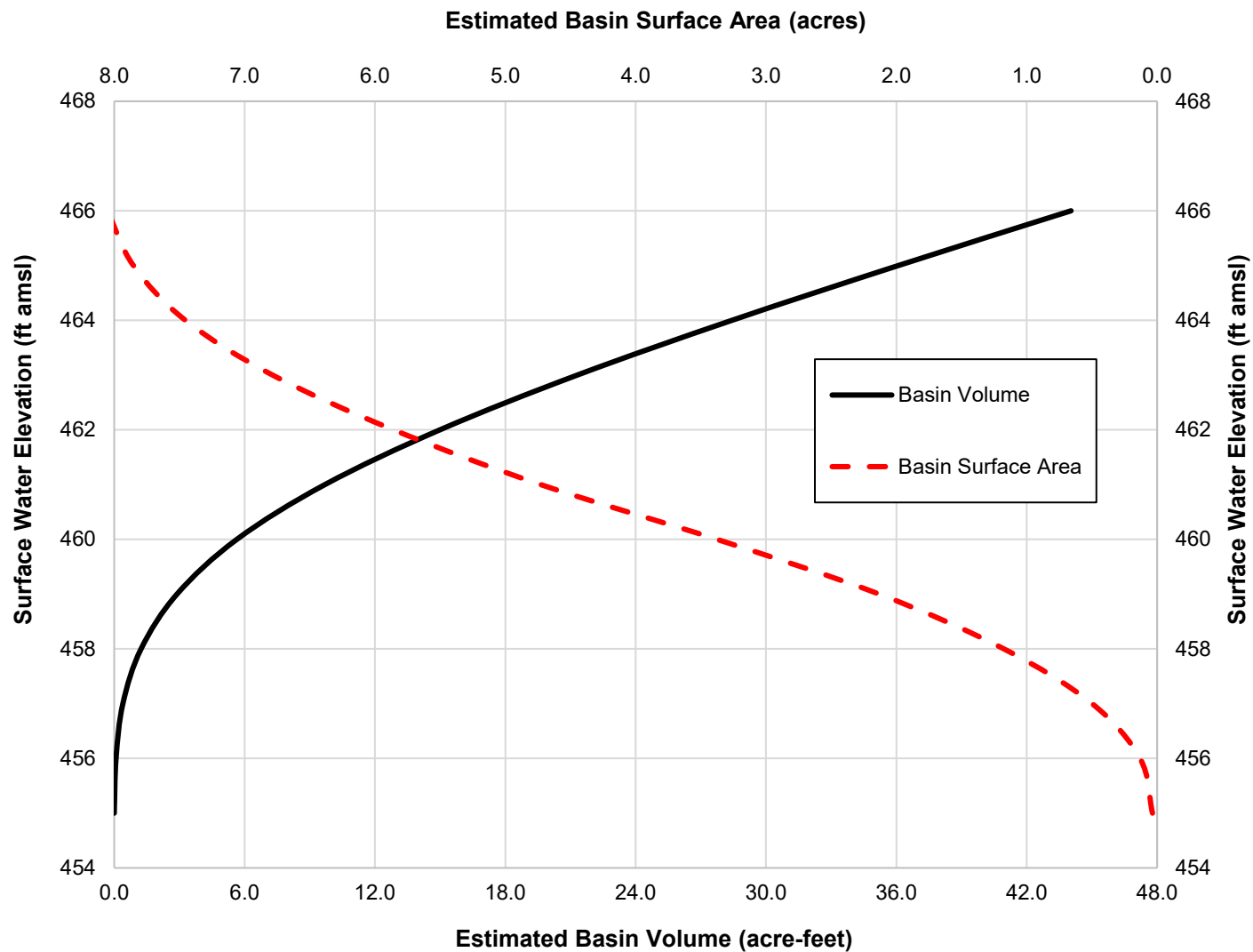
3.10 DAILY FIELD INSTALLATION REPORTS

- A. At the beginning of each day, the Geomembrane Installer shall provide the Owner and/or Engineer with a report for all work completed the previous day.
- B. The Daily Field Installation Report shall include the following:
 - 1. The total amount and location of geomembrane placed.
 - 2. The total length and location of seams completed, technician name and welding unit numbers.
 - 3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).
 - 4. Results of pre-qualification test seams, if available.
 - 5. Results of non-destructive testing.
- C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

END OF SECTION

**ATTACHMENT 1-4
RETROFITTED ASH SURGE BASIN
AREA-CAPACITY CURVE**

Retrofitted Ash Surge Basin Area-Capacity Curve



ATTACHMENT 2-1
CCR CHEMICAL CONSTITUENTS ANALYSIS

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

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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.

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Case Narrative

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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 4.6° 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 Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

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

Lab Sample ID: 500-201436-2

Date Collected: 06/23/21 14:23

Matrix: Solid

Date Received: 06/24/21 15:35

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

Lab Sample ID: 500-201436-3

Date Collected: 06/23/21 15:00

Matrix: Solid

Date Received: 06/24/21 15:35

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

Definitions/Glossary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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	

Eurofins TestAmerica, Chicago

QC Association Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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	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

Eurofins TestAmerica, Chicago

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Lab Sample ID: LCS 500-607902/13-A
Matrix: Solid
Analysis Batch: 608143

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 608919

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 608919

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 607925

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Solid
Analysis Batch: 607925

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
Chloride	200	205		mg/Kg		103	85 - 115

Lab Sample ID: LCSD 500-607760/3-A
Matrix: Solid
Analysis Batch: 607925

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
Chloride	200	206		mg/Kg		103	85 - 115	0	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-607760/1-A
Matrix: Solid
Analysis Batch: 607876

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

Eurofins TestAmerica, Chicago

QC Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

Eurofins TestAmerica, Chicago

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

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

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					
Address 13082 E Manito Road		Due Date Requested		 500-201436 COC					
City Pekin		TAT Requested (days)							
State Zip IL, 61554		Compliance Project: ☐ Yes ☐ No							
Phone 815-372-4589(Tel)		PO # 4502051132							
Email joseph.kotas@nrg.com		WO # 36733393							
Project Name Powerton Station		Project # 50000647		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_C1_E Total Number of Containers 500-201436					
Site:		SSOW#							
Sample Identification		Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Preservation Codes			
						A HCL M Hexane B NaOH N None C Zn Acetate O AsNaO2 D Nitric Acid P Na2O4S E NaHSO4 Q Na2SO3 F MeOH R Na2S2O3 G Amchlor S H2SO4 H Ascorbic Acid T TSP Dodecahydrate I Ice U Acetone J DI Water V MCAA K EDTA W pH 4-5 L EDA Z other (specify) Other			
						Special Instructions/Note			
1	FAB	6/23/21	13:30	G	Solid				
1	FAB2	6/23/21	13:30	C	Solid		X		
					Solid				
2	ASH BASIN	6/23/21	14:23	C	Sol		X		
1	ASH2	6/23/21	14:23	C	Sol		X	X	
3	Metals Z	6/23/21	15:00	C	Sol		X		
1	Metals CB	6/23/21	15:00	C	Sol		X	X	
Possible Hazard Identification						Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)			
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological						☐ 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: J Kotas		Date/Time: 6/23/21 4:30		Company:		Received by: Stephonie Hernandez		Date/Time: 6/24/21 1535	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:	
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time:	
Custody Seals Intact.		Custody Seal No		Cooler Temperature(s) °C and Other Remarks.					
☐ Yes ☐ No				4.9 → 4.6					

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

SHIP DATE 23JUN21
ACTWGT 30 00 LB
CAD 100275867/NET4340
DIMS 14x12x22 IN
BILL SENDER

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

UNIVERSITY PARK IL 60484

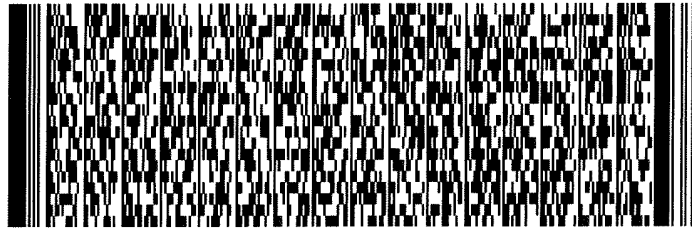
(708) 534-5200 X 153

REF

500-201436 Wayb

INV
PO

DEPT



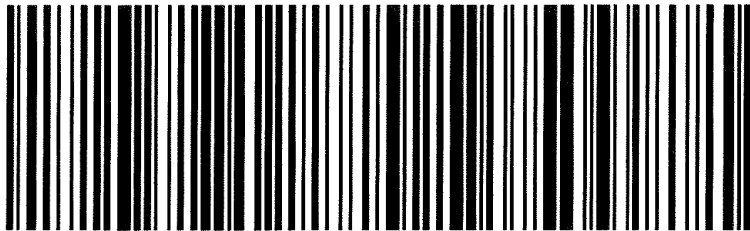
56DJ3B38/FE4A

THU - 24 JUN 4:30P
STANDARD OVERNIGHT

TRK# **7740 8262 9809**

UF JOTA

60484
ORD
IL-US



489t.

for 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

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Use 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 for 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 value, 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 from 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 direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims 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

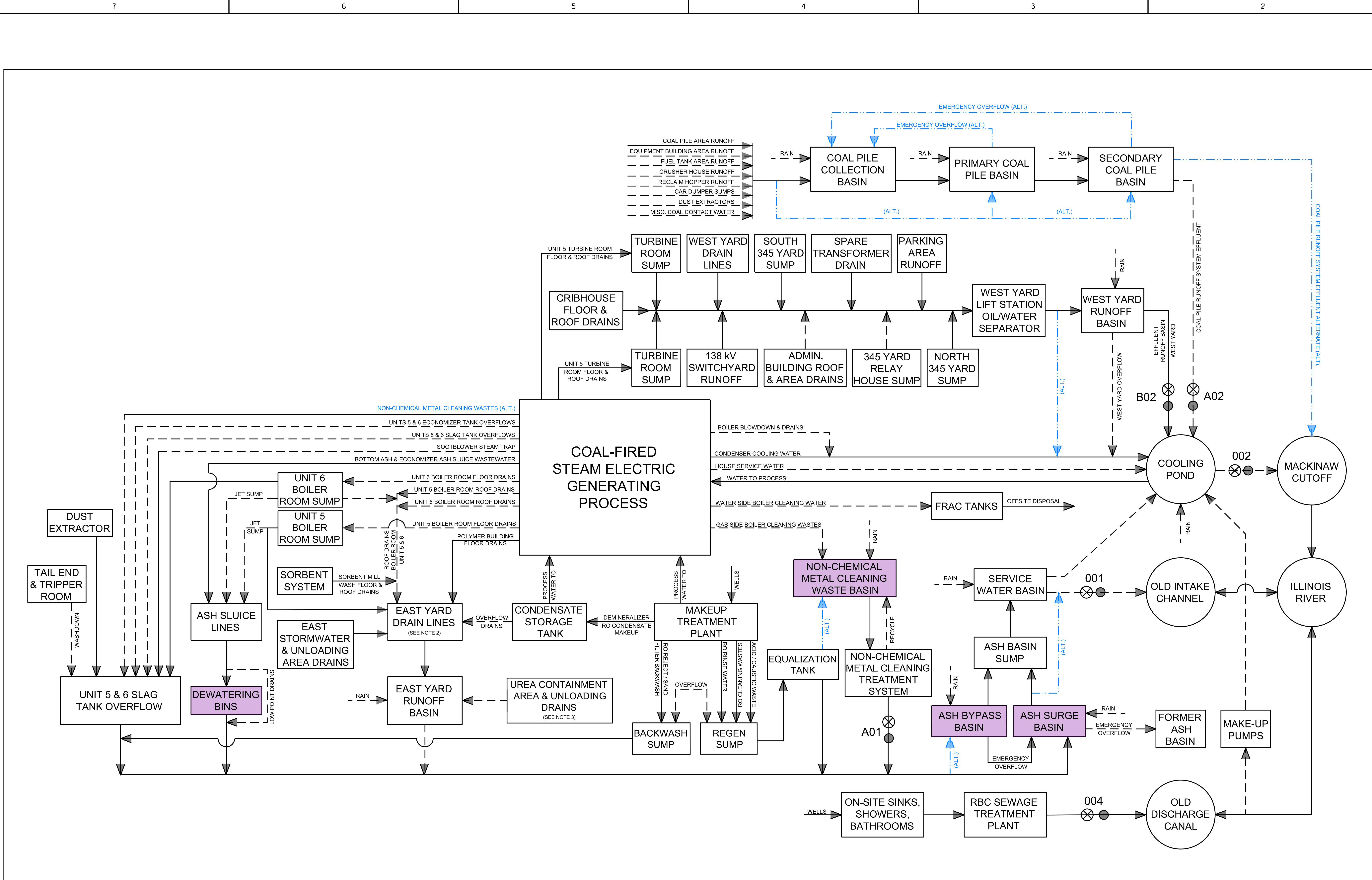
List Number: 1

Creator: Hernandez, Stephanie

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ 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 $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT 2-2
POWERTON PROCESS FLOW DIAGRAM

PD11153/041864/S:\C:\v\l\Design\m2-Powerton - CCR\Drawings\PDH-CSK-PFD-001.dgn
Form 606-0401-01-08, ANSI (Imperial), MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



LEGEND	
—	TYPICAL
- - -	INTERMITTENT
---	ALTERNATE
●	OUTFALL NUMBER
⊗	SAMPLING POINT
■	CCR TREATMENT/STORAGE FACILITY

NOTES	
1.	THIS DRAWING WAS DEVELOPED USING MIDWEST GENERATION, LLC DRAWING "GENERAL FLOW DIAGRAM WITH NPDES OUTFALLS, NPDES PERMIT NO. IL0002232," PREPARED BY APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC (DATED NOVEMBER 2019) AND USED WITH PERMISSION FROM MIDWEST GENERATION, LLC. SARGENT & LUNDY HAS NOT INDEPENDENTLY VERIFIED THE INFORMATION SHOWN ON THIS DRAWING.
2.	"EAST YARD DRAIN LINES" INCLUDES FAN BAY DRAINS, DRAINS ON EAST HALF OF PROPERTY.
3.	VALVE IS LOCATED ON SUMP FROM UREA CONTAINMENT AREA & UNLOADING DRAINS TO THE EAST YARD RUNOFF BASIN.
4.	OUTFALL 006, TREATED ASBESTOS CONTAMINATED STORMWATER, IS NOT INCLUDED IN THIS DIAGRAM AND IS BEING PROPOSED FOR REMOVAL DUE TO THERE NO LONGER BEING DEMOLITION DEBRIS.

HOLD INFORMATION	
NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	11-25-2020	FOR USE

ISSUE PURPOSE: FOR USE
SPECIFICATION: ---
PROJECT NO.: 12661-097

CAD FILE NAME: POW-CSK-PFD-001.DGN
PREPARED BY: J. CHAVEZ
REVIEWED BY: T. DEHLIN
APPROVED BY: T. DEHLIN

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.

Sargent & Lundy
SARGENT & LUNDY^{LLC}
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603-5780

MWG

PROJECT	
MIDWEST GENERATION, LLC POWERTON GENERATING STATION UNITS 5 & 6	

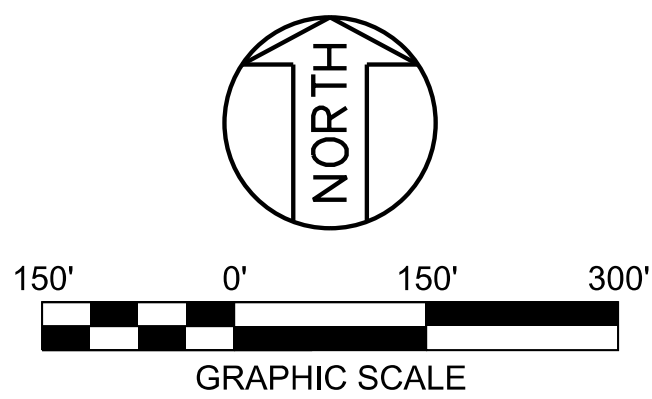
DRAWING TITLE	
EXISTING WATER BLOCK FLOW DIAGRAM	

DRAWING NUMBER	REVISION
POW-CSK-PFD-001	0

SHEET	1	OF	1

ATTACHMENT 2-3
ON-SITE TRANSPORTATION PLAN

FIGURE	REV.	TITLE
FIGURE 2	0	ASH SURGE BASIN SITE TRANSPORTATION MAP



LEGEND	
—	TYPICAL VEHICLE ACCESS TO METAL CLEANING BASIN
—	LARGE VEHICLE ACCESS TO METAL CLEANING BASIN
—	ASH SURGE BASIN BOUNDARY

NOTES

REFERENCE DRAWINGS	

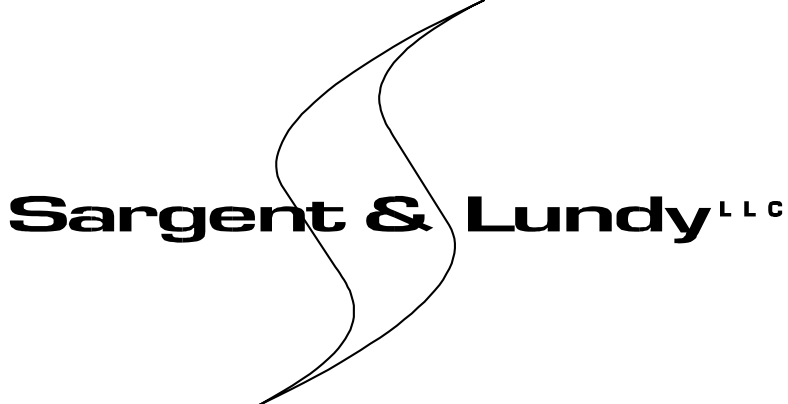
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

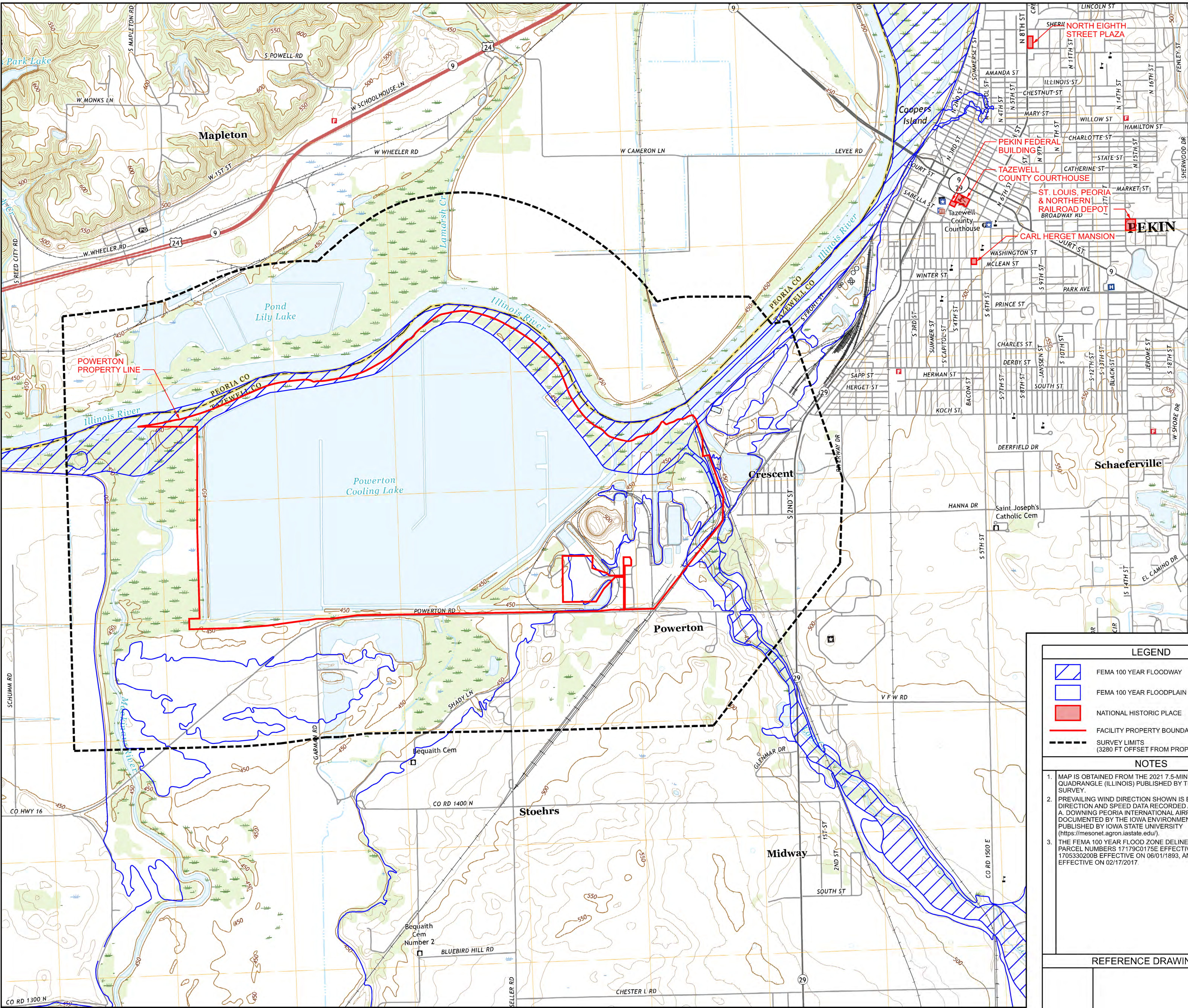
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

FOR PERMIT
NOT FOR CONSTRUCTION

HOLD INFORMATION				
NO.	DESCRIPTION			
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.				
RELEASE INFORMATION				
REV.	DATE	DESCRIPTION		
0	07-26-2023	FOR PERMIT		
ISSUE PURPOSE: PERMIT				
SPECIFICATION: N/A				
PROJECT NO.: A12661.152				
CAD FILE NAME: ASB-FIGURE 2.DGN				
PREPARED BY: M. KARNIA / J. CHAVEZ				
REVIEWED BY: T. DEHLIN				
APPROVED BY: T. DEHLIN				
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.				
 SARGENT & LUNDY ^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780				
				
PROJECT				
MIDWEST GENERATION, LLC POWERTON GENERATING STATION AHS SURGE BASIN RETROFIT				
DRAWING TITLE				
ASH SURGE BASIN SITE TRANSPORTATION MAP				
DRAWING NUMBER		REVISION		
FIGURE 2		0		
SHEET	1 OF 1			

ATTACHMENT 3
SITE LOCATION MAP

PL14003/01534/4/Share/Info CENTER/IS/PLINE REF MATERIAL/CLIV/DESIGN2-Powerton - CCR/ash Surge Basin Closure Drawings/ASB-Attachment 3.dgn
Form: SDC-0401-1-01-00, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 1/14, Revision Date: 04-30-2010



FOR PERMIT
NOT FOR CONSTRUCTION



LEGEND

- FEMA 100 YEAR FLOODWAY
- FEMA 100 YEAR FLOODPLAIN BOUNDARY
- NATIONAL HISTORIC PLACE
- FACILITY PROPERTY BOUNDARY LINE
- SURVEY LIMITS (3280 FT OFFSET FROM PROPERTY LINE)

NOTES

- MAP IS OBTAINED FROM THE 2021 7.5-MINUTE PEKIN QUADRANGLE (ILLINOIS) PUBLISHED BY THE U.S. GEOLOGICAL SURVEY.
- PREVAILING WIND DIRECTION SHOWN IS BASED ON WIND DIRECTION AND SPEED DATA OBTAINED AT GENERAL WAYNE A. DOWNING PEORIA INTERNATIONAL AIRPORT AS DOCUMENTED BY THE IOWA ENVIRONMENTAL MESSONET PUBLISHED BY IOWA STATE UNIVERSITY (<https://mesonet.agron.iastate.edu/>).
- THE FEMA 100 YEAR FLOOD ZONE DELINEATION IS FROM FEMA PARCEL NUMBERS 17179C0175E EFFECTIVE 02/17/2017, 1705330200B EFFECTIVE ON 06/01/1893, AND 17179C0160E EFFECTIVE ON 02/17/2017.

REFERENCE DRAWINGS

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

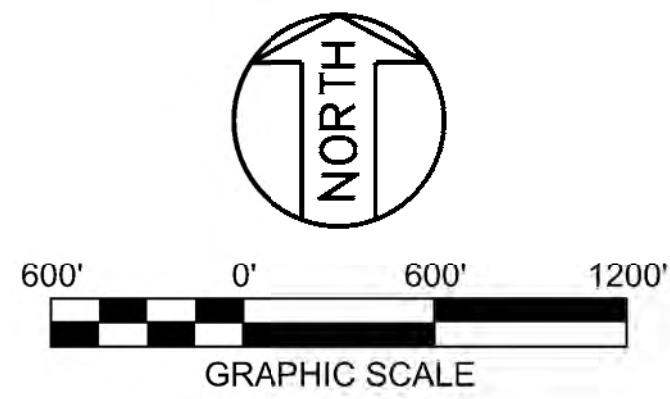
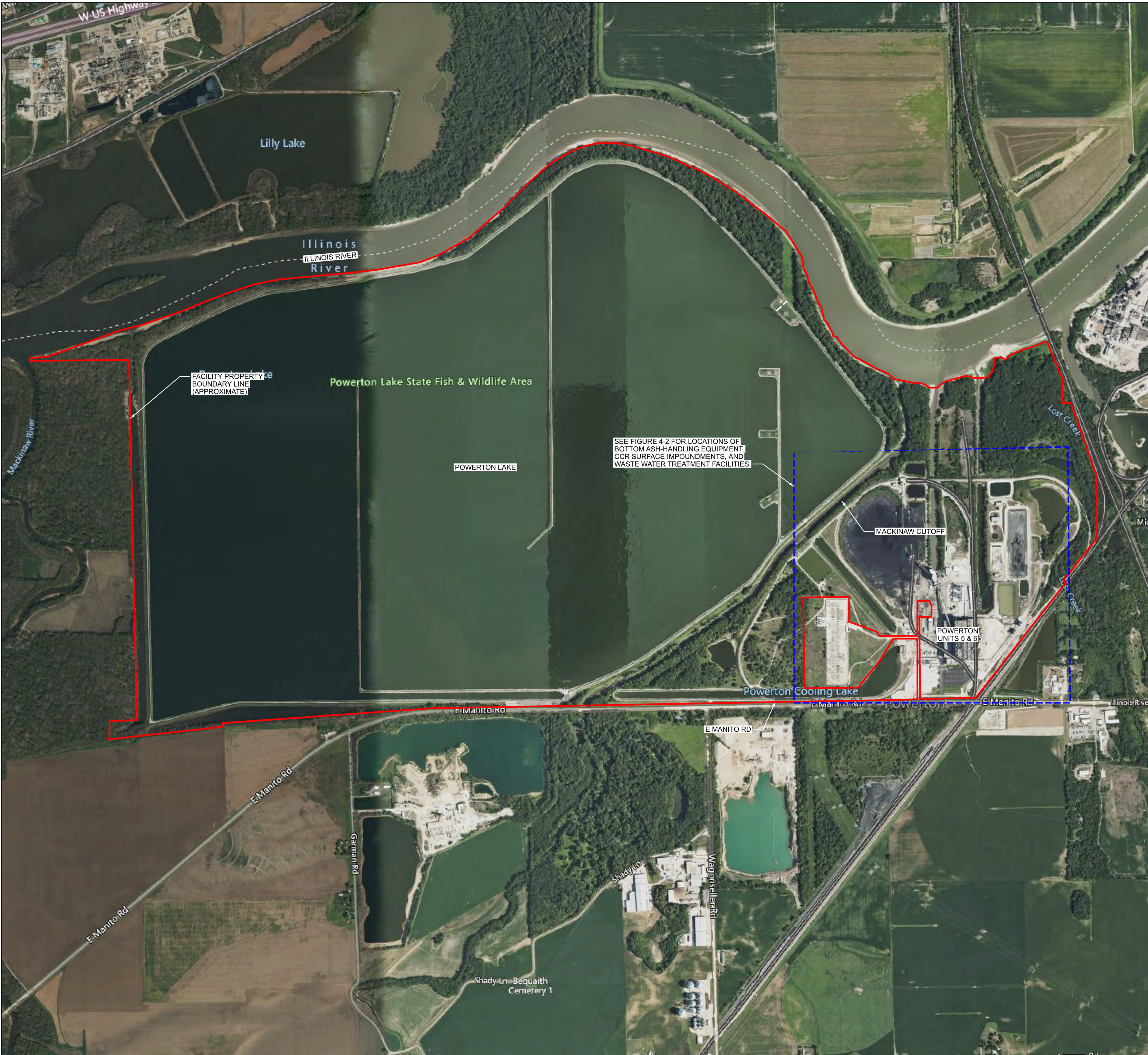
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTOR(S) PERFORMING THE WORK.

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUB-CONTRACTOR(S) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: N/A		
PROJECT NO.: A12661.152		
CAD FILE NAME: ASB-ATTACHMENT 3.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 SARGENT & LUNDY ^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
 Midwest Generation, LLC		
PROJECT		
MIDWEST GENERATION, LLC POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
SITE LOCATION MAP		
DRAWING NUMBER		REVISION
ATTACHMENT 3		0
SHEET	1 OF 1	

ATTACHMENT 4
SITE PLAN MAPS

FIGURE	REV.	TITLE
FIGURE 4-1	0	SITE PLAN MAP
FIGURE 4-2	0	BOTTOM ASH-HANDLING EQUIPMENT AND CCR SURFACE IMPOUNDMENTS



LEGEND	
—	FACILITY PROPERTY BOUNDARY LINE

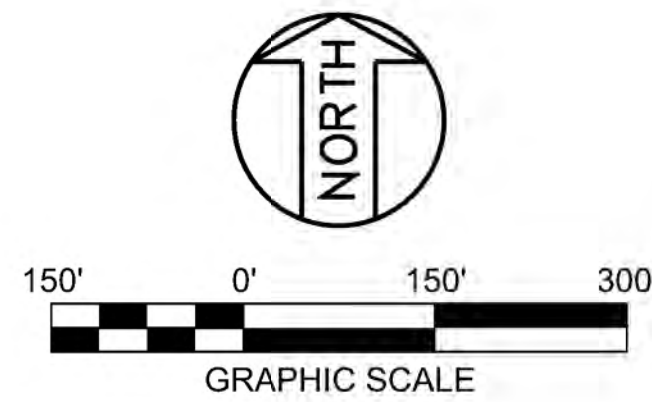
NOTES	
1.	AERIAL IMAGE IS FROM GOOGLE EARTH PRO V.7.3 AND IS DATED 09/14/2017.

REFERENCE DRAWINGS	

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.	
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.	
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.	

FOR PERMIT
NOT FOR CONSTRUCTION

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: N/A		
PROJECT NO.: A12661.152		
CAD FILE NAME: ASB-FIGURE 4-1.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 Sargent & Lundy ^{LLC} SARGENT & LUNDY ^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
 MWG Midwest Generation, LLC		
PROJECT		
MIDWEST GENERATION, LLC POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
SITE PLAN MAP		
DRAWING NUMBER		REVISION
FIGURE 4-1		0
SHEET	1 OF 1	



NOTES

1. AERIAL IMAGE IS FROM GOOGLE EARTH PRO V.7.3 AND IS DATED 09/14/2017.

REFERENCE DRAWINGS

FOR PERMIT
NOT FOR CONSTRUCTION

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

HOLD INFORMATION			
NO.	DESCRIPTION		
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.			
RELEASE INFORMATION			
REV.	DATE	DESCRIPTION	
0	07-26-2023	FOR PERMIT	
ISSUE PURPOSE: PERMIT			
SPECIFICATION: N/A			
PROJECT NO.: A12661.152			
CAD FILE NAME: ASB-FIGURE 4-2.DGN			
PREPARED BY: M. KARNIA / J. CHAVEZ			
REVIEWED BY: T. DEHLIN			
APPROVED BY: T. DEHLIN			
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.			
 SARGENT & LUNDY ^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780			
			
PROJECT			
MIDWEST GENERATION, LLC POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT			
DRAWING TITLE			
BOTTOM ASH-HANDLING EQUIPMENT AND CCR SURFACE IMPOUNDMENTS			
DRAWING NUMBER			
FIGURE 4-2			
REVISION			
0			
SHEET	1	OF	1

ATTACHMENT 5-1
CONSTRUCTION PLANS & SPECIFICATIONS



Midwest Generation, LLC

POWERTON GENERATING STATION

SPECIFICATION P-1802

ASH SURGE BASIN RETROFIT

S&L PROJECT NO.: 12661-152

REVISION 0C

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-26-2023





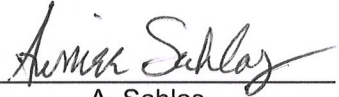
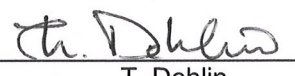
SECTION 000106

ISSUE SUMMARY AND APPROVAL PAGE

<u>Rev.</u>	<u>Purpose of Issue</u>	<u>Date</u>	<u>Sections Affected</u>
0A	Client Comment	03-14-2023	All
0B	Public Comment	03-24-2023	All
0C	Permit	07-26-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications and Bills of Materials, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

<u>Rev.</u>	<u>Prepared By</u>	<u>Reviewed By</u>	<u>Approved By</u>
0A	A. Sahlas	T. Dehlin	--
0B	A. Sahlas	T. Dehlin	--
0C	 A. Sahlas	 T. Dehlin	 T. Dehlin



SECTION 000107
CERTIFICATION PAGE

Sargent & Lundy (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin Date: July 26, 2023

Seal:



Th. Dehlin
7/26/2023
EXP. 11/30/2023



SECTION 000110
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DIVISION 31 - EARTHWORK

Section 319005	Earthwork
Section 319020	High Density Polyethylene Geomembrane Liner with Geocomposite
Section 319025	Geosynthetic Clay Liner
Section 319050	Leachate Collection and Removal System

ATTACHMENTS

Attachment 1	Design Drawings
Attachment 2	Reference Drawings
Attachment 3	2016 Structural Stability & Factor of Safety Assessment

END OF SECTION 000110



SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

- | | | |
|-------|-------------------|---|
| 101.1 | Owner: | Midwest Generation, LLC (MWG) |
| 101.2 | Design Engineer: | Sargent & Lundy (S&L) |
| 101.3 | Project Name: | Ash Surge Basin Retrofit |
| 101.4 | Project Location: | Powerton Generating Station
13082 E. Manito Rd.
Pekin, IL 61554 |

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

- 102.1 The purpose of this project is to retrofit the Ash Surge Basin at Midwest Generation, LLC's Powerton Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845, and with the U.S. Environmental Protection Agency's (EPA) CCR Rule, 40 CFR Part 257 Subpart D.
- 102.2 The Ash Surge Basin will be retrofitted by first removing all CCR and CCR-mixed materials remaining in the basin; removing the basin's existing gravel warning, sand cushion, and riprap layers; and decontaminating the basin's existing geomembrane liner and appurtenant structures, which will remain in place. Following material removal and decontamination of the basin facilities remaining in-place, a new composite liner system and new leachate collection and removal system (LCRS) will be installed within the Ash Surge Basin over the basin's existing decontaminated and leak-tested geomembrane liner.

103. SCOPE OF WORK

- 103.1 In general, this Specification covers the technical requirements for a General Work (GW) Contractor to retrofit the Ash Surge Basin at the Powerton Generating Station. The Work includes the following activities:
- a. Furnishing and installing temporary sediment and erosion control best management practices (BMPs) prior to and during all phases of earth disturbance work.
 - b. Retrofitting the Ash Surge Basin by:
 - b1. Removing all CCR, gravel warning layer, sand cushion, and riprap layers above the basin's existing geomembrane liner with offsite disposal of dry waste material in a permitted landfill approved by the Owner and disposal of liquid waste in the retrofitted Bypass Basin or as otherwise directed by the Owner.
 - b2. Decontaminating the basin's existing geomembrane liner and appurtenant structures, for re-use in the retrofitted basin, including conducting and documenting visual inspections and analytical testing to demonstrate the existing liner is no longer contaminated with CCR constituents.



- b3. Ensuring all appropriate measures are taken to protect the Ash Surge Basin's existing HDPE geomembrane liner system from damage.
 - b4. Placing, compacting, and grading Structural Fill to establish the lines and grades for the basin's LCRS as specified on the Design Drawings.
 - b5. Installing a new composite liner system over the existing, decontaminated geomembrane liner and Structural Fill placed within the basin. The composite liner system consists of an HDPE geomembrane liner over a geosynthetic clay liner (GCL).
 - b6. Installing a new LCRS over the new composite liner system. The LCRS consists of drainage geocomposite – an HDPE geonet core with a non-woven geotextile heat-laminated to each side of the geonet – over a perforated HDPE collection pipe installed within a pipe bedding layer.
 - b7. Installing a Sand Filter Layer above the drainage geocomposite.
 - b8. Installing a Protective Warning Layer above the Sand Filter Layer on the basin floor.
 - b9. Installing riprap on a gravel bedding layer above the Sand Filter Layer along the basin's side slopes to protect the Sand Filter Layer from erosion.
 - c. Restoring and cleaning the project site.
 - d. Developing fueling and maintenance facilities and practices to protect the project site from hydrocarbon spills or other environmental impacts that may impact the project site, adjacent property, or the Illinois River and connected waterways.
- 103.2 In addition, the Work shall include but not be limited to the following:
- a. Engineering and construction services required to perform or install the Work.
 - b. Surveying to ensure the Work is located as indicated on the Design Drawings.
 - c. Furnishing all installation equipment and tools including any calibrated instruments required for monitoring and testing.
 - d. Maintaining the project site in a dry condition that includes dewatering of all areas that collect storm water or groundwater in the area controlled by the GW Contractor, redirecting any surface water as a result of rainfall or water generated by the installation Work. Any groundwater and/or surface water which requires removal from the area of work shall be disposed of in compliance with the Powerton Generating Station's National Pollutant Discharge Elimination System (NPDES) discharge permit in effect at the time of the Work. The methods and proposed place of discharge shall be approved by the Owner prior to disposing of the water.
 - e. Disposing of excess excavated material and other construction related debris in an off-site permitted landfill approved by the Owner.
 - f. Maintaining a record of the installation (i.e., as-built drawings) in accordance with the technical requirements of this Specification.
 - g. Furnishing the services of qualified personnel at the project site to perform the Work.
 - h. Progress reporting as specified in the Commercial Terms and Conditions.
 - i. Daily site cleanup and disposal of waste and debris.
 - j. Participation in the Owner's on-site safety program, including the Owner's CCR Safety and Health Plan Training.



- k. GW Contractor shall allow access to all work areas by Owner, Design Engineer, CQA Contractor staff, and other parties as approved by Owner. GW Contractor shall not install, modify, repair or work on any elements of the project that are subject to the CQA testing and inspection services without notifying the CQA Contractor at least 2 workdays in advance. Work on weekends or holidays shall be scheduled as soon as possible with the CQA Contractor. Failure to provide CQA Contractor adequate advanced notice to staff the site shall result in a hold on work until the CQA Contractor staff arrive on site.
- 103.3 The Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The Work shall be performed exclusively by the GW Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of all people located on the work site, including the GW Contractor's personnel (or that of its subcontractor(s)) performing the Work.
- 103.4 Performance of the Work shall include all the labor, supervision, administration, management, material procurement, tools, installation and testing equipment, miscellaneous material, and consumables to perform the Work specified herein.
- 103.5 Provide all installation equipment and all incidental items not shown or specified but reasonably implied for successful completion of the Work and in strict accordance with the Design Drawings and this Specification, including inspection, testing and quality standards.
- 103.6 Provide installation quality assurance and quality control submittals where required.
- 103.7 Prepare red-lined as-built drawings for review upon completion of the Work to document any variances between the construction issue of the Design Drawings and the actual installation. Finalize as-built drawings after the Owner and the Design Engineer review.
- 103.8 All other work as indicated on the Design Drawings, as specified herein, or as required to properly complete the Work.
- 104. DIVISION OF RESPONSIBILITY & CONTRACTOR QUALIFICATIONS
- 104.1 Owner:
 - a. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor. The Owner will ultimately be responsible for the retrofit construction for the Ash Surge Basin and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings.
- 104.2 Design Engineer:
 - a. S&L is the Design Engineer and is responsible for designing the retrofitted features for the Ash Surge Basin.
 - b. The Design Engineer will assure that the retrofit design meets or exceeds the construction requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.
 - c. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory



requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.

104.3 Permitting Authority:

- a. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit application for retrofitting the Ash Surge Basin to assure compliance with state regulations and for granting the construction permit for the project.
- b. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm the Ash Surge Basin was retrofitted as specified in Project Specifications and the Design Drawings.

104.4 GW Contractor:

- a. The GW Contractor is the firm with whom the Owner establishes a contract for the satisfactory performance of the Work.
- b. The GW Contractor is responsible for the work, quality, and safety of their staff and all subcontractors and suppliers.
- c. The GW Contractor may devise the Work into the following division of responsibilities between an Earthwork Contractor and a Geosynthetics Contractor.

104.5 Earthwork Contractor:

- a. The Earthwork Contractor is the contractor responsible for:
 - a1. Earthwork and sitework.
 - a2. Removal of existing CCR and protective layers above the Ash Surge Basin's existing geomembrane liner.
 - a3. Placement of fill material to support the basin's new composite liner system and to establish the lines and grades of the basin's new LCRS.
 - a4. Placement of fill material over liner run-outs.
 - a5. Placement of bedding material around and installation of the leachate collection pipe.
 - a6. Installation of the granular materials above the basin's new LCRS.
- b. The GW Contractor may self-perform or subcontract the Earthwork Contractor's scope of work.

104.6 Geosynthetics Contractor:

- a. The Geosynthetics Contractor is the contractor responsible for supplying and installing all geosynthetic materials for the project, including geosynthetic clay liner (GCL), high-density polyethylene (HDPE) geomembrane, drainage geocomposite, and non-woven geotextile.
- b. The GW Contractor may self-perform or subcontract the Geosynthetics Contractor's scope of work.



- c. Qualifications:
 - c1. The Geosynthetics Contractor shall be approved by the manufacturer(s) of the geosynthetics materials for installing the geosynthetic materials supplied for the project.
 - c2. The Geosynthetics Contractor shall be approved by the Owner.
 - c3. The Geosynthetics Contractor shall have a minimum 5-year history of successfully performing similar work.
- 104.7 Construction Quality Assurance (CQA) Contractor:
 - a. The CQA Contractor is the firm with whom the Owner establishes a contract to perform all CQA work as specified on the Design Drawings and in Specification P-1803.
 - b. The CQA Contractor is independent of the GW Contractor and their subcontractors.
- 105. MATERIAL AND SERVICES FURNISHED BY OTHERS
 - 105.1 The following work has been, or will be, performed and/or provided by Others:
 - a. Initial dewatering and removal of a significant quantity of CCR from the Ash Surge Basin.
 - a1. The GW Contractor shall be responsible for dewatering (if necessary) and removing all CCR and CCR-mixed materials remaining in the Ash Surge Basin after the GW Contractor mobilizes to the site.
 - a2. Estimated quantity of CCR and existing protective layer materials to be removed from the basin will be provided by Owner during the bid period for the Work.
 - b. Construction Quality Assurance services as detailed in Specification P-1803 will be procured by the Owner.
- 106. DEFINITIONS
 - 106.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.
 - 106.2 The term "Work" means the material and services furnished to retrofit the Ash Surge Basin as identified on the Design Drawings and as specified herein.
 - 106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material that has been accepted by the Owner.
- 107. INTENT OF DOCUMENTS
 - 107.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor, material, equipment, and transportation necessary for the proper execution of the Work.
 - 107.2 Discrepancies between the Design Drawings and this Specification or errors or omissions, or mis-descriptions in either the Design Drawings or in this Specification, shall be referred to the Design Engineer for interpretation and adjustment prior to beginning the Work. Do not proceed without the Design Engineer's written acceptance.
- 108. PERFORMANCE OF THE WORK
 - 108.1 The GW Contractor shall provide materials and employ construction practices that are sustainable to the greatest extent possible, including disposal of waste.



- 108.2 The GW Contractor shall provide a representative that will input and provide daily force reports and daily production reports.
- 108.3 The performance of the Work, as specified herein and as indicated on the Design Drawings, shall comply with the current safety and health standards authorized by the U.S. Department of Labor's Occupational Safety and Health Administration, as well as state and local jurisdictional requirements.
- 108.4 The GW Contractor shall take all appropriate precautions to ensure the safety of all people working on site.
- 108.5 The GW Contractor shall maintain the necessary skilled and qualified labor force for the Work to ensure the on-time completion of the Work.
- 108.6 The GW Contractor's personnel shall be competent, capable, qualified, and able to perform the duties required to the satisfaction of the Owner. A supervisor vested with authority to make decisions binding on the GW Contractor shall be assigned to the task to resolve installation problems as they arise so as not to delay completion of the Work.
- 108.7 The GW Contractor shall be solely responsible for advising the Design Engineer in writing of any conflicts between this Specification and the Design Drawings and the GW Contractor's drawings, including performance and levels of quality. The GW Contractor agrees that its obligations, liabilities, and warranties shall not be diminished or extinguished due to its meeting the requirements of this Specification and the Design Drawings.
109. REGULATORY REQUIREMENTS
- 109.1 The GW Contractor shall at all times be solely responsible for complying with all applicable laws, ordinances, regulations, and codes, including those relating to safety of all persons, in connection with the Work. No obligation of the Owner or Design Engineer shall impose upon them any duty to review the GW Contractor's compliance with safety measures.
110. PROTECTION OF PROPERTY AND PERSONNEL SAFETY
- 110.1 The GW Contractor shall take adequate precautions to protect existing structures, fences, pavements, above-ground utilities, and underground utilities and to avoid damage thereto. The GW Contractor shall, at no addition expense to the Owner, repair any damage caused by its operations or by that of its subcontractors.
- 110.2 The GW Contractor shall conduct safety training of all its personnel (including any subcontractors) in accordance with the Owner's safety requirements, including the Owner's CCR Safety and Health Plan.
- 110.3 The GW Contractor shall take adequate precautions to protect the Illinois River, other waterways, and adjacent properties from environmental damage.
111. CLEAN-UP AND DISPOSAL OF DEBRIS
- 111.1 The GW Contractor shall be responsible for clean-up and disposal of all debris resulting from the installation work. All excess excavated material and other construction related debris shall be properly disposed of (i.e., in an environmentally responsible way) offsite in a permitted landfill approved by the Owner.



111.2 Clean up, disposal, and site restoration, if required, shall be in compliance with the applicable requirements of all access permits. If any additional permits are required for disposal of debris, these shall be the responsibility of the GW Contractor.

111.3 Work areas shall be kept clean and orderly at all times with as little disturbance as possible to existing conditions. Upon completion of work at each site, all tools, equipment, material, and debris shall be completely removed and the area left in a clean condition.

112. EXISTING SITE CONDITIONS

112.1 Prior to performing any Work in any part of the project site, the GW Contractor shall make a thorough field check for the purposes of verifying existing conditions that may affect the Work. The GW Contractor shall include a thorough investigation of the potential interferences and difficulties that it may encounter in the proper and complete execution of the Work, including the field location and identification of underground and overhead utilities within and adjacent to the limits of the Work. The GW Contractor shall advise the Owner immediately of the discovery of any conditions, including the existence of underground and overhead utilities that may affect the timely and safe execution of the Work.

112.2 The GW Contractor shall be responsible for location of underground utilities and obstructions prior to performance of the Work and shall promptly notify Owner of any potential interferences that may impact performance of the Work. Modifications to the design to resolve these interferences shall not be implemented until approved by the Owner.

112.3 The GW Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface material and obstacles, including underground or embedded utilities, to be encountered insofar as this information is reasonably ascertainable from:

- a. An inspection of the site (including field location and identification of underground utilities).
- b. Reference drawings made available by the Owner.
- c. Drawings and specifications that are a part of the Contract.
- d. The character and extent of existing work within or adjacent thereto.
- e. Any other work being performed thereon at the time of the submission of bids.

112.4 Should the GW Contractor fail to perform any of the obligations set forth above, the GW Contractor's later plea of ignorance of existing or foreseeable conditions which create difficulties or hindrances in the execution of the Work will not be considered as an excuse for any failure on the part of the GW Contractor to fulfill in every detail the requirements of the Contract nor will such a plea be acceptable as the basis of a claim for additional compensation or time to complete the work.

113. VERIFICATION OF DIMENSIONS ON DRAWINGS AND MEASUREMENTS AT SITE

113.1 The GW Contractor shall make a thorough field check for the purpose of verifying existing conditions that may affect the Work, such as existing topographic data shown on the Design Drawings, difficulties that might be encountered in the execution of the Work for any reason, and dimensions and other questions relating to interconnection of the Work with the existing Ash Surge Basin construction.



- 113.2 The GW Contractor shall satisfy itself as to the accuracy of the dimensions of the existing Ash Surge Basin construction as such dimensions relate to the dimensions given on any drawing issued by the Design Engineer. It shall be understood that neither the Design Engineer nor the Owner guarantee the exactness of such dimensions.
- 113.3 Should the GW Contractor discover any variation in the dimensions of existing conditions and the dimensions given on any drawings issued by the Design Engineer, the GW Contractor shall give immediate notice thereof to the Owner and the GW Contractor shall not proceed with the Work until such variation is resolved.
114. SOIL DATA
- 114.1 A structural stability and factor of safety assessment for the Ash Surge Basin was prepared in October 2016. Site specific soil data and geotechnical recommendations are provided and referenced therein. The geotechnical information in and referenced by this assessment indicates the general character of the subsurface conditions at the site. This information is made available for the GW Contractor's information and for interpretation of soil and water conditions that may be encountered at the site. The logs and test data that are provided are not to be taken as a complete description of the site soil and water information, but only display what was found in borings at the indicated locations. The Owner and the Design Engineer take no responsibility for the accuracy of this information.
- 114.2 The GW Contractor may obtain additional subsurface information, as it deems necessary, for installation purposes.
115. LINES AND GRADES
- 115.1 The GW Contractor shall use the existing benchmarks established at the site, as identified on the survey drawings included in the reference documents for the project, to lay out lines and grades on the project site. The GW Contractor is fully responsible for the correctness of such lines and grades and for proper execution of work to such lines and grades.
- 115.2 The Owner reserves the right to verify correctness of lines and grades during progress of the Work. Such verification by the Owner will not relieve the GW Contractor of responsibility as herein specified.
- 115.3 The GW Contractor shall preserve and maintain existing benchmarks and reference points established at the project site. Should the GW Contractor, during execution of the Work, destroy or remove any existing benchmark or reference point, the cost to the Owner for re-establishing the benchmark or reference point will be charged to the GW Contractor.
116. CONTROL AND CHARGE OF CONTRACTOR'S WORK
- 116.1 The Design Engineer shall have no authority to stop the Work by the GW Contractor for any reason.
- 116.2 The GW Contractor shall be responsible for the safety of its employees and subcontractors and for maintaining the safety of the job site.
- 116.3 The GW Contractor shall be solely responsible for construction means, methods, techniques, sequences, and procedures used in the construction of the Work. The Owner, however, reserves the right to request, and the Contractor shall supply, detailed information regarding the Work such as procedures or work methods.



116.4 Only the Owner (or its authorized representative) has the authority to stop the Work (in accordance with the Commercial Terms and Conditions) if such Work is determined to be not in accordance with this Specification, the Design Drawings, or the Contract documents.

117. DESIGN DRAWINGS

117.1 The Design Drawings prepared by the Design Engineer indicate the physical dimensions of the Work to be installed as defined by the Scope of Work and form a part hereof.

117.2 Refer to Attachment 1 of this Specification for the applicable Design Drawings for this project.

118. REFERENCE DOCUMENTS

118.1 The reference documents assembled by the Design Engineer are for information only.

118.2 Refer to Attachments 2 and 3 of this Specification for applicable reference documents for this project.

END OF SECTION 011100



SECTION 319005

EARTHWORK

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the material and work requirements associated with preparing and placing Structural Fill within the Ash Surge Basin and other tasks associated with installing a new composite liner system for the Ash Surge Basin. The Structural Fill will support the basin's new composite liner system and will establish the lines and grades for the basin's new leachate collection and removal system (LCRS). This work is further defined and depicted on the Design Drawings.

101.2 The work shall include, but not be limited to, the following items:

- a. Clearing, grubbing, and topsoil stripping.
- b. Excavating the granular protective layers covering the basin's existing liner.
- c. Cleaning and decontaminating the existing liner system and basin appurtenances remaining in-place.
- d. Placing and compacting Structural Fill.
- e. Preparing the Structural Fill surface to be lined with the Ash Surge Basin's new composite liner system.
- f. Preparing concrete surfaces that will come into contact with geosynthetic materials.
- g. Excavating crest anchor trenches where indicated on the Design Drawings.
- h. Placing fill materials over run-outs and in crest anchor trenches for geosynthetic materials.
- i. Placing crushed stone to re-surface existing roads on the top of the Ash Surge Basin's dikes where indicated on the Design Drawings.
- j. Disposing excess or unsuitable excavated earthen material and debris in an off-site, permitted landfill approved by the Owner.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

- a. GW Specification P-1802:
 - a1. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a2. Section 319025 – Geosynthetic Clay Liner.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - a3.1 Refer to Section 319050 for material and installation requirements for granular materials associated with the Ash Surge Basin's new LCRS.



- b. CQA Specification P-1803:
- b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.
- 103. REFERENCE DOCUMENTS
- 103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 103.2 References to these documents are to the latest issue of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of the Contract for the Work.
- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 103.4 ASTM – ASTM International:
 - a. C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - b. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
 - c. D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - d. D2974 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
- 103.5 IDOT – Illinois Department of Transportation:
 - a. Standard Specifications for Road and Bridge Construction (Adopted January 1, 2022).
- 103.6 ITP – Illinois Test Procedure:
 - a. 27 Sieve Analysis of Fine and Coarse Aggregates
 - b. 96 Resistance by Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - c. 104 Soundness of Aggregate by Use of Sodium Sulfate
- 104. SUBMITTALS
- 104.1 The GW Contractor shall submit drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 104.2 Submittals with Bid Proposal:
 - a. Catalog data on all compaction equipment and proofrolling equipment the Earthwork Contractor plans to use on the project.
 - b. Earthwork Contractor's plan for placing Structural Fill material to meet the requirements specified herein while preventing damage to the Ash Surge Basin's existing geomembrane liner.



104.3 Submittals After Award:

a. Earthwork Equipment:

- a1. Earthwork Contractor's demonstration that all earthwork equipment to be used to transport and place Structural Fill material will not exert a ground pressure greater than 8 psi.

b. Structural Fill Material:

- b1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Structural Fill material signed by the supplier or a qualified geotechnical engineering consultant that certify the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
b1.1 Sieve Analysis	ASTM C136	Percent Passing Selected Sieves
b1.2 Classification of Material	ASTM D2487	Classification
b1.3 Organic Content	ASTM D2974	Percent of Organic Material
b1.4 Atterberg Limits ⁽²⁾	ASTM D4318	Liquid Limit and Plasticity Index

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.
 (2) Atterberg limits are only required if cohesive/fine grained materials are to be used for Structural Fill.

c. Crushed Stone Surfacing for Roads:

- c1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the crushed stone material to be used to re-surface the existing roads on top of the basin dikes, which shall be signed by the supplier or a qualified geotechnical engineering consultant certifying the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
c1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
c1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
c1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

105. QUALITY ASSURANCE

- 105.1 Material and construction procedures shall be subject to inspection and testing by the CQA Contractor hired by Owner. Such inspections and tests will not relieve the Earthwork Contractor of responsibility for providing and placing materials in compliance with specified requirements.



- 105.2 The Owner reserves the right, at any time before final acceptance, to reject material not complying with the specified requirements. The Earthwork Contractor shall correct all deficiencies which inspections, laboratory tests, or field tests have indicated are not in compliance with specified requirements. The Earthwork Contractor shall perform additional tests, at their expense, as may be necessary to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work.
- 105.3 The Earthwork Contractor shall promptly correct errors or flaws in the work or material identified during construction and which prevent proper installation. The Earthwork Contractor shall make immediate substitution of the noncomplying material or shall make field changes to make the noncomplying material acceptable. The correction or substitution shall be performed at no cost to the Owner.
- 105.4 CQA activities shall be performed as described herein and in Specification P-1803.

PART 2 - PRODUCTS

201. MATERIAL FOR STRUCTURAL FILL

201.1 Definitions:

- a. Structural Fill is fill placed within the Ash Surge Basin to support the basin's new composite liner system, as identified on the Design Drawings.

201.2 Satisfactory Material:

a. Granular Material:

- a1. Granular material for use as Structural Fill shall be rounded and not crushed, with less than one percent organic or other deleterious material, free of excess moisture, and a maximum particle size less than one inch.
- a2. Acceptable granular materials are soils which are classified as coarse-grained soils in the Unified Soil Classification System, ASTM D2487. Classifications are GW, GP, GC, SW, SP, or SC, or combinations of these such as SP-SC.
- a3. No material with a silt content of greater than 12 percent (i.e., SM or GM) shall be used for Structural Fill.

b. Cohesive Material:

- b1. Cohesive material is suitable for use as Structural Fill if it contains not more than two percent organic or other deleterious material, has a maximum particle size of one inch, has a liquid limit of less than 45, and has a plasticity index of less than 25.
- b2. Acceptable cohesive materials are soils which are classified as fine-grained soils in the Unified Soil Classification System, ASTM D2487. Classification is CL.

201.3 Unsatisfactory Material:

a. Material unsatisfactory use as Structural Fill is as follows:

- a1. Soils classified as silt, silty, or organic soils in the Unified Soil Classification System, ASTM D2487. Classifications are SM, GM, ML, MH, PT, OL and OH.
- a2. Clay soils classified as CH in the Unified Soil Classification System, ASTM D2487.
- a3. Soils classified as CL-ML (plasticity index of 4 to 7) in the Unified Soil Classification System, ASTM D2487.



a4. Rock material without a soil matrix in which nesting of rocks could occur.

a5. Uncontrolled fill.

a6. Debris.

201.4 Material Sources:

a. Structural Fill material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner.

202. RESTRICTIONS ON THE USE OF MATERIAL FOR ANY PURPOSE

202.1 Any material which is frozen is considered unsatisfactory for use as fill.

202.2 Fill and backfill soils placed by previous construction shall be considered unsatisfactory for use as fill unless they meet the requirements for satisfactory material. This specifically includes using any of the existing protective layers below the Ash Surge Basin's new composite liner system or on roads outside of the basin.

203. CRUSHED STONE SURFACING FOR ROADS

203.1 Material Requirements:

a. Crushed stone for re-surfacing existing roads on the top of the basin dikes shall be composed of gravel, crushed gravel, or crushed stone that is processed to meet the following requirements:

a1. The material shall conform to Gradation CA 6 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.

a2. The material quality shall be Class D or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

203.2 Material Sources:

a. Crushed stone surfacing material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner.

PART 3 - EXECUTION

301. DEMOLITION, CLEARING, GRUBBING AND STRIPPING

301.1 General:

a. The work required is shown on the Design Drawings. No work shall be performed outside of the designated area without prior written approval of the Owner.

b. All work incidental to excavation or fill work will not be specifically indicated on the Design Drawings but shall be performed as part of the work.

301.2 Demolition:

a. Demolition and removal of minor items which are incidental to the earthwork may be required. The Earthwork Contractor shall identify any such items during their pre-bid walkdown. The Earthwork Contractor shall demolish such items as required as part of the performance of the work.

b. All waste resulting from demolition work shall be disposed of by the Earthwork Contractor in an offsite disposal area.



301.3 Clearing, Grubbing, and Topsoil Stripping:

- a. All vegetation within areas to be excavated or to receive fill shall be cleared and grubbed, stripped of topsoil and debris, and shall be inspected and approved by the Owner prior to beginning the earthwork operations.
- b. Weeds, small roots, heavy grass, and other vegetation remaining after clearing and grubbing operations shall be removed with the topsoil.
- c. Disposal:
 - c1. Stripped topsoil shall be placed in an onsite stockpile area as directed by Owner. Topsoil may be removed from the stockpile area at a later date and used to cover finished slopes and other designated areas.
 - c2. If any material remains in the topsoil stockpile area after construction is complete, the stockpile area side slopes shall be graded to a maximum slope of 20 percent (five horizontal to one vertical), the top of the pile shall be sloped to drain properly and provided with devices to control erosion, and the stockpile shall be seeded.

302. EXCAVATION

- 302.1 All material within the Ash Surge Basin and above the basin's existing liner shall be carefully removed. The limits and specifications for this excavation work are specified on the Design Drawings.
- 302.2 All material excavated from the Ash Surge Basin shall be disposed of as specified on the Design Drawings.

303. PLACEMENT OF STRUCTURAL FILL

303.1 Acceptable Placement Methods:

- a. Acceptable placement methods for Structural Fill include:
 - a1. Using a conveyor truck to place material from outside of the basin.
 - a2. Using a crane to place material from outside of the basin.
 - a3. Transporting material into the basin to the point of dumping using trucks or scrapers, while complying with maximum ground pressure requirements.
 - a4. Alternate placement method(s) proposed by the Earthwork Contractor and approved by the Owner.
- b. Requirements for Transportation of Structural Fill Materials into Basin:
 - b1. Under no circumstances shall any equipment (wheeled or tracked) traverse the Ash Surge Basin's existing geomembrane liner or new liner when less than 10 inches of earthen material are above the subject liner.
 - b2. Equipment transporting material into the basin shall use the permanent ramp along the basin's eastern dike.
 - b3. Only earthmoving equipment with low ground pressure shall be used to transport material inside of the basin. The Earthwork Contractor shall demonstrate that equipment entering the basin will not exert a ground pressure greater than 8 psi. The ground pressure is



influenced by the tread pattern / tire contact area and is not the reading from a tire pressure gauge.

- b4. Equipment operating within the basin shall avoid hard braking on ramps and avoid sharp turns or quick stops that could pinch or tear the existing geomembrane liner.
- b5. Structural Fill shall be placed by the “dump and spread” method in which lightweight equipment with low ground pressure is used to spread the material.
- b6. Material placement over the existing geomembrane liner during periods of warm weather can cause wrinkling and damage to the liner. Placement of the initial lift of Structural Fill shall be halted when the air temperature is greater than 85°F or less than 40°F.
- b7. When Structural Fill is being placed, a worker shall safely walk alongside earthmoving equipment spreading the material to spot and remove rocks, stones, roots, and other debris that may be present in the Structural Fill that could cause damage to the existing geomembrane liner.

303.2 Moisture Content of Structural Fill Material:

- a. At the time of compaction, the moisture content of Structural Fill material shall be within ± 3 percent of optimum moisture content as determined by ASTM D1557.
- b. Fill material containing excessive moisture shall not be compacted unless the material has dried and the moisture content is within the specified limits.
- c. Fill material that is too dry shall have moisture added and then be blended so that the moisture content is uniform prior to compaction.
- d. For granular materials, non-compliance with moisture content shall not be the sole criteria for rejection of the work.

303.3 Lift Thickness:

- a. Fill material shall be placed in horizontal layers in thicknesses compatible with the material being placed, equipment being used, and the compaction requirements.
- b. Unless otherwise approved by the Owner, the loose thickness shall not exceed the following:
 - b1. 12 inches maximum loose lift thickness for the lowest lift in contact with the Ash Surge Basin’s existing geomembrane liner.
 - b2. 8 inches maximum loose lift thickness for compaction by self-propelled equipment.
 - b3. 4 inches maximum loose lift thickness for compaction by hand-operated equipment.

303.4 Placement Structural Fill:

- a. Each layer of fill shall be evenly spread and moistened or aerated as required to achieve the required moisture content.
- b. Each lift of Structural Fill in the Ash Surge Basin shall be uniformly placed to cover the entire length and width of the basin prior to compaction or placement of the next lift.
- c. As allowed by the design of the LCRS, the top surface of each layer shall be approximately level but shall have sufficient crown or cross fall to provide adequate



drainage of water at all times during the construction period. The crown or crossfall shall be at least 1 in 50 (2 percent) but no greater than 1 in 20 (5 percent).

- d. Fill placed on slopes steeper than 20 percent (i.e., 5 horizontal to 1 vertical) shall be overfilled a minimum of 6 inches beyond the face of the slope, measured horizontally, and then cut back and trimmed to the required line and grade to expose a smooth surface uniformly compacted to the required density. Installing the fill slope to lines and grades shown on the Design Drawings and then compacting is not acceptable on the basin side slopes.
- e. Prior to placing Structural Fill material on the existing concrete ramp within the Ash Surge Basin, the Earthwork Contractor shall intentionally roughen the existing concrete surfaces receiving Structural Fill to a minimum amplitude of 1/4 inch.

303.5 Compacting Structural Fill:

- a. Equipment:
 - a1. Each layer of fill shall be compacted by tamping, pneumatic-tired roller, or other mechanical means acceptable to the Owner that will produce the specified compaction. Sheepfoot, modified sheepfoot, padfoot, or other non-smooth drums shall not be used to compact Structural Fill placed for this work.
 - a2. At locations where it would be impractical because of inaccessibility to use self-propelled compacting equipment, fill layers shall be compacted using hand directed compaction equipment.
 - a3. When soils are used that develop a densely packed surface as a result of spreading or compacting equipment, the surface of each layer of fill shall be sufficiently roughened after compaction to ensure bonding of the succeeding layer.
- b. Inspection and Testing:
 - b1. All work is subject to inspection and testing by the CQA Contractor. The CQA Contractor shall have access to the work at all times. Testing shall be in accordance with the Contract. Refer to Specification P-1401 for inspection and testing requirements.
 - b2. Each layer of compacted fill shall be tested before proceeding with the next layer.
 - b3. It is the Earthwork Contractor's responsibility to request inspection prior to proceeding with further work that would make parts of the work inaccessible for inspection.
 - b4. If the fill material fails to meet the required density, the material shall be removed and replaced or reworked, altering the construction method as necessary to obtain the required density and compaction. Sufficient time shall be allotted between lifts for the necessary testing of the soils.
- c. Compaction Density:
 - c1. Structural Fill shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

303.6 Fine Grading:

- a. Structural Fill shall be fine graded using equipment with low ground pressure.



303.7 Reporting Damage:

- a. If damage occurs to the Ash Surge Basin's existing geomembrane liner while placing Structural Fill material, the Earthwork Contractor shall report the damage(s) to the Owner and Geosynthetics Contractor immediately so that repairs can be performed without delay.
- b. Repairs to the existing geomembrane liner shall be made by the Geosynthetics Contractor as specified in Section 319020 at no additional cost to the Owner.

304. REQUIREMENTS FOR PREPARATION AND ACCEPTANCE OF STRUCTURAL FILL SURFACE SUPPORTING COMPOSITE LINER

304.1 Intersections Between Planes:

- a. Intersections between planes shall be rounded as specified below to provide a firm bearing for the geosynthetic clay liner (GCL) without abrupt change:

	<u>Intersection of Slope</u>	<u>Radius of Rounding</u>
a1.	Side slope and bottom plane	3 feet minimum
a2.	Side slope and top of dike or grade	6 inch minimum
a3.	Intersection of 2 bottom planes (planes sloped at 10% or less)	Straight line is acceptable

304.2 Earthwork Contractor's Responsibility:

- a. The Earthwork Contractor shall be responsible for preparing the surface of the Structural Fill beneath the GCL prior to placement of the GCL.
- b. The subgrade is subject to inspection and acceptance by the Owner and the CQA Geosynthetics Inspector prior to installation of the GCL.

304.3 Inspection:

- a. The Earthwork Contractor, the Owner, the Geosynthetics Contractor, and the CQA Geosynthetics Contractor shall inspect and document the following:
 - a1. Lines, grades, and slopes are in conformance with the Design Drawings.
 - a2. Surface has been graded and rolled such that it is free of irregularities, protrusions, loose soil, and abrupt changes in grade.
 - a3. The surface is free of debris, clods, stones, roots, and organic material.
 - a4. That no settlement or erosion has occurred.
 - a5. That there are no side slope failures.
 - a6. That there are no moisture seeps, puddling, or ponding.
 - a7. That there are no soft spots.



304.4 Certification:

- a. The Geosynthetics Contractor shall provide written certification that the surface is acceptable. The acceptance shall be recorded and copies of the certification given to both the Earthwork Contractor, the CQA Contractor, and the Owner.
- b. Only as much surface as will be lined the following day shall be inspected, certified, and documented as acceptable.

304.5 Geosynthetic Contractor's Responsibility:

- a. After the surface for the Ash Surge Basin's new composite liner system has been accepted by the Geosynthetics Contractor, the responsibility for changes or repair work become the Geosynthetics Contractor's.
- b. Necessary changes or repairs made to the surface after the surface has been accepted by the Geosynthetics Contractor shall be made at no additional cost to the Owner.

305. PREPARATION OF CONCRETE SURFACES

305.1 All concrete surfaces on which Structural Fill material will be placed shall be intentionally roughened in accordance with Paragraph 303.4e.

305.2 All concrete surfaces that will come in contact with the Ash Surge Basin's new composite liner system shall be free of sharp edges or rough spots that can puncture or abrade the new liner materials. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor. Where specified on the Design Drawings, geotextiles shall be placed between the concrete surface and the new composite liner system components to act as protective cushioning layers for the new liner components.

306. CREST ANCHORAGE OF GEOSYNTHETIC MATERIALS

306.1 Anchor Trench Excavation and Shaping:

- a. Where specified on the Design Drawings, anchor trenches shall be excavated by the Earthwork Contractor at the top of the basin slope to the lines and widths shown on the Design Drawings prior to the Geosynthetics Contractor deploying the geosynthetic clay liner component of the Ash Surge Basin's new composite liner system.
- b. A slightly rounded corner shall be provided in the trench where the geosynthetic materials adjoin the trench to avoid sharp bends in the geosynthetic materials. The radius of rounding is shown on the Design Drawings. No loose soil shall be allowed to underlie the geosynthetic materials in the anchor trench.
- c. Anchor trenches shall be adequately drained to prevent ponding or softening of the adjacent soils while the trenches are open.

306.2 Fill Placement Over Liner Run-Outs and in Anchor Trenches:

- a. The Earthwork Contractor shall place fill over liner run-outs or in an anchor trench after all geosynthetic materials are in place and seams are welded.
- b. Fill placement over liner run-outs and in anchor trenches shall occur during the morning or during extended periods of overcast skies when the geosynthetic materials are at their most contracted states.
- c. The first lift of fill placed above geosynthetic materials in an anchor trench may be 12 inches in thickness.



- d. If compacted using hand-operated equipment, backfill shall be placed in lifts not exceeding 4 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.
- e. If compacted using self-propelled equipment, backfill shall be placed in lifts not exceeding 8 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

307. GRADING TOLERANCES

- 307.1 The acceptable deviation from lines and grades indicated on the Design Drawings shall be as shown in Table 319005-1.
- 307.2 Slopes shall be finished in conformance with the lines and grades shown on the Design Drawings. When completed, the average plane of a slope shall conform to the slope indicated on the Design Drawings, and no point on the completed slope shall vary from the designated plane by more than 6 inches measured at right angles to the slope.

308. CLEAN-UP

- 308.1 All waste, excess materials, and debris shall be disposed of in an offsite disposal area approved by the Owner.

TABLE 319005-1
ACCEPTABLE DEVIATIONS FROM DESIGN LINES AND GRADES

Type of Installation (Excavation or Fill)	Maximum Acceptable Deviation from Line (feet)	Maximum Acceptable Deviation from Grade ⁽¹⁾ (feet)
General Earthwork		
Top of Structural Fill	±0.3	+0.1 to -0.0
Roads		
Road Embankment	±0.2	+0.1 to -0.0
Leachate Collection & Removal System		
Leachate Collection Pipe Trench	±0.3	+0.1 to -0.0

Note:

- (1) After initial settlement has taken place. Initial settlement is that settlement that will occur up to the time of determination and acceptance of final grade elevation as approved by the Owner.

END OF SECTION 319005

SECTION 319020

HIGH-DENSITY POLYETHYLENE GEOMEMBRANE LINER WITH GEOCOMPOSITE

PART 1 - GENERAL

101. EXTENT

- 101.1 This section defines the minimum material and installation requirements for the high-density polyethylene (HDPE) geomembrane liner to be used as the upper component of the retrofitted Ash Surge Basin's new composite liner system, and the minimum material and installation requirements for the drainage geocomposite to be used in the retrofitted Ash Surge Basin's new leachate collection and removal system (LCRS), all in accordance with the Design Drawings and as specified herein.
- 101.2 The Work shall include, but not be limited to, the following items:
- a. Manufacture, shipping, handling, and storage of HDPE geomembrane and drainage geocomposite materials.
 - b. Preparation and inspection of surfaces to be lined.
 - c. Placement and seaming of geomembrane.
 - d. Placement and joining drainage geocomposite.
 - e. Crest anchorage of geomembrane and drainage geocomposite using liner run-outs or anchor trenches as specified on the Design Drawings.
 - f. Attachment of the geomembrane to concrete structures and existing marker posts.
 - g. Non-destructive field testing of geomembrane seams.
 - h. Removal of samples of geomembrane seams and transportation to an independent third-party laboratory for destructive testing.
 - i. Repair of defective geomembrane seams.
 - j. Repair of defects in the geomembrane and at locations where samples were taken.
 - k. Visual inspection of the completed geomembrane liner.
- 101.3 Definitions and Qualifications:
- a. The following definitions of terms shall apply throughout this section:
 - a1. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor's work.
 - a2. GM/GC Manufacturer: The manufacturer who is responsible for manufacturing and transporting the HDPE geomembrane liner and drainage geocomposite materials to the site.
 - b. Qualifications:
 - b1. The GM/GC Manufacturer shall be approved by the Owner. Owner's considerations when approving the GM/GC Manufacturer may include, but are not limited to, financial, safety, and prior performance aspects of the manufacturer.

- b2. The GM/GC Manufacturer shall have an internal QA/QC program to ensure and to verify the manufactured products consistently meet or exceed the requirements of this section.
- b3. The GM/GC Manufacturer shall have at least 10 years of experience manufacturing products similar to those required for this Work.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

- 102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:
- a. GW Specification P-1802:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319025 – Geosynthetic Clay Liner.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - b. CQA Specification P-1803:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

- 103.1 Standards, specifications, manuals, codes, and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 103.4 ASTM — ASTM International:
- a. A276 Specification for Stainless and Heat Resisting Steel Bars and Shapes.
 - b. B633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - c. D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - d. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - e. D1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
 - f. D1505 Test Method for Density of Plastics by the Density-Gradient Technique.
 - g. D1603 Standard Test Method for Carbon Black Content in Olefin Plastics.
 - h. D4218 Standard Test Method for Determination of Carbon Black Content of Polyethylene Compounds by the Muffle-Furnace Technique.

- i. D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.
- j. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- k. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- l. D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- m. D4716 Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- n. D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
- o. D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
- p. D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
- q. D5261 Test Method for Measuring Mass per Unit Area of Geotextiles.
- r. D5397 Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
- s. D5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- t. D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
- u. D5721 Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.
- v. D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
- w. D5885 Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Colorimetry.
- x. D5994 Test Method for Measuring Core Thickness of Textured Geotextile.
- y. D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- z. D6364 Standard Test Method for Determining Short-Term Compression Behavior of Geosynthetics.
- aa. D6392 Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-fusion Methods.
- bb. D7005 Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.
- cc. D7179 Standard Test Method for Determining Geonet Breaking Force
- dd. D7466 Standard Test Method for Measuring Asperity Height of Textured Geomembranes
- ee. D8117 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by Differential Scanning Calorimetry.

- 103.5 Geosynthetic Research Institute (GRI):
- a. GM6 Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembrane.
 - b. GM9 Cold Weather Seaming of Geomembranes
 - c. GM10 Specification for the Stress Crack Resistance of Geomembrane Sheet.
 - d. GM13 Standard Specification for Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
 - e. GM14 Standard Guide for Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.
 - f. GM19a Standard Specification for Seam Strength and Related Properties of Thermally Bonded Homogenous Polyolefin Geomembranes/Barriers.
- 103.6 Industrial Fabrics Association International (IFAI):
- a. Field Sewing of Geotextiles by V. Diaz and B. Myles, 1989.
104. SUBMITTALS
- 104.1 The GW Contractor shall submit the following drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 104.2 Submittals with the Bid Proposal:
- a. Geosynthetics Contractor:
 - a1. Geosynthetics Contractor's name, address, and telephone number.
 - a2. Geosynthetics Contractor's qualifications, including letter or certificate from the GM/GC Manufacturer documenting the manufacturer's approval of the Geosynthetics Contractor (or subcontracted Installer) to install the geomembrane and drainage geocomposite materials supplied for the project.
 - a3. Installer's qualifications if the Geosynthetics Contractor is proposing to subcontract the geomembrane and/or drainage geocomposite installation work.
 - b. HDPE Geomembrane and Drainage Geocomposite Materials:
 - b1. Certification of Compliance from the GM/GC Manufacturer , signed by its authorized representative, indicating that the materials meet the criteria specified herein and that those requirements are guaranteed by the manufacturer.
 - b2. One representative sample of each type of geosynthetic material.
 - b3. GM/GC Manufacturer's Quality Control and Quality Assurance Policies and Procedures for the geomembrane and drainage geocomposite materials being supplied for the project.

- c. Warranty:
 - c1. Written warranties from the GM/GC Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as applicable.
 - c1.1 The minimum period of warranty for materials shall be 20 years with first year non-prorated.
 - c1.2 The minimum period of warranty for installation shall be 5 years with the first year non-prorated.
 - c2. Warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the GM/GC Manufacturer and the Geosynthetics Contractor.
- 104.3 Submittals After Award:
 - a. Geomembrane Resin:
 - a1. Certification signed by the GM/GC Manufacturer's authorized representative stating that the resin meets the criteria specified herein.
 - a2. Certification signed by the GM/GC Manufacturer's authorized representative stating the origin of the resin and that all resin is from the same supplier (including resin supplier's name, identification brand name, and number).
 - a3. Copies of GM/GC Manufacturer's and resin supplier's QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch used to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index and percent carbon black.
 - b. Geomembrane Sheeting:
 - b1. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane to be shipped to the site, along with chain of custody and certification that the samples submitted are from the geomembrane material to be delivered to the site. The number of samples shall be determined in accordance with the number of CQA conformance tests specified in Specification P-1803.
 - b2. Signed certification that the properties of the manufactured sheeting meet the criteria specified herein and are guaranteed by the GM/GC Manufacturer.
 - b3. Statement certifying that no post consumer resin (PCR) has been added to the formulation.
 - b4. Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).
 - b5. Copies of all of the GM/GC Manufacturer's QA/QC certificates. The certificates shall include documents of test results.
 - c. Drainage Geocomposite:
 - c1. Copy of the raw material producers' certificates describing the origin and identification of the raw materials.
 - c2. Copy of the raw material producers' QC certificates.

- c3. Statement certifying that the manufactured drainage geocomposite is free of per- and polyfluoroalkyl substances (PFAS).
- c4. Copy of the GM/GC Manufacturer's QA/QC certificates on tests performed on the geonet core, geotextile cap and carrier, and double-sided laminated geocomposite as specified in Table 319020-2 and a summary of the results of the tests.
- c5. Certification that the properties of the manufactured material meet the criteria specified herein and are guaranteed by the GM/GC Manufacturer.
- d. Extrudate Resins or Rod for Seaming Geomembranes:
 - d1. Certification that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.
- e. Installation Data:
 - e1. GM/GC Manufacturer's proposed geomembrane panel layout for each installation.
 - e2. GM/GC Manufacturer's recommended procedures for making and testing seams if different from those specified herein.
 - e3. GM/GC Manufacturer's recommended procedures for repairing damaged geomembrane sections and seams if different from those specified herein.
 - e4. GM/GC Manufacturer's details of geomembrane liner anchorage and attachment to structures if different from those specified herein and from the details shown on the Design Drawings.
- 104.4 Submittals After Installation is Complete:
 - a. Geosynthetics Contractor:
 - a1. As-built panel layout.
 - a2. Drawing showing locations of repairs and types of repairs made.
 - a3. Locations of destructive tests.
 - a4. Results of destructive tests.
 - a5. Results of non-destructive tests.
- 105. QUALITY ASSURANCE
 - 105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of the responsibility for providing materials and installation in compliance with specified requirements.
 - 105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
 - 105.3 CQA activities shall be performed as described herein and in Specification P-1803.

PART 2 - PRODUCTS

201. HIGH-DENSITY POLYETHYLENE GEOMEMBRANE

201.1 Manufacturers of HDPE Geomembrane Products:

- a. The products of the following manufacturers meeting the requirements herein are acceptable:
 - a1. AGRU America, 500 Garrison Road, Georgetown, SC 29440.
 - a2. Solmax, 19103 Gundle Road, Houston, TX 77073.
 - a3. Others as approved by the Owner.

201.2 General Requirements:

- a. All HDPE geomembrane shall be textured on both sides and meet the requirements of Table 319020-1.
- b. The top surface of the HDPE geomembrane shall be white.
- c. Textured surfaces shall be manufactured using a co-extrusion process, have uniform texturing appearance, and be free from agglomerated texturing material and such defects that would affect the specified properties of the HDPE geomembrane.
- d. Each roll of HDPE geomembrane shall have 6-inch wide (minimum) smooth edges to provide suitable seaming surfaces. Textured HDPE geomembrane without smooth edges may be provided if approved by the Owner.
- e. The HDPE geomembrane shall be manufactured from first quality, virgin resin. Blending of resins shall not be allowed. No recycled or reworked geomembrane may be used except edge trim generated during the manufacturing process, which shall be limited to at most 10%. No post-consumer resin (PCR) of any type shall be added to the formulation.
- f. The resin used to produce the HDPE geomembrane shall be formulated to be resistant to chemical and ultraviolet degradation.
- g. The HDPE geomembrane shall be free of plasticizers, leachable additives, and per- and polyfluoroalkyl substances (PFAS).
- h. During manufacture, each roll of HDPE geomembrane shall be continuously monitored across the width to assure uniformity of thickness. Thickness measurements shall meet the requirements of Table 319020-1.
- i. The HDPE geomembrane shall be free of factory seams.
- j. The HDPE geomembrane shall be free from dirt, oil, foreign matter, scratches, cracks, creases, bubbles, blisters, pits, tears, holes, pores, pinholes, voids, undispersed raw material, any sign of contamination or other defects that may affect serviceability, and shall be uniform in color, thickness, and surface texture.
- k. Panels of HDPE geomembrane shall be capable of being seamed in the field to yield seams that are as resistant to waste liquids as the sheeting.
- l. The HDPE geomembrane shall be manufactured in the United States or Canada.

TABLE 319020-1
HIGH-DENSITY POLYETHYLENE TEXTURED GEOMEMBRANE REQUIREMENTS⁽¹⁾

Property	ASTM Test Method	Polyethylene Base Compound	Geomembrane	Testing Frequency
Nominal Thickness (mil)	--	--	60	--
Resin Properties				
Density of Base Resin, g/cc (min.)	D1505 / D792	0.932		200,000 lbs. of Resin
Oxidative Induction Time (OIT) (min. ave.)				
a. Standard OIT (minutes)	D8117	100	--	200,000 lbs. of Resin
-- or --				
b. High Pressure OIT (minutes)	D5885	400	--	200,000 lbs. of Resin
Oven Aging at 85°C	D5721	--	--	
a. Standard OIT (min. ave.), % retained after 90 days	D8117	55	--	One per Formulation
-- or --				
b. High Pressure OIT (min. ave.), % retained after 90 days	D5885	80	--	One per Formulation
UV Resistance				
High Pressure OIT (min. ave.), % retained after 1600 hrs.	D5885	50	--	One per Formulation
Analytical Properties				
Formulated Density, g/cc (min.)	D1505 / D792	--	0.940	200,000 lbs. of Resin
Carbon Black Content, % (range)	D4218	2.0 – 3.0	--	20,000 lbs. of Resin
Carbon Black Dispersion for 10 Different Views	D5596	Note (2)	--	45,000 lbs. of Resin
Mechanical Properties				
Thickness, mils	D5994	--	--	One per Roll
Minimum Average			57	
Lowest Individual for 8 out of 10 Values			54	
Lowest Individual for 10 out of 10 Values			51	
Asperity Height, mils (min. ave.)	D7466	--	16	Every Second Roll ⁽³⁾
Tensile Properties in Each Direction (min. ave.)	D6693 (Type IV Specimen at 2 ipm)			20,000 lbs. of Resin
Tensile Stress at Yield, ppi (min.)		--	126	
Elongation at Yield, % (min.)		--	12	
Tensile Stress at Break, ppi (min.)		--	90	
Elongation at Break, % (min. 2" gage length)		--	100	
Tear Resistance, lbs. (min. ave.)	D1004		42	45,000 lbs. of Resin
Puncture Resistance, lbs. (min. ave.)	D4833		90	45,000 lbs. of Resin
Bonded Seam Strength ⁽⁴⁾	D6392	--	--	
Shear Strength, ppi		--	120	
Peel Adhesion (Hot Wedge), ppi		--	91	
Peel Adhesion (Extrusion Fillet), ppi		--	78	
Environmental Aging Effect on Properties				
Stress Crack Resistance, hours (min.)	D5397	--	500	Per GRI GM10

Notes:

- (1) Requirements shown in this table meet the minimum requirements of GRI Standard GM13, Revision 16 (March 17, 2021) except for bonded seam strength.
- (2) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.
- (3) Alternate measurement side for double-sided textured sheet.
- (4) Seam strength requirements shown in this table meet the minimum requirements of GRI Standard GM19a, Revision 10 (March 18, 2021).

201.3 Panel Layout:

- a. Prior to manufacture of the geomembrane, a panel layout of the surface to be lined shall be made. Each panel to be used for the installation shall be given a numeric or alphanumeric identification number.
- b. Each panel identification number shall be related in writing to the manufacturing roll number that identifies the resin type, batch number, and date of manufacturer.
- c. The panel layout shall be made considering the following requirements:
 - c1. Panel lengths shall include slope gain and run-out distance / anchorage.
 - c2. Perpendicular tie-ins shall be made a minimum of 5 feet beyond the toe of the slope.
 - c3. A minimum 6-inch overlap shall be allowed at double fusion welded seams.
 - c4. All field seams on slopes shall be oriented parallel to the slope (oriented along, not across the slope).
 - c5. The number of seams in corners or odd shaped geometric locations shall be minimized.

201.4 Packaging and Shipping:

- a. All HDPE geomembrane liner material shall be shipped to the project site in rolls. No HDPE geomembrane liner material shall be folded.
- b. Packaging and transportation of all HDPE geomembrane liner materials to the project site shall be the responsibility of the GM/GC Manufacturer, who shall retain responsibility of the material until the material is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the HDPE geomembrane liner material at the project site.
- c. A label shall be attached or adhered to each roll of the HDPE geomembrane. The label shall identify the following:
 - c1. Name of GM/GC Manufacturer.
 - c2. Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier's name, resin production plant, resin brand name type, and production date of the resin).
 - c3. Order number.
 - c4. Date of manufacture.
 - c5. Manufacturing lot number.
 - c6. Geomembrane thickness and type.
 - c7. Roll identification number.
 - c8. Roll dimensions (length and width) and weight.
 - c9. Panel number, which shall be referenced to the proposed HDPE geomembrane liner panel layout drawing prepared by the GM/GC Manufacturer.

202. DRAINAGE GEOCOMPOSITE

202.1 Manufacturers of Drainage Geocomposite Products:

a. The products of the following manufacturers meeting the requirements herein are acceptable:

a1. AGRU America, 500 Garrison Road, Georgetown, SC 29440.

a2. Solmax, 19103 Gundle Road, Houston, TX 77073.

a3. Others as approved by the Owner.

202.2 General Requirements:

a. The drainage geocomposite shall consist of a HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet.

b. HDPE Geonet:

b1. The geonet shall be a profiled geonet manufactured by extruding two sets of polyethylene strands to form a three-dimensional structure in a diamond shape to provide planar water flow.

b2. The HDPE geonet formulation shall consist of a minimum of 97 percent of polyethylene resin, with the balance being carbon black and antioxidants for protection during extrusion and long-term service performance. No fillers, extenders, or other materials shall be mixed into the formulation.

b3. Regrind or reworked polymer which is previously processed HDPE geonet in chip form is acceptable if:

b3.1 It is the same formulation as the geonet being produced.

b3.2 No more than 25% rework material is used in the formulation.

b4. No PCR of any type shall be added to the formulation.

c. Non-Woven Geotextiles:

c1. The geotextiles shall be non-woven, spun bonded fabric manufactured from long chain polymeric filaments, yarns, staple fibers, or other structural components of polyester or polypropylene formed into a stable network (mesh).

c2. The nominal weight of each geotextile shall be 8 oz/sy.

202.3 Material Requirements:

a. The drainage geocomposite shall meet the requirements of Table 319020-2.

TABLE 319020-2
DRAINAGE GEOCOMPOSITE MATERIAL REQUIREMENTS

Property	Value	ASTM Test Method	Test Frequency
Geonet Core (Before Lamination)			
Thickness ⁽¹⁾	300 mil (min. ave.)	D5199	Per 50,000 lb.
Density of Formulated Material ⁽²⁾	0.95 g/cm ³ (min. ave.)	D1505 / D792	Per 50,000 lb.
Carbon Black Content	1.5% to 3.0%	D1603 / D4218	Per 100,000 lb.
Tensile Strength	75 lb/in. (min. ave.) ⁽³⁾	D7179	Per 50,000 lb.
Compressive Strength	120 psi (min. ave.)	D6364 ⁽⁴⁾	Per 100,000 lb.
Geotextile Cap and Carrier (Before Lamination)			
Mass per Unit Area	8 oz/sy (Min. ARV)	D5261	Varies ⁽⁵⁾
Grab Strength	200 lb (Min. ARV)	D4632	
Grab Elongation	50% (Min. ARV)	D4632	
Tear Strength	80 lb (Min. ARV)	D4533	
Puncture Strength	430 lb (Min. ARV)	D6241	
Permittivity	0.2 sec ⁻¹ (Min. ARV)	D4491	
AOS	0.25 (Max. ARV)	D4751	
UV Stability	50% Retained (500 hr)	D4355	
Double-Sided Laminated Composite			
Flow Rate / Width Hydraulic Gradient Pressure Seating Dwell Time	0.42 gpm / ft (min. ave.) 0.03 2,000 psf 15 min.	D4716 ⁽⁶⁾	Per 200,000 lb.
Ply Adhesion	1.0 lb/in. (min. ave.) ⁽⁷⁾	D7005	Per 100,000 lb.

Notes:

- (1) The diameter of the presser foot shall be 2.22 in. and the pressure shall be 2.9 psi.
- (2) The density of the base resin will be slightly lower than the density of the formulated material.
- (3) This is the average peak value for five equally spaced machine direction tests across the roll width.
- (4) Test shall be conducted using ASTM D6364 Section 6.3, the movable plate method.
- (5) Because the specified geotextile properties are based on average roll values (ARV), the statistics needed to obtain such values will dictate the frequency of testing.
- (6) Geocomposite shall be tested for ASTM D4716 flow rate per unit width between rigid end plates. Test values are for machine direction only.
- (7) This is the average of five equally spaced machine direction tests across the roll width. Both sides of the geocomposite shall be tested for ply adhesion.

202.4 Packing and Shipping:

- a. The drainage geocomposite shall be shipped to the project site in rolls. No material shall be folded.
- b. Packaging and transportation of all drainage geocomposite materials to the project site shall be the responsibility of the GM/GC Manufacturer, who shall retain responsibility until the drainage geocomposite is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the drainage geocomposite material at the project site.
- c. A label shall be attached or adhered to each roll of the drainage geocomposite. The label shall identify the following:
 - c1.1 Name of GM/GC Manufacturer.
 - c1.2 Product identification (e.g., brand name, product code).
 - c1.3 Order number.
 - c1.4 Date of manufacture.
 - c1.5 Manufacturing lot number.
 - c1.6 Drainage geocomposite thickness and type.
 - c1.7 Roll identification number.
 - c1.8 Roll dimensions (length and width) and weight.
 - c1.9 Panel number.

203. MATERIALS FOR ATTACHMENT OF GEOMEMBRANE TO CONCRETE

203.1 Batten Strip:

- a. Batten strip material shall be hot rolled, annealed, and pickled Type 316L stainless steel in accordance with ASTM A276.
- b. Strips shall be 1/4 inch thick by 2 inches wide. Random lengths are acceptable.

203.2 Expansion Anchors:

- a. Expansion anchors shall be stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633. Wedges shall be manufactured from ANSI Type 304 stainless steel. Hilti Kwik Bolt 3 Expansion Anchors, or equal, are acceptable.
- b. Wedge-type anchors shall have a minimum yield strength of 60,000 psi. Stud-type anchors shall have a minimum tensile strength of 65,000 psi.
- c. Anchors shall be 3/8-inch diameter by 3 1/2-inches long.
- d. Washers for anchors shall be Type 18-8 stainless steel flat washers for 3/8-inch diameter bolt size.

203.3 Neoprene Gaskets for Batten Strips:

- a. Neoprene gaskets shall be 1/4-inch thick by 2-inches wide, closed cell neoprene sponge sealing strips. Operating temperature range of neoprene shall be -40°F to +220°F.

- b. Neoprene gaskets placed against concrete shall have a pressure sensitive adhesive on the side of the gasket placed against the concrete.

PART 3 - EXECUTION

301. ONSITE HANDLING AND STORAGE

301.1 Unloading:

- a. Handling and unloading of materials shall be responsibility of the Geosynthetics Contractor.
- b. Upon arrival at the site, the rolls of geomembrane liner and drainage geocomposite shall be carefully unloaded by the Geosynthetics Contractor in accordance with the GM/GC Manufacturer's recommendations and in a manner to ensure that the material is not damaged.

301.2 Inspection:

- a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of geomembrane and drainage geocomposite for damage or defects. This inspection shall be done without unrolling any rolls unless damage to the inside of a roll is found or suspected.
- b. Any damage or defects shall be noted and immediately reported to the Owner, the GM/GC Manufacturer, and the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner (or their authorized representative), is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.

301.3 Storage:

- a. The Owner will provide on-site, outdoor storage space in a location near the area to be lined.
- b. The Geosynthetics Contractor shall store and stage the rolls such that on-site transportation and handling are minimized.
- c. The Geosynthetics Contractor shall be responsible for protecting the rolls of geomembrane liner and drainage geocomposite from damage, moisture, theft, and vandalism.
- d. The rolls of geomembrane and drainage geocomposite shall be placed on a smooth surface free of rocks and standing water.

302. PREPARATION OF SURFACES TO BE LINED

302.1 Geosynthetic Clay Liner:

- a. See Section 319025 regarding installation, inspection, and acceptance of the geosynthetic clay liner (GCL) underlying the HDPE geomembrane liner.

302.2 Preparation of Concrete Surfaces:

- a. All concrete surfaces that will come in contact with a geomembrane shall be free of sharp edges or rough spots that can puncture or abrade the geomembrane. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor.

- b. Where specified on the Design Drawings, one or more layers of geomembrane scuff strips shall be placed between the concrete and the geomembrane liner to act as a protective layer for the geomembrane liner.

303. INSTALLATION OF HDPE GEOMEMBRANE LINER

303.1 Weather:

- a. Geomembrane shall not be placed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds that acceptable welds can be made at the prevailing temperature. Trial welds shall be as described in Paragraph 303.7c. Under no circumstances shall geomembrane be deployed when the air temperature is below 5°F.

- a1. If the air temperature is above 32°F, trial welds shall be as described in Paragraph 303.6c.

- a2. If the air temperature is at or below 32°F, trial welds and field seaming shall be as described in GRI Test Method GM9.

- b. Geomembrane shall not be deployed or placed in any of the following conditions:

- b1. During any rainfall or snowfall.

- b2. In ponded water.

- b3. During high winds.

- b4. In the presence of excessive moisture due to fog or dew.

- b5. On frozen subgrade.

303.2 Precautions to Prevent Wind Damage:

- a. If possible, work shall be oriented in the direction of the prevailing wind.
- b. To prevent uplift of the geomembrane by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the edges of the exposed sheets using sandbags, tires, or other means which will not damage the geomembrane.

303.3 Other Precautions to Prevent Damage:

- a. Protection of the geomembrane from damage due to foot traffic on the slopes shall be provided.
- b. Provisions of facilities for safe entrance and egress of employees from sloped depressions shall be provided.

303.4 Panel Layout:

- a. The panels shall be placed in accordance with the GM/GC Manufacturer's panel layout drawing to ensure that they are placed in the proper direction for seaming.
- b. If panels are installed in a location other than indicated on the panel layout drawing, the revised location shall be indicated on an "as-built" layout drawing. The "as-built" record drawing shall be submitted to the Owner and the CQA Contractor after all of the geomembrane has been placed and seamed.

303.5 Panel Deployment:

- a. Only the panels that can be anchored and seamed together in one shift shall be unrolled.
- b. Unroll and layout panels in as close to the final position as possible. Pulling geomembrane panels should be minimized to reduce the chance of permanent tension.
- c. The methods and equipment used to deploy the panels shall not damage the geomembrane or the supporting surface.
- d. Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the geomembrane at the lowest expected operating temperature.

303.6 Replacement of Damaged Geomembrane:

- a. Any area of a panel which, in the judgement of the Owner and/or the CQA Contractor, becomes seriously damaged (torn, twisted, or crimped permanently) shall be replaced at no additional cost to the Owner.

303.7 Field Seaming:

a. Method of Seaming:

- a1. The primary welding procedure for seams shall be double wedge fusion welding.
- a2. Extrusion welding shall be used only for repairs, detail work, and for seaming where double wedge fusion welding is not possible.
- a3. The rods used for extrusion welding shall be the same type of resin as the geomembrane, unless otherwise approved by the Owner.
- a4. The use of solvents or adhesives is not permitted.

b. General Requirements for Seaming:

- b1. On slopes steeper than 10 horizontal to 1 vertical, seams shall be oriented parallel to the line of maximum slope (oriented up and down, not across the slope) when possible. No seams oriented across the slope shall be used unless approved by the Owner.
- b2. Seams parallel to the toe of the slope shall be located a minimum of 5 feet from the toe.
- b3. Seams parallel to the crest of the slope shall be located a minimum of 2 feet from the crest.
- b4. Seams at the bottom of a slope shall be overlapped so that the upslope sheet is positioned above the downslope sheet.
- b5. Seaming shall extend to the outside edge of panels to be covered with fill material or to be placed in an anchor trench. Seams at sheet corners of three or four sheets shall be completed with a patch having a minimum dimension of 24 inches, extrusion welded to the parent sheets.
- b6. All cross seams between the two rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of geomembrane.

- c. Trial Welds Prior to Beginning Seaming:
 - c1. Trial welds are required for pre-qualification of personnel, equipment, and procedures for making seams on identical geomembrane material under the same climatic conditions as the actual field production seams will be made.
 - c2. Trial welds shall be made as follows:
 - c2.1 Prior to each seaming period.
 - c2.2 Every 4 to 5 hours (i.e., at the beginning of the work shift and after the lunch break).
 - c2.3 Whenever personnel or equipment are changed.
 - c2.4 When climatic conditions result in wide changes in geomembrane temperature.
 - c2.5 When requested by CQA Geosynthetics Inspector for any seaming crew or piece of welding equipment if problems are suspected.
 - c3. Once qualified by passing a trial weld, welding technicians shall not change parameters without performing another trial weld.
 - c4. Trial welds shall be made on both double wedge fusion welds and on extrusion welds.
 - c5. A test strip shall be prepared by joining two pieces of geomembrane, each piece shall be at least 6 inches wide. The length of double wedge fusion welded seams shall be a minimum of 10 feet long. The length of an extrusion welded seam shall be a minimum of 4 feet long. The CQA Geosynthetics Inspector shall witness the fabrication of each test strip.
 - c6. All test welds shall be tested by destructive testing. Testing can be done as soon as the seam cools.
 - c7. A minimum of three 1-inch wide sample strips shall be cut from each test strip, one from each end and one from the middle. The location of each sample shall be selected by the CQA Geosynthetics Inspector. The test strips shall be tested in peel at 2 inches per minute using a field tensiometer. The CQA Geosynthetics Inspector shall witness all tests.
 - c8. If any of the test specimens fail, a new test strip shall be fabricated and the tests repeated for the new strip. If additional specimens fail, the seaming apparatus and the seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and successful trial welds have been achieved.
 - c9. The trial weld is considered acceptable if, when tested for peel adhesion using the field tensiometer, all three specimens meet the criteria specified in Table 319020-1 for both peel and shear under Bonded Seam Strength, or the three specimens exhibit Film Tear Bond (FTB) (yielding of the parent material before seam failure). In the case of a double wedge fusion welded seam, both welds must pass in order to be considered acceptable.
 - c10. If the specimens pass the tests, production seaming operations can begin.
 - c11. The Geosynthetics Contractor shall document all data on each trial weld, including:
 - c11.1 Date.
 - c11.2 Time.

- c11.3 Operator.
- c11.4 Machine number.
- c11.5 Ambient temperature.
- c11.6 Operating temperature.
- c11.7 Speed setting.
- c11.8 Pass/Fail designation.
- d. Preparation for Seaming:
 - d1. Prior to seaming, the surface of the geomembrane shall be wiped with a clean cloth to ensure that it is clean and free from moisture, grease, dust, dirt, and debris of any kind before seam welding is started.
 - d2. The panels shall be adjusted so that the seams are aligned to eliminate wrinkles and fish mouths. Where necessary, fish mouths and wrinkles shall be cut to achieve flat overlap.
- e. Seaming:
 - e1. Seaming shall be performed in accordance with the GM/GC Manufacturer's accepted procedure.
 - e2. Double Wedge Fusion Welds:
 - e2.1 The panels shall be overlapped a minimum of 4 inches prior to welding.
 - e2.2 A vehicle-mounted automated hot wedge welding apparatus shall be used to make each seam.
 - e3. Extrusion Fillet Welding:
 - e3.1 Geomembrane overlap shall be a minimum of 3 inches for extrusion welding.
 - e3.2 Geomembrane panels shall be temporarily bonded using a hot air device prior to extrusion welding.
 - e3.3 The edge of the geomembrane to be fillet welded shall be pre-beveled before heat-tacking the seam in place.
 - e3.4 The seam overlap shall be ground (abraded) no more than one hour prior to welding.
 - e3.5 Grinding shall be performed in accordance with the GM/GC Manufacturer's instructions in a manner that does not damage the geomembrane.
 - e3.6 Grinding shall not extend more than 1/4 inch past the area to be covered with extrudate during welding.
 - e3.7 All grind marks shall be covered with extrudate.
- 303.8 Non-Destructive Field Testing
 - a. General:
 - a1. All non-destructive field testing shall be performed and documented by the Geosynthetics Contractor.

- a2. The CQA Geosynthetics Inspector shall observe all non-destructive test procedures.
- a3. One hundred (100) percent of the seam length shall be tested using non-destructive procedures to check the continuity of the field seams. Non-destructive testing is not meant to qualify seam strength.
- a4. Air pressure testing shall be performed in accordance with ASTM D5820 and GRI GM6.
- a5. Vacuum box testing shall be performed in accordance with ASTM D5641 and as specified herein.
- a6. Continuity testing shall be performed as seaming progresses or as soon as a suitable length of seam is available, not at the completion of all field seaming.
- b. Double Wedge Fusion Welded Seams:
 - b1. Double wedge fusion welded seams shall be tested using air pressure testing.
 - b2. The procedure for testing shall be as specified in GRI GM6 for the type and thickness of geomembrane in use.
 - b3. The following pressures are applicable to all HDPE geomembrane. After an initial 2-minute pressure stabilization period, the pressure shall be maintained between 27 and 30 psi for 60 mil HDPE geomembrane. The pressure shall be sustained for a minimum of 5 minutes. The loss of pressure shall not exceed a maximum of 3 psi in 5 minutes. If the pressure does not stabilize in the first two minutes or the pressure loss exceeds the loss specified, the seam test shall be considered a failure.
 - b4. For every seam that fails a seam test:
 - b4.1 The leak or suspected leak shall be located and repaired.
 - b4.2 The repaired seam shall be re-tested as required until all leaks are identified and repaired and the seam passes a subsequent air pressure test.
 - b5. When the geometry of a double wedge fusion weld makes air testing impossible or impractical, vacuum testing may be used to test the seam.
- c. Extrusion Welded Seams:
 - c1. Extrusion welded seams shall be tested using vacuum chamber testing in accordance with ASTM D5641.
 - c2. The completed seam shall exhibit no leakage when tested between 4 and 8 psi minimum vacuum for approximately 10 seconds.
 - c3. If leaks are discovered during vacuum box testing, they shall be located, marked, and repaired.
 - c4. The repaired area shall be re-tested and exhibit no leakage.
- d. Inaccessible Seams:
 - d1. Where extrusion welded seam locations make use of vacuum box testing impractical, then the electric wire method of testing shall be used or the seam shall be cap stripped as approved by the Owner.

- d2. If cap stripping is approved by the Owner, the seams shall be cap stripped as described in Paragraph 303.11d with strips of the same type and thickness of geomembrane being installed. The cap stripping shall be performed in the presence of the CQA Geosynthetics Inspector and the Owner's representative.
- d3. The electric wire test method shall consist of placing a 24-gauge copper wire 1/8 inch beneath the top sheet overlap of the two sheets prior to welding with the extruder. The wire shall be embedded in the seam. After welding, a holiday spark detector, operating at 20,000 volts, shall be connected to one end of the wire, and slowly moved over the length of the seam. A seam defect between the probe and the embedded wire shall result in an audible alarm indicating where the defect is located.
- e. Test Reports:
 - e1. Test reports for all air pressure tests shall contain all data specified in ASTM D5820 and GRI GM6.
 - e2. Test reports for vacuum box testing shall contain all of the data specified in ASTM D5641.
 - e3. Test reports for other types of non-destructive tests shall contain the following data for each test as a minimum:
 - e3.1 Location.
 - e3.2 Type of test.
 - e3.3 Test parameters.
 - e3.4 Test data.
 - e3.5 Test number.
 - e3.6 Name of tester.
 - e3.7 Outcome of the test.
- 303.9 Destructive Testing
 - a. Testing:
 - a1. Destructive testing shall be performed by an independent third-party laboratory employed by the CQA Contractor on samples cut from production welds in the field by the Geosynthetics Contractor.
 - a2. Samples shall be taken by the Geosynthetics Contractor to the third-party laboratory and tested for shear strength and peel adhesion. For double wedge seam samples, both welds shall be tested for peel adhesion.
 - b. Location and Frequency:
 - b1. Test locations shall be determined after seaming. The location where the test samples shall be taken shall be marked by the CQA Geosynthetics Inspector. Locations may be prompted by the appearance of excessive heating, contaminations, offset welds, or a suspected defect. Destructive test samples shall be taken at a minimum average frequency of one per every 500 linear feet of seam length.

- b2. The Method of Attributes described in GRI GM14 may be exercised to minimize the number of test samples taken if more than 100 destructive seam samples will be required based on the sampling strategy given in Paragraph 303.9b1.
- b3. Each sample location shall be numbered and marked with permanent identification, and every sample location shall be indicated on a plan drawing prepared and maintained by the Geosynthetics Contractor. The following shall be recorded for each sample:
 - b3.1 Date and time.
 - b3.2 Ambient temperature.
 - b3.3 Seam number and location.
 - b3.4 Welding apparatus used.
 - b3.5 Name of Master Geomembrane Seamer.
 - b3.6 Reason for taking the sample.
 - b3.7 Size of sample.
 - b3.8 Test results.
 - b3.9 Name of tester.
- b4. Samples shall be cut by the Geosynthetics Contractor in the presence of the CQA Geosynthetics Inspector.
- b5. Test samples shall be cut every shift and taken by the CQA Geosynthetics Inspector to the third-party laboratory the same day that the sample is prepared.
- c. Sample Size:
 - c1. The minimum sample size shall be 12-inches wide with a seam 16-inches long centered length wise in the sample.
 - c2. As agreed to with the Owner, a sample may be increased in size to accommodate the requirements of the third-party testing laboratory.
- d. Field Testing:
 - d1. A one-inch wide specimen shall be cut from each end of each sample for field testing.
 - d2. Each one-inch wide specimen shall be tested with a field tensiometer for peel adhesion.
 - d3. The CQA Geosynthetics Inspector shall witness each field test.
 - d4. A test is considered acceptable if a specimen meets the criteria specified in Table 319020-1 for both peel and shear under Bonded Seam Strength, or exhibits Film Tear Bond (FTB). For double wedge fusion welds, both welds must pass the test. If either sample fails the field test, it shall be assumed that the seam will not pass the specified laboratory testing and the sample shall be given a fail designation.
- e. Laboratory Testing:
 - e1. Samples shall be tested for shear strength and peel adhesion in accordance with ASTM D6392. Five specimens shall be tested for each test method.

- e2. All samples shall meet minimum requirements for shear strength and peel adhesion given in Table 319020-1 under Bonded Seam Strength.
- f. Test Results:
 - f1. In accordance with CQA Specification P-1803, verbal laboratory test results will be given by the CQA Contractor to the Geosynthetics Contractor within 24 hours of receipt of the samples. Written results will follow within one week.
 - f2. All test locations shall be marked with a pass/fail designation on the liner and on the drawings maintained by the Geosynthetics Contractor for submittal to the Owner after the geomembrane liner is installed.
- g. Re-Testing if Failure Occurs:
 - g1. If a seam fails testing, one additional sample shall be taken 10 feet on each side of the location of the failed test. Additional samples shall continue to be taken at 10-foot intervals until tests show that seam strength is adequate and the zone in which the seam requires reconstruction is identified. Additional field and laboratory tests required to determine failed seams and any necessary patching and rework shall be performed at no additional cost to the Owner.
 - g2. All passing seams shall be bounded by two locations from which samples passing laboratory destructive tests have been taken.
 - g3. The entire seam length failing strength tests shall be reconstructed at no additional cost to the Owner.
 - g4. If the length of reconstructed seam exceeds 150 feet, a sample shall be taken of the reconstructed seam every 150 feet and shall pass destructive testing.
- 303.10 Inspection:
 - a. After seaming is complete, the Geosynthetics Contractor and the CQA Geosynthetics Inspector shall conduct a detailed walk-down to visually check all seams and non-seam areas of the HDPE geomembrane liner.
 - b. All defects, holes, blisters, tears, signs of damage during installation, areas of undispersed carbon, and holes from destructive or non-destructive testing shall be marked and repaired.
- 303.11 Repair of Defects and Seams
 - a. Patching:
 - a1. Patching shall be used to repair large holes, tears, and destructive sample locations.
 - a2. All patches shall be round or oval or shall have rounded corners.
 - a3. All patches shall be made of the base HDPE geomembrane material and shall extend a minimum of 3 inches beyond the edges of the defect.
 - a4. Patches shall be extrusion welded to the base sheet.
 - b. Grinding and Welding:
 - b1. Grinding and welding shall be used to repair sections of extruded fillet seams with small defects.

c. Spot Welding:

c1. Spot welding shall be used to repair small tears, pinholes, or other minor localized flaws.

d. Capping:

d1. Capping shall be used to repair lengths of extrusion welded seams with large defects and to repair double wedge fusion welded seams.

d2. Cap strips shall be made with strips of the same type and thickness of the geomembrane being installed. Strips shall extend a minimum of 6 inches beyond the weld and shall have rounded corners.

d3. Cap strips shall be extrusion welded to the base sheet.

e. Cut Out and Replacement:

e1. When approved by the Owner, a length of defective seam may be cut out and replaced with a strip of new material seamed into place.

f. Verification of Repairs:

f1. All repairs shall be non-destructive tested using one of the procedures described in Paragraph 303.8.

f2. Repairs passing non-destructive testing shall be deemed acceptable.

f3. Repairs of a seam in excess of 150 feet in length shall have one destructive seam test per 150 feet in length.

304. INSTALLATION OF DRAINAGE GECOMPOSITE

304.1 General Requirements:

a. In the presence of wind, all drainage geocomposite shall be weighted with sand bags or the equivalent. Weights shall be installed during deployment and shall remain in place until deployment of the cover material.

b. The drainage geocomposite shall not be welded to the geomembrane liner.

c. All necessary precautions shall be taken to prevent damage to underlying geomembrane during placement of the drainage geocomposite.

d. During placement of the drainage geocomposite, care shall be taken not to entrap dirt or excessive dust that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the drainage geocomposite, it shall be cleaned and all dirt removed prior to placement of the cover material. Care shall be taken in the handling of sand bags to prevent rupture or damage of the sand bag.

304.2 Placement of Drainage Geocomposite:

a. On slopes, the drainage geocomposite shall be secured with temporary ballasting material (e.g., sand bags) at the top of the slope or, as specified in the Design Drawings, in an anchor trench and then rolled down the slope in such a manner as to continuously keep the drainage geocomposite in tension. If necessary, the drainage geocomposite shall be positioned by hand after unrolling to minimize wrinkles and folds.

- b. The drainage geocomposite shall be placed on side slopes with no horizontal seams along the slope and so that the long dimension is parallel to the slope.
- c. No horizontal seam shall be located within 5 feet of the toe of a slope.
- d. The drainage geocomposite shall be positioned on both the slopes and the bottom so that the geonet core overlaps by a minimum of 4 inches.
- e. Drainage geocomposite placed in the corners of the side slope shall be cut to eliminate excessive overlap of material.
- e1. The drainage geocomposite shall only be cut using scissors or other cutting tools approved by the GM/GC Manufacturer that will not damage the underlying geomembrane.
- e2. Cutting tools shall not be left on the drainage geocomposite.

304.3 Joining Geonet Cores:

- a. The geonet cores between adjacent drainage geocomposite panels shall be joined using white or yellow self-locking straps. Metal fastening devices are not permitted and shall not be used.
- b. Adjacent panels on slopes shall be joined on 5-foot centers.
- c. Adjacent panels on the basin floor shall be joined on 10-foot centers.
- d. End seams on the basin floor shall be joined on 1-foot centers.
- e. Horizontal and end seams in anchor trenches shall be joined on 1-foot centers.

304.4 Joining Geotextile Caps:

- a. Sewing on Basin Floor:
 - a1. On the basin floor and interior slopes flatter than 10H:1V (i.e., 10%), the geotextile caps between adjacent drainage geocomposite panels shall be continuously sewn or continuously heat bonded in accordance with the GM/GC Manufacturer's recommendations.
 - a2. Spot seaming is not allowed.
- b. Sewing on Basin Slopes:
 - b1. On basin slopes greater than 10H:1V (i.e., 10%), the geotextile caps between adjacent drainage geocomposite panels shall be continuously sewn. All seams shall be vertical (i.e., parallel with the slope). No horizontal seams (i.e., across the slope) shall be permitted on basin slopes greater than 10H:1V (i.e., 10%).
 - b2. Spot seaming and heat bonding are not allowed.
- c. Sewing Requirements:
 - c1. Sewing shall be done using polyester or heat-set UV stabilized polypropylene sewing thread with chemical and ultraviolet light resistance properties equal to or exceeding the values specified in Table 319020-2. The thread color shall contrast with the color of the geotextile cap to assist in inspection of the seam. Tex size or denier number of the thread shall be specified by the Geosynthetics Contractor.

- c2. Seams shall be “prayer” or “flat” seams. Seams shall be formed by mating the edge of the geotextile caps and sewing the caps together with continuous stitches located a minimum of four inches from the mated edges.
- c3. Sewing procedures shall conform to the latest procedures recommended by the GM/GC Manufacturer.
- c4. Stitching:
 - c4.1 For drainage geocomposites placed on the interior slopes of the basin, stitching shall be two rows (SSa-2) of stitching using a 01 two-thread locking chain stitch as described in the IFAI with 6 to 10 stitches per inch. Thread strength shall be such field seam strength will be a minimum of 90 percent of the tensile strength of the geotextile cap.
 - c4.2 For drainage geocomposites used elsewhere in the basin, stitching shall be one row (SSa-1) of stitching using a Type 401 two-thread locking chain stitch as described in the IFAI with a minimum of 5 stitches per inch, or the seam shall be heat bonded. Thread strength shall be selected by the Geosynthetics Contractor.
- c5. Seam Inspections:
 - c5.1 Visual examinations shall be conducted to ensure that 100 percent of the seams are sewn or heat bonded as required.
 - c5.2 Seam sampling and testing are not required.
- 304.5 Protection of HDPE Geomembrane:
 - a. The Geosynthetics Contractor shall be responsible for protection of the HDPE geomembrane liner during installation of the drainage geocomposite and shall be responsible for repair of any damage caused to the liner by installation of the drainage geocomposite.
- 304.6 Repair of Holes or Tears:
 - a. All holes or tears in the drainage geocomposite shall be repaired by placing a patch of drainage geocomposite over the hole or tear. The patch shall extend 2 feet beyond the edges of the hole or tear. If the hole or tear width across the roll is more than 50% of the width of the roll, the damaged drainage geocomposite shall be removed and replaced.
 - b. A patch’s geonet core shall be secured to the original geonet core by tying every 12 inches.
 - c. A patch’s geotextile cap shall be sewn into place by hand or machine so as the patch will not accidentally shift out of position or be moved when it is covered. The thread shall be the same as specified for sewing seams.
- 305. CREST ANCHORAGE
- 305.1 At the top of a slope, the HDPE geomembrane liner and the drainage geocomposite shall extend to the run-out distance indicated on the Design Drawings or, if otherwise indicated on the Design Drawings, shall be anchored in an anchor trench.
- 305.2 Prior to the placement of the geosynthetic clay liner (GCL) underlying the HDPE geomembrane liner, and if specified on the Design Drawings, the Earthwork Contractor shall excavate the crest anchor trench to the lines and widths shown on the Design Drawings and in accordance with the excavation and shaping requirements specified in Section 319005.



- 305.3 After installation of the LCRS in accordance with Section 319050, the Earthwork Contractor shall place fill over the geosynthetic materials along the specified run-out distance or in the anchor trench as shown on the Design Drawings.
306. ATTACHMENT TO CONCRETE
- 306.1 Geomembrane shall be attached to concrete using batten strips in accordance with details on the Design Drawings.
307. ATTACHMENT TO PIPE PENETRATIONS
- 307.1 Geomembrane shall be attached to pipe penetrations through the lining in accordance with details on the Design Drawings.
- 307.2 Prefabricated or field fabricated HDPE sleeves (pipe boots) used for attaching the geomembrane to the pipe shall be supplied by the GM/GC Manufacturer.

END OF SECTION 319020



SECTION 319025
GEOSYNTHETIC CLAY LINER

PART 1 – GENERAL

101. EXTENT

101.1 This section defines the minimum material and installation requirements for a geosynthetic clay liner (GCL) to be used as the lower component of the retrofitted Ash Surge Basin's new composite liner system, all in accordance with the Design Drawings and as specified herein.

101.2 The work shall include, but not be limited to, the following items:

- a. Manufacturing, shipping, handling, and storage of GCL.
- b. Preparation and inspection of surfaces to be lined.
- c. Placement and seaming of GCL.
- d. Crest anchorage of GCL using liner run-outs or anchor trenches as specified on the Design Drawings.
- e. Sealing GCL around existing marker posts and on existing concrete surfaces.
- f. Visual inspection of the completed GCL.
- g. Patching and repairs as necessary.

101.3 Definitions and Qualifications:

- a. The following definitions of terms shall apply throughout this section:
 - a1. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor's work.
 - a2. GCL Manufacturer: The manufacturer who is responsible for manufacturing and transporting GCL materials to the site.
- b. Qualifications:
 - b1. The GCL Manufacturer shall be approved by the Owner. Owner's considerations when approving the GCL Manufacturer may include, but are not limited to, financial, safety, and prior performance aspects of the manufacturer.
 - b2. The GCL Manufacturer shall have an internal QA/QC program to ensure and to verify the manufactured products consistently meet or exceed the requirements of this section.
 - b3. The GCL Manufacturer shall have at least 10 years of experience manufacturing products similar to those required for this Work.



102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

- 102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:
- a. GW Specification P-1802:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a3. Section 319050 – Leachate Collection and Removal System.
 - b. CQA Specification P-1803:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

- 103.1 Standards, specifications, manuals, codes, and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 103.4 ASTM – ASTM International:
- a. D4643 Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.
 - b. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - c. D5887 Standard Test Method for Measurement of Index Flux through Saturated Geosynthetic Clay Liner Specimens using a Flexible Wall Permeameter.
 - d. D5889 Standard Practice for Quality Control of Geosynthetic Clay Liners.
 - e. D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
 - f. D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
 - g. D5993 Standard Test Method for Measuring Mass per Unit of Geosynthetic Clay Liners.
 - h. D6243 Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by Direct Shear Method.
 - i. D6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners
 - j. D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners



104. SUBMITTALS

- 104.1 The GW Contractor shall submit the following drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 104.2 Submittals with Bid Proposal:
- a. Geosynthetics Contractor:
 - a1. Geosynthetics Contractor's name, address, and telephone number.
 - a2. Geosynthetics Contractor's qualifications, including letter or certificate from GCL Manufacturer documenting the manufacturer's approval of the Geosynthetics Contractor (or subcontracted Installer) to install the GCL materials supplied by the GCL Manufacturer.
 - a3. Installer's qualifications if the Geosynthetics Contractor is proposing to subcontract the GCL installation work.
 - b. GCL Material:
 - b1. Copies of the GCL Manufacturer's catalog data describing the GCL material proposed for use on this project.
 - b2. Copies of GCL Manufacturer's QA certificates on tests performed on the material and a summary of results after the tests.
 - b3. Certification of Compliance from the GCL Manufacturer, signed by its authorized representative, stating that the GCL material meets the specification requirements and that those requirements are guaranteed by the GCL Manufacturer.
 - b4. GCL Manufacturer's Quality Control and Quality Assurance Policies and Procedures.
 - c. Warranty:
 - c1. Written warranties from the GCL Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as applicable.
 - c2. Warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the GCL Manufacturer and the Geosynthetics Contractor.
- 104.3 Submittals After Award:
- a. Installation Data:
 - a1. GCL Manufacturer's proposed GCL panel layout for each installation.
 - a2. GCL Manufacturer's recommended procedures for making seams if different from those specified herein.
 - a3. GCL Manufacturer's recommended procedures for repairing damaged GCL sections and seams if different from those specified herein.
 - a4. GCL Manufacturer's details of GCL anchorage and attachment to structures and penetrations if different from those specified herein and from the details shown on the Design Drawings.



- 104.4 Submittals Upon Shipment:
- a. Two representative samples of each GCL material to be used for the project.
 - b. GCL Manufacturer's QA/QC certificates with each shipment of GCL. The QA/QC certificates shall include:
 - b1. GCL lot and roll numbers with corresponding shipping information.
 - b2. GCL Manufacturer's test data for the geotextile materials used in GCL production including, at a minimum, mass per unit area data and tensile test data.
 - b3. Certificates of analyses for the bentonite clay used in GCL production including, at a minimum, test data for the properties shown in Table 319025-1.
 - b4. GCL Manufacturer's test data for the finished GCL product including, at a minimum, test data for the properties shown in Table 319025-2.
- 104.5 Submittals After Installation is Complete:
- a. As-built panel layout.
 - b. Plan drawing showing locations of repairs and types of repairs made.
105. QUALITY ASSURANCE
- 105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of the responsibility for providing and installing materials in compliance with specified requirements.
- 105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
- 105.3 CQA activities shall be performed as described herein and in Specification P-1803.

PART 2 - PRODUCTS

201. GEOSYNTHETIC CLAY LINER (GCL)
- 201.1 Approved GCL Products:
- a. The products of the following manufacturers meeting the requirements herein are acceptable:
 - a1. CETCO BENTOMAT® DN.
 - a2. Solmax BentoLiner® NW.
 - a3. AGRU America GeoClay® N66.
 - a4. Owner-approved alternative(s) meeting the requirements herein.
- 201.2 General Requirements:
- a. The GCL shall be a needle punched GCL. The GCL shall be manufactured by placing a uniform layer of high-swell sodium bentonite encapsulated between two geotextiles and



then needle punching through both layers of the geotextile and the bentonite to push fibers from the geotextile cap through the bentonite layer and embed them in the geotextile carrier on the other side.

- b. The upper and lower support materials shall protect the bentonite but shall be sufficiently porous to allow bentonite flow-through to create a positive bentonite-to-bentonite seal at the seams.
- c. The support materials used in the manufacturing shall not interfere with the swelling, self-healing, or low permeability characteristics of the GCL.
- d. The GCL shall be fabricated such that bentonite will not be displaced when the liner is cut.
- e. Six-inch and nine- or twelve-inch overlap marks shall be marked longitudinally on both edges of the geotextile cap by the GCL Manufacturer to assist in obtaining the proper overlap. The lines shall be printed in easily visible, non-toxic ink.
- f. The minimum period of warranty for GCL materials shall be 5 years.

201.3 GCL Material Specifications:

- a. Sodium Bentonite. The bentonite utilized in the manufacture of the GCL, as well as any accessory bentonite provided for seaming and detail work, shall be Wyoming-grade sodium bentonite with the properties listed in Table 319025-1.

TABLE 319025-1
PROPERTIES OF BASE BENTONITE IN GCL MATERIALS

Property ⁽¹⁾	ASTM Test Method	Value	Min. Testing Frequency ⁽²⁾
Free Swell	D5890	24 mL / 2g min.	1/100,000 lb
Fluid Loss	D5891	18 mL max.	1/100,000 lb
Moisture Content	D4643	12% max.	1/100,000 lb

Notes:

(1) Properties of the base bentonite prior to incorporation into the finished GCL product.

(2) Minimum testing frequencies are per ASTM D5889. One test per 50 tonnes is also acceptable.



- b. Geosynthetic Clay Liner. The finished GCL shall have the properties listed in Table 319025-2.

TABLE 319025-2
PROPERTIES OF FINISHED GCL MATERIALS

Property	ASTM Test Method	Value	Min Testing Frequency ⁽¹⁾
Geotextile Properties			
Non-Woven Cap	D5261	6.0 oz/yd ² min.	1/20,000 SF
Non-Woven Carrier	D5261	6.0 oz/yd ² min.	1/20,000 SF
Finished GCL Properties			
Bentonite Mass/Area	D5993	0.75 lb/ft ² min. at 0% moisture content	1/20,000 SF
Moisture Content	D5993	35% max.	1/20,000 SF
Hydrated Internal Shear Strength	D6243	500 psf min. ⁽²⁾	1/20,000 SF
Tensile Strength ⁽³⁾	D6768	45 lb/in. min.	1/20,000 SF
Peel Strength	D6496	3.5 lb/in. min.	1/20,000 SF
Index Flux ⁽⁴⁾	D5887	2x10 ⁻⁹ m ³ /m ² /sec max.	1/20,000 SF
Hydraulic Conductivity ⁽⁴⁾⁽⁵⁾	D5887	1x10 ⁻⁹ cm/sec max.	1/20,000 SF

Notes:

- (1) Minimum testing frequencies listed are in accordance with ASTM D5889.
 (2) Typical peak value for specimen sheared under a 200 psf normal stress.
 (3) Machine (warp) direction of primary backing.
 (4) Index flux and hydraulic conductivity measured at 5 psi effective confining stress and 2 psi head.
 (5) Hydraulic conductivity based on 7-mm-thick bentonite layer.

201.4 Packing and Shipping:

- a. All GCL material shall be shipped to the project site in rolls. No GCL material shall be folded.
- b. Transportation of GCL materials to the project site shall be the responsibility of the GCL Manufacturer who shall retain responsibility of the material until the material is accepted at the project site. The Geosynthetics Contractor will be responsible for unloading the GCL material at the project site.
- c. The finished GCL shall be completely wrapped and adequately secured with a durable polyethylene protective cover in order to provide protection from ultraviolet degradation of the Primary Backing Material (PBM) and excessive loss of moisture during shipping and storage.
- d. A label shall be attached or adhered to each roll of the GCL. The label shall identify the following:
- d1. Name of GCL Manufacturer.
- d2. Product identification (brand name, product code).
- d3. Order number.



- d4. Date of manufacture.
 - d5. Manufacturing lot number.
 - d6. GCL thickness.
 - d7. Roll identification number.
 - d8. Roll dimensions (i.e., length and width) and weight.
 - d9. Panel number, which shall be referenced to the proposed GCL panel layout drawing prepared by the GCL Manufacturer.
 - e. The GCL shall be stenciled throughout each roll with the product name and name of the GCL Manufacturer, which can be cross-referenced to the roll number marked on the label and to the production and quality control data sheets.
202. **BENTONITE SEALING COMPOUND (BSC) AND GRANULAR BENTONITE (GB)**
- 202.1 The BSC and GB shall be supplied by the GCL Manufacturer and shall be comprised of the same bentonite used in the manufacturing of the GCL. The BSC shall be a mixture of non-aqueous liquid suspension agents which creates a paste-like texture.
- 202.2 The suspension agents used in the manufacture of the BSC shall be non-toxic, water-soluble and shall not restrict the bentonite's ability to swell and absorb water upon hydration.

PART 3 - EXECUTION

301. **ONSITE HANDLING AND STORAGE**
- 301.1 Unloading:
- a. Handling and unloading shall be the responsibility of the Geosynthetics Contractor.
 - b. Upon arrival at the site, the rolls of the GCL shall be carefully unloaded by the Geosynthetics Contractor in accordance with the GCL Manufacturer's recommendations and in a manner to ensure the material is not damaged.
- 301.2 Inspection:
- a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of GCL for damage (rips, tears, etc.). Any protective sleeve damage shall be repaired immediately with tape or additional plastic sheeting.
 - b. Any damage to a roll of GCL or its protective sleeve shall be noted and immediately reported to the Owner, the GCL Manufacturer, and the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner, is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.
- 301.3 Storage:
- a. The Owner will provide on-site, outdoor storage space in a location near the area to be lined.
 - b. The Geosynthetics Contractor shall store and stage the GCL rolls such that on-site transportation and handling are minimized.



- c. The Geosynthetics Contractor shall be responsible for protecting the GCL rolls from damage, moisture, theft, and vandalism.
 - d. Rolls of GCL shall be:
 - d1. Stored horizontally in their original, unopened, wrapped cover in a clean, dry area.
 - d2. Stored off the ground on pallets or plywood in small stacks not to exceed five rolls in height. Rolls shall be stacked in a manner recommended by the GCL Manufacturer that prevents them from sliding or rolling.
 - d3. Covered with a heavy, protective tarpaulin or plastic sheeting.
 - e. The Geosynthetics Contractor shall keep the GCL clean and free from debris prior to installation.
 - f. Any rolls that come in contact with moisture while in storage shall be set aside by the Geosynthetics Contractor to await examination by the Owner. Damaged rolls shall also be set aside and inspected to determine suitability of the material for use.
302. PREPARATION OF SURFACE TO BE LINED
- 302.1 The Earthwork Contractor shall be responsible for the initial preparation and maintenance of the surfaces to be lined as specified in the Section 319005 prior to placement of the GCL.
 - 302.2 The Geosynthetics Contractor shall provide written certification to both the Earthwork Contractor and the Owner that the surface on which the GCL is to be installed is acceptable. The surface then becomes the responsibility of the Geosynthetics Contractor.
 - 302.3 The surface upon which the GCL is to be placed shall be free of standing water and maintained in a firm, clean, and smooth condition during liner installation.
303. GENERAL INSTALLATION REQUIREMENTS
- 303.1 Weather:
 - a. GCL shall not be deployed or placed in the following conditions:
 - a1. During any rainfall or snowfall.
 - a2. In ponded water.
 - a3. During high winds.
 - a4. In the presence of excessive moisture due to fog or dew.
 - a5. On frozen subgrade.
 - b. GCL shall not be deployed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds the overlying HDPE geomembrane liner sheets can be welded at the prevailing temperature in accordance with the field seaming requirements specified in Section 319020. Under no circumstances shall GCL be deployed when the air temperature is below 5°F.
 - 303.2 Precautions to Prevent Wind Damage
 - a. If possible, work shall be oriented in the direction of the prevailing wind.



- b. To prevent uplift of the GCL by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the edges of the exposed sheets using sandbags, tires, or other means which will not damage the GCL.

303.3 Other Precautions to Prevent Damage

- a. Protection of the GCL from damage due to foot traffic on the slopes shall be provided.
- b. Provisions of facilities for safe entrance and egress of employees from sloped depressions shall be provided.

303.4 Panel Layout:

- a. Horizontal panel seams are not allowed on slopes, except as required at the intersection of two slopes (valley). All panel seams on slopes shall be parallel to the flow line down the slope.
- b. The panels shall be placed in accordance with the GCL Manufacturer's panel layout drawing to ensure that they are placed in the proper direction for overlapping.
- c. If panels are installed in a location other than indicated on the panel layout drawing, the revised location shall be indicated on an "as-built" layout drawing prepared by the Geosynthetics Contractor. The as-built record drawing of the panel layout shall be submitted to the Owner and the CQA Contractor after all of the GCL has been placed and seamed.

304. PANEL DEPLOYMENT

- 304.1 Deploy only as much GCL as can be covered with the HDPE geomembrane liner (in accordance with section 319020) by the end of the day or in a reasonably short time in the event of precipitation.
- 304.2 Any rutting of the subgrade (i.e., Structural Fill) shall be smoothed and leveled prior to covering that area with GCL.
- 304.3 Where required by the Design Drawings, the anchor trench for the area to be lined shall be excavated before installation of the GCL begins.
- 304.4 Rolls of GCL shall be brought to the area to be lined with a front-end loader and support pipes set up such that the GCL roll is fully supported across its length, is freely suspended, and can unroll freely. The core bar and spreader bar shall not flex or bend excessively when a full roll is lifted.
- 304.5 The cap material shall face upwards toward the installer. The GCL shall be placed over the prepared surface in such a manner as to assure minimum handling.
- 304.6 Installation shall begin at a high elevation and proceed to a low elevation.
- 304.7 Pulling GCL panels shall be minimized to reduce the chance of permanent tension.
- 304.8 Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the GCL at the lowest expected operating temperature.

305. FIELD SEAMING

305.1 General Requirements for Seaming:

- a. Horizontal seams shall be located at least 5 feet from the toe of a slope.
- b. On slopes, all runs shall be continuous with the long dimension of all panels oriented parallel to the slope.
- c. Panels placed on the basin floor require no particular orientation.
- d. Once the first run has been laid, adjoining runs shall be laid with a 6 inch minimum overlap on the longitudinal seams and 24 inch minimum overlap on end seams. If the GCL Manufacturer recommends larger overlap seams, then the GCL Manufacturer's recommendations shall be followed.
- e. The edges of GCL panels shall be adjusted to smooth out wrinkles, creases, or "fishmouths" in order to maximize contact with the underlying panel.
- f. If the air temperature is higher than 85°F and the humidity is low, contraction may occur soon after placement when no confining stress has been placed over the GCL. To allow for the possibility of contraction under these conditions, the minimum seam overlap shall be increased to a minimum of 12 inches on longitudinal seams and 36 inches on end seams, or to 4% of the distance to the next parallel seam, whichever is greater.

305.2 Seaming:

- a. Seaming shall be performed in accordance with the GCL Manufacturer's written recommended procedures.
- b. All seams shall be formed by executing a bentonite-enhanced overlap to ensure that a continuous seal is achieved.
- c. The side of the overlying panel shall be pulled back to expose and examine the overlap areas. Seam overlap areas shall be clean and free from moisture, free from dust and debris of any kind before seaming is started. Any contamination shall be removed.
- d. A fillet of dry granular bentonite shall be poured in a continuous manner along the overlap zone (between the edge of the panel and the six-inch line) at a rate of at least one-quarter pound per linear foot. All dry granular bentonite used shall be that provided by the GCL Manufacturer.
- e. Seam overlap on the bottom of a slope shall be placed such that the direction of flow is from the top sheet to the bottom sheet to form a shingle effect and prevent flow into the seam.

306. SEALING AROUND AND AGAINST EXISTING STRUCTURES

306.1 The GCL shall be sealed to existing structures within the Ash Surge Basin.

306.2 A wedge of GB shall be installed at the point of intersection of an existing structure and the basin floor or sideslope. This GB wedge shall be placed between the existing liner and the new GCL and shall be at least 1.0 lbs per foot.

306.3 At the intersection of the GCL and an existing structure, the GCL shall extend higher on the structure than the termination point for the existing geomembrane liner.



- 306.4 If the attachment hardware for the existing geomembrane liner are sharp or protrude to the extent that they could damage the GCL, a supplement HDPE geomembrane rub sheet shall be installed between the GCL and existing attachment hardware.
- 306.5 Vertical GCL shall be anchored to an existing structure at an elevation higher than the existing HDPE geomembrane liner and lower than the new HDPE geomembrane liner as shown on the Design Drawings. As an alternate, the Geosynthetics Contractor may propose a self-adhering GCL product that demonstrates similar properties to the base GCL in accordance with GCL Manufacturer's written recommendations.
307. INSPECTION
- 307.1 After seaming is complete, the Geosynthetics Contractor and the CQA Geosynthetics Inspector shall conduct a detailed walkdown to visually check all seams and non-seam areas of the GCL.
- 307.2 All defects, holes, blisters, tears, and signs of damage during installation shall be marked for repair.
308. PATCHING AND REPAIRS
- 308.1 Patching shall be used to repair small defects, blisters, holes, and tears.
- 308.2 All dirt and debris present in the patched area shall be removed.
- 308.3 All patches shall be round or oval or shall have rounded corners.
- 308.4 All patches shall be made of the base GCL and shall extend a minimum of 12 inches beyond the edges of the defect. Accessory bentonite shall be placed around the perimeter of the affected area at a rate of one-quarter pound per lineal foot prior to placing the patch. Adhesive, such as wood glue, may be used if necessary to secure the patch.
309. CREST ANCHORAGE
- 309.1 At the top of a slope, the GCL shall extend to the run-out distance indicated on the Design Drawings or, if otherwise indicated on the Design Drawings, shall be anchored in an anchor trench.
- 309.2 Prior to the placement of the GCL and if indicated on the Design Drawings, the Earthwork Contractor shall excavate the crest anchor trench to the lines and widths shown on the Design Drawings and in accordance with the excavation and shaping requirements specified in Section 319005.
- 309.3 After installation of the LCRS in accordance with Section 319050, the Earthwork Contractor shall place fill over the geosynthetic materials along the specified run-out distance or in the anchor trench as shown on the Design Drawings.
310. PROTECTIVE COVER
- 310.1 The GCL shall be covered the same day with the HDPE geomembrane liner as shown on the Design Drawings in accordance with Section 319020. Precautions shall be taken to prevent damage to the GCL by restricting heavy equipment traffic.
- 310.2 To prevent premature hydration or contraction, only the amount of GCL that can be installed, inspected, repaired, and covered in the same day shall be installed.



- 310.3 Any leading edge or panels of GCL left unprotected shall be covered with a heavy, waterproofing tarp which is adequately secured and protected with sand bags or other ballast.
311. CORRECTIVE MEASURES FOR PREMATURE HYDRATION OF GCL
- 311.1 If the GCL is prematurely hydrated, becomes saturated, etc., then the following corrective action program shall be implemented:
- a. The affected panels shall be identified, documented, and exposed so that they can dry. Traffic over the impacted area shall be kept to a minimum during the drying process.
 - b. Once the affected panels have had enough time to dry, the Geosynthetics Contractor, the CQA Geosynthetics Inspector, and the Owner shall evaluate the impacted area for damage.
 - c. Following evaluation of the impacted area, the Geosynthetics Contractor shall recommend to either leave the GCL in place or to replace the GCL. The Geosynthetics Contractor's recommendation shall be made in writing, submitted with photographs documenting the evaluated area, and based on the extent of damage (or lack thereof).
 - c1. If the Geosynthetics Contractor's recommendation is to replace the affected GCL panels, then they shall be replaced at no additional cost to the Owner.
 - c2. If the Geosynthetics Contractor's recommendation is to leave the affected GCL panels in-place, and if the Owner or CQA Geosynthetics Inspector disagree with that recommendation, then the Owner will contact the GCL Manufacturer for their recommendation.
 - c2.1 If the GCL Manufacturer's recommendation is to replace the affected GCL panels, then they shall be replaced at no additional cost to the Owner.
 - c2.2 If the GCL Manufacturer's recommendation is to leave the affected GCL panels in-place, and if either the Owner or CQA Geosynthetics Inspector disagree with that recommendation, then the GCL panels shall be removed in accordance with a negotiated agreement between the Owner and the GW Contractor.

END OF SECTION 319025



SECTION 319050

LEACHATE COLLECTION AND REMOVAL SYSTEM

PART 1 - GENERAL

101. **EXTENT**

101.1 This section defines the minimum material and installation requirements for the components of the Ash Surge Basin's new leachate collection and removal system (LCRS) including high-density polyethylene (HDPE) leachate collection and sideslope riser pipes, Coarse Aggregate Bedding Material, Sand Filter Layer material, Protective Warning Layer material, Riprap Bedding Layer material, and riprap, all in accordance with the Design Drawings and as specified herein.

101.2 The components and dimensions of the LCRS are shown on the Design Drawings. The division of work shall include, but not be limited to, the following items:

a. The following items shall be furnished and installed by the Earthwork Contractor:

a1. Coarse Aggregate Bedding Material.

a2. Sand Filter Layer.

a3. Protective Warning Layer.

a4. Perforated leachate collection pipe.

a5. Solid sideslope riser pipe and cover.

b. The following items shall be furnished and installed by the Geosynthetics Contractor in accordance with Sections 319020 and 319025:

b1. HDPE geomembrane.

b2. HDPE scruff strips.

b3. Drainage geocomposite.

b4. Geotextiles.

b5. Geosynthetic clay liner (GCL).

c. The following items will be furnished and installed by Others:

c1. Wheeled submersible pump with flexible hose.

c2. Flowmeters.

c3. Control station for pumps and meters.

c4. Electrical and instrument conduit.

101.3 Definitions:

a. The following definitions of terms shall apply throughout this section:

a1. Pipe Manufacturer: The manufacturer who is responsible for manufacture of LCRS pipe materials and fittings and for transporting these materials to the site.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

- a. GW Specification P-1802:
 - a1. Section 319005 – Earthwork.
 - a2. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
 - a3. Section 319025 – Geosynthetic Clay Liner.
- b. CQA Specification P-1803:
 - b1. Section 014362 – Quality Assurance for Fill, Liner, and Leachate Collection Materials.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

- a. D2434 Standard Test Method for Permeability of Granular Soils (Constant Head)
- b. D2487 Standard Practice for Classification of Soils for Engineering Purposes.
- c. D2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
- d. D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
- e. D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- f. D6473 Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control
- g. D6825 Standard Guide for Placement of Riprap Revetments
- h. F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

103.5 IDOT – Illinois Department of Transportation:

- a. Standard Specifications for Road and Bridge Construction (Adopted January 1, 2022).

103.6 ITP – Illinois Test Procedure:

- a. 27 Sieve Analysis of Fine and Coarse Aggregates

- b. 96 Resistance by Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- c. 104 Soundness of Aggregate by Use of Sodium Sulfate
- d. 203 Deleterious Particles in Coarse Aggregate
- 103.7 NSF – National Sanitation Foundation International:
 - a. NSF Listings: Plastics and Plumbing System Components.
- 104. **SUBMITTALS**
- 104.1 The GW Contractor shall submit drawings and data at least 30 days prior to use. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems specified by the Owner.
- 104.2 Submittals with Bid Proposal:
 - a. HDPE Pipe:
 - a1. Pipe Manufacturer's name, address, and telephone number.
 - a2. Pipe Manufacturer's literature providing specifications of the pipes that will be supplied for the project.
 - a3. Pipe Manufacturer's signed certification that the pipes that will be supplied comply with the requirements of this Specification.
 - a4. Pipe Manufacturer's signed certification that no reclaimed polymer has been added to the resin.
- 104.3 Submittals After Award:
 - a. Coarse Aggregate Bedding Material:
 - a1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Coarse Aggregate Bedding Material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
a1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
a1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
a1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.
a1.4 Deleterious Materials	ITP 203	Shale, Percent Max. Clay Lumps, Percent Max. Soft & Unsound Fragments, Percent Max. Other Deleterious, Percent Max. Total Deleterious, Percent Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.



b. Sand Filter Layer Material:

- b1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Sand Filter Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
b1.1 Classification of Material	ASTM D2487	Classification
b1.2 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
b1.3 Hydraulic Conductivity	ASTM D2434	Hydraulic Conductivity

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

c. Protective Warning Layer Material:

- c1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Protective Warning Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
c1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
c1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
c1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

- d. Riprap Bedding Layer Material:
- d1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Riprap Bedding Layer material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
d1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
d1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.
d1.3 Los Angeles Abrasion	ITP 96	Percent Loss Max.
d1.4 Deleterious Materials	ITP 203	Shale, Percent Max. Clay Lumps, Percent Max. Soft & Unsound Fragments, Percent Max. Other Deleterious, Percent Max. Total Deleterious, Percent Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

- e. Riprap:
- e1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the riprap material signed by the supplier or a qualified geotechnical engineering consultant certifying that the following items comply with or exceed specifications for the material:

Property	Standard ⁽¹⁾	Data Required
e1.1 Sieve Analysis	ITP 27	Percent Passing Selected Sieves
e1.2 Na ₂ SO ₄ Soundness 5 Cycle	ITP 104	Percent Loss Max.

Note:

- (1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

104.4 Submittals Upon Shipment:

- a. HDPE Pipe:
- a1. Copies of Pipe Manufacturer's QA/QC certificates on tests performed during fabrication.

104.5 Submittals After Construction is Complete:

- a. HDPE Pipe:
- a1. Logs indicating the location of each joint that did not pass visual examination and the work done to correct improper fusion weld.



105. QUALITY ASSURANCE

- 105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Earthwork Contractor of the responsibility of providing and placing materials in compliance with specified requirements.
- 105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Earthwork Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
- 105.3 CQA activities shall be performed as described herein and in Specification P-1803.

PART 2 - PRODUCTS

201. PIPE

- 201.1 Pipe Materials:
- a. Leachate Collection Pipe and Sideslope Riser shall meet the general and material requirements presented in Table 319050-1.
- 201.2 Pipe Requirements:
- a. Gravity leachate collection piping shall be single wall piping.
- 201.3 Fittings:
- a. All fittings shall be prefabricated and manufactured by the same manufacturer as the pipe.

TABLE 319050-1
MATERIAL REQUIREMENTS FOR LEACHATE COLLECTION PIPE

General Requirements for Leachate Collection Pipes & Fittings			
Item	Leachate Collection Pipe		
Service	Leachate Collection		
Location	Leachate Collection Trench		
Material	Perforated High-Density Polyethylene, Thermal Butt Fusion Welded Joints ⁽¹⁾		
Listing	NSF Listed and Approved		
Rating	Maximum Working Temperature:	Ambient	
	Maximum Working Pressure:	Atmospheric	
Material Requirements for Leachate Collection Pipes & Fittings			
Item	ASTM Test Method	Size (in.)	Remarks
Pipe ⁽¹⁾	ASTM F714, Pipe Grade PE4710 Resin	6	SDR 11
Joints	Not Applicable	All	Thermal Butt Fusion Welded
Fittings ⁽²⁾ : 30°, 45°, 60°, and 90° Bends	ASTM D2513 and ASTM D3261	6	SDR 11 (reduced pressure) Injection molded butt fittings from same resins as pipe.
Fittings ⁽²⁾ : Tees, Wyes, and Reducers	Not Applicable	6	SDR 11 (reduced pressure) Mitered fittings fabricated from angular cut sections of pipe.
Cleanout	Not Applicable	6	Lockable Cap
Approved Manufacturers of Leachate Collection Pipes and Fittings			
Manufacturer		Trade Name	Size Range (in.)
Chevron Phillips Chemical Company		Performance Pipe DriscoPlex® 4100	6
KWH Pipe		Sclairpipe	6
JM Eagle		HDPE Water Sewer C906	6
Others as Approved by the Owner		--	--

Notes:

- (1) Solid or perforated pipe shall be provided as specified on the Design Drawings. Perforated pipe shall be perforated in accordance with the details shown on the Design Drawings.
- (2) Fittings are reduced pressure rating fittings.

202. COARSE AGGREGATE BEDDING MATERIAL:

- a. The bedding material for the leachate collection pipe shall be washed gravel or washed crushed coarse aggregate. Crushed slag or Portland cement concrete shall not be used.
- b. The gradation for Coarse Aggregate Bedding Material shall conform to Gradation CA 7 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
- c. The material quality for Coarse Aggregate Bedding Material shall be Class B or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

203. SAND FILTER LAYER MATERIAL:

- a. The "Sand Filter Layer" placed on top of the HDPE geonet and geotextile shall be composed of washed sand imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that is processed to meet the following requirements:
 - a1. The material shall be classified as SP, SM, or SP-SM in the Unified Soil Classification System, ASTM D2487.
 - a2. The material shall conform to Gradations FA 1 or FA 2 in accordance with Paragraph 1003.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a3. The material shall have a permeability of greater than 1×10^{-5} cm/sec when tested in accordance with ASTM D2434.
 - a4. The material shall be free from all organic material and deleterious material.
 - a5. Fine aggregate produced by crushing slag or Portland cement concrete is not acceptable.

204. PROTECTIVE WARNING LAYER MATERIAL:

- a. The "Protective Warning Layer" placed on top of the Sand Filter Layer along the basin floor shall be composed of gravel, crushed gravel, or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that is processed to meet the following requirements:
 - a1. The material shall conform to Gradation CA 6 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a2. The material quality for Protective Warning Layer material shall be Class D or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

205. RIPRAP BEDDING LAYER MATERIAL

- a. The "Riprap Bedding Layer" placed on top of the Sand Filter Layer along the basin side slopes shall be composed of gravel, crushed gravel, or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that meets the following requirements:
 - a1. The material shall conform to Gradation CA 16 in accordance with Paragraph 1004.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.

- a2. The material quality for Riprap Bedding Layer material shall be Class B or better in accordance with Paragraph 1004.01(b) of the IDOT Standard Specifications for Road and Bridge Construction.

206. RIPRAP

- a. Riprap placed along the basin side slopes shall consist of quarried or crushed stone imported from an offsite borrow source, which shall be identified by the Earthwork Contractor and approved by the Owner, that meets the following requirements:
 - a1. Riprap stones shall have 100% of all faces angular or crushed and shall be free from structural defects, laminations, seams, weak cleavage planes, and undesirable effects of weathering. Stone containing shale, unsound sandstone, or any other material which will readily disintegrate under handling and placing or under weathering shall not be used. All riprap material shall be clean and free from deleterious material and impurities, including but not limited to earth, clay, and refuse.
 - a2. Riprap material shall conform to Gradation RR 2 in accordance with Paragraph 1005.01(c) of the IDOT Standard Specifications for Road and Bridge Construction.
 - a3. Riprap material shall meet Quality A requirements in accordance with Paragraph 1005.01(b) of the IDOT Standard Specifications for Road and Bridge Construction, except that the bulk specific gravity of the riprap shall not be less than 2.55 per ASTM D6473 (approximate unit weight of 160 pounds per cubic foot).
 - a4. Riprap color shall be gray unless otherwise approved by the Owner.

PART 3 - EXECUTION

301. LEACHATE COLLECTION AND SIDESLOPE RISER PIPE INSTALLATION

- 301.1 The perforated leachate collection pipe and solid wall sideslope riser pipe shall be installed according to the elevations and locations indicated on the Design Drawings.
- 301.2 The maximum vertical variation from the correct profile and section shall not exceed ± 0.1 ft. The slope of each pipeline shall not vary from the specified slopes by more than $\pm 0.1\%$. The Earthwork Contractor shall regrade any area which does not meet the specified tolerances.
- 301.3 The perforated leachate collection pipe shall have two rows of 1/2-inch diameter perforations spaced 6 inches apart along the length of the pipe. The perforations shall face down in the collection and cleanout trenches.
- 301.4 All PE pipes shall be joined by the thermal butt-fusion process described in Article 302. The inside of the pipe shall be ground smooth so that it will not impede the sliding of the pumps.
- 301.5 The Earthwork Contractor shall provide hydraulic jet cleaning of all pipelines following installation. The jet cleaning shall verify that each pipe is intact and unobstructed. Defects in any pipeline identified by the cleaning process shall be repaired by the Earthwork Contractor.

302. WELDING AND TESTING OF HDPE PIPE JOINTS

- 302.1 Joints for HDPE Pipe:
 - a. HDPE pipe shall be joined together by the thermal butt fusion method in accordance with ASTM D2657 Procedure 2. Fittings shall be fabricated to provide a smooth inside surface. The hot plate butt fusion procedure shall be performed using apparatus recommended by the Pipe Manufacturer and which complies with ASTM D2657.

302.2 Bent Strap Test

a. Test Requirements:

- a1. A bent strap test shall be made on each diameter of pipe prior to the start of joint welding procedures. A test joint shall be made and a specimen cut from the joint and destructively tested to confirm fusion joint integrity, operator procedure, and fusion machine settings, including temperature and pressure.
- a2. Additional bent strap tests may be required by the Owner and/or CQA Contractor during the joint welding process if it is found that the joints of unacceptable quality are being made. These tests shall be used to adjust fusion machine settings and/or operator procedures as required. Test joints shall be prepared at no additional cost to the Owner.

b. Test Procedure:

- b1. Using waste pieces of pipe, a joint specimen shall be prepared and then butt fusion welded and allowed to cool to ambient temperature.
- b2. A test strap shall be cut from the specimen:
 - b2.1 The width of the strap shall be 1-1/2 times the pipe wall thickness, but not less than one inch.
 - b2.2 The length of the strap on each side of the fusion weld shall be 15 times the pipe wall thickness, but not less than six inches.
- b3. The cut shall be bent so that the ends of the strap touch. If any separation, cracks or voids are observed, the fusion is unacceptable and indicates poor fusion quality.
- b4. If failure occurs, fusion procedures and/or machine settings shall be changed, and a new trial fusion weld and new bent strap specimen shall be prepared and tested.
- b5. The CQA Contractor shall witness all bent strap tests.
- b6. Field fusion of pipe shall not proceed until a test joint has passed the bent strap test and visual inspection indicates that the fusion beads and "V" groove are the correct size.

303. VISUAL INSPECTION OF HDPE PIPE DURING INSTALLATION

303.1 General:

- a. The Earthwork Contractor shall visually inspect all pipes during installation for:
 - a1. Verification that all perforated pipe has been placed with the perforations facing down.
 - a2. Surface damage.
 - a3. Weld quality.

303.2 Surface Damage:

- a. Surface damage to a pipe that occurs during handling or installation shall be minimized. The maximum acceptable depth of damage is 10 percent of wall thickness of the pipe. If excessive damage occurs, the damaged portions of pipe shall be cut out and replaced. Deep, sharp notches may be filled with extudite and dressed smooth.
- b. Butt fuse on misalignment shall not exceed 10 percent of the pipe wall thicknesses. Misaligned butt fusions shall be cut out and redone.

303.3 Butt-Fusion Joint Weld Quality:

- a. All butt fusion welded joints shall be visually inspected to ensure joint quality. The size and shape of the fusion beads shall be used as an indicator of joint quality. Specifically:
 - a1. The double bead width shall be 2 to 2-1/2 times the height of the bead measured from the pipe surface.
 - a2. Both beads shall be uniform in size and shape around the joint.
 - a3. The depth of the "V" between the two beads shall not be more than half the bead height.
- b. If the "V" groove is too deep a "cold" fusion may have occurred (uneven heating or insufficient heating time, or excessive pressure during heating or during joining). A non-uniform bead shape around the pipe indicates uneven heating.
- c. A joint with cold fusion or a non-uniform bead is a poor quality joint that shall be removed (i.e., cut-out) and remade.
- d. The Earthwork Contractor shall prepare and maintain logs of pipe joints indicating, at a minimum:
 - d1. Locations with corresponding pipe markings.
 - d2. Visual inspection results.
 - d3. For each joint that did not pass visual inspection, the work done to correct the improper fusion weld.

304. INSTALLATION OF GRANULAR AND RIPRAP MATERIALS

304.1 "Granular Materials" in this article include Coarse Aggregate Bedding Material, Sand Filter Layer material, Protective Warning Layer material, and Riprap Bedding Layer material.

304.2 Acceptable Placement Methods:

- a. Acceptable placement methods for Granular Materials include:
 - a1. Using a conveyor truck to place material from outside of the basin.
 - a2. Using a crane to place material from outside of the basin.
 - a3. Transporting material into the basin to the point of dumping using trucks or scrapers.
 - a4. Alternate placement method(s) proposed by the Earthwork Contractor and approved by the Owner.
- b. Requirements for Transportation of Granular and Riprap Materials into Basin:
 - b1. Under no circumstances shall there be direct equipment travel over any geosynthetic material (GCL, geomembrane, geotextile, geonet, etc.).
 - b2. Equipment transporting material into the basin shall use the permanent ramp along the basin's east dike. Structural Fill shall be installed above the existing HDPE geomembrane liner along the ramp surface as detailed on the Design Drawings and as specified in Section 319005 before any equipment uses the ramp to access the basin floor.
 - b3. Only earthmoving equipment with low ground pressure shall be used to transport material inside of the basin. The Earthwork Contractor shall demonstrate that equipment entering the

basin will not exert a ground pressure greater than 8 psi. The ground pressure is influenced by the tread pattern / tire contact area and is not the reading from a tire pressure gauge.

- b4. Equipment operating within the basin shall avoid hard braking on ramps and avoid sharp turns or quick stops that could pinch or tear the geosynthetic materials.
- b5. The Sand Filter Layer, Protective Warning Layer, and Riprap Bedding Layer Materials shall be placed by the "dump and spread" method in which appropriate lightweight equipment with low ground pressure are used to spread the material.
- b6. No travel over piping shall be allowed without sufficient protection of the piping.
- b7. Material placement over geosynthetic materials during periods of warm weather can cause wrinkling in the geosynthetic materials. The wrinkling effect can cause damage to the geosynthetic materials. Placement of Granular Materials shall be halted when the air temperature is greater than 85°F or less than 40°F.
- b8. When Sand Filter Layer, Protective Warning Layer, or Riprap Bedding Layer materials are being placed, a worker shall walk alongside earthmoving equipment spreading the material to spot and remove all rocks, stones, roots, and other debris that may be remaining in the materials that could cause damage to a geosynthetic material.
- b9. Placement of Granular Materials and riprap on the basin's side slopes shall begin at the toe of the slope and proceed up the slope.

304.3 Placement of Coarse Aggregate Bedding Material:

- a. Coarse Aggregate Bedding Material shall be placed under and around the leachate collection and sideslope riser pipes to the thicknesses shown on the Design Drawings.
- b. All piping shall be installed over an initial layer of Coarse Aggregate Bedding Material. After a pipe is installed, Coarse Aggregate Bedding Material shall be placed by hand beneath the haunches and above the pipe and compacted to ensure complete and uniform support of the pipe.

304.4 Placement of Sand Filter Layer Material:

- a. Installation of the Sand Filter Layer shall not begin until Geosynthetics Contractor has finished installing the non-woven geotextile and HDPE geonet components of the LCRS, the CQA Contractor has finished inspecting those geosynthetic components of the LCRS, and the area has been released to the Earthwork Contractor in writing to proceed.
- b. Sand Filter Layer material shall be placed in a single layer to the thickness shown on the Design Drawings without compaction or working of the material that could cause intrusion through the non-woven geotextile into the underlying HDPE geonet.
- c. The Sand Filter Layer shall be fine graded using low ground pressure equipment.

304.5 Placement of Protective Warning Layer Material:

- a. Protective Warning Layer materials shall be placed to the thickness shown on the Design Drawings.
- b. Compaction:
 - b1. Protective Warning Layer materials shall be placed and maintained to a uniform thickness, free of ruts and irregularities.

- b2. The Protective Warning Layer shall be compacted by a minimum of four passes in each direction (perpendicular to each other) by the equipment spreading the material. The upper surface shall then be compacted with a minimum of four passes each way by a vibratory drum roller with a minimum static weight of 13 tons.
- b3. Acceptance of the fill shall be based on ruts less than 1 inch between the last successive passes. Compaction testing is not required.
- c. The Protective Warning Layer shall be fine graded using low ground pressure equipment.

304.6 Placement of Riprap Bedding Layer Material:

- a. Riprap Bedding Layer materials shall be placed to the full thickness shown on the Design Drawings in one operation using methods which will not cause segregation of particle sizes.
- b. Riprap Bedding Layer materials shall not be dropped onto the underlying Sand Filter Layer from a height exceeding 3 feet.
- c. Compaction of the Riprap Bedding Layer is not required; however, the surface shall be reasonably even and free from mounds or windrows.
- d. The Riprap Bedding Layer shall be fine graded using low ground pressure equipment.

304.7 Placement of Riprap:

- a. Riprap shall be placed in general accordance with the methods described in ASTM D6825 in designated areas to the lines, grades, and thickness specified on the Design Drawings. Riprap shall be placed to the full thickness in one operation.
- b. Riprap placement operations – including handling, stockpiling, and transporting – shall be accomplished in such a manner as to produce a reasonably well graded mass of rock with minimum percentage of voids, free from objectionable pockets of small stone and clusters of large stones. The larger stones shall be well distributed and the entire mass of stones in their final positions shall be roughly graded to conform to the gradation specified.
- c. Riprap shall be placed by dragline, clamshell, appropriately-sized excavators, or similar equipment, which shall be operated so as to place each load of material in approximately its final position without reworking and without excessive height drop (i.e., more than 12 inches).
- d. Placing riprap in layers is not permitted.
- e. Placing stones by dumping into chutes or other methods, which cause segregation of various stone sizes, is not permitted.

304.8 Grading Tolerances:

- a. Horizontal and vertical tolerances for the Sand Filter Layer and Protective Warning Layer shall be as specified in Table 319050-2.
- b. Thickness determination of riprap and Riprap Bedding Layer materials will be made at points selected by the CQA Contractor. When the average constructed thickness is less than the thickness specified on the Design Drawings, additional material shall be added to obtain the specified thickness at no additional cost to the Owner.



304.9 Reporting Damage:

- a. If damage occurs (or is suspected to have occurred) to any portion of the LCRS, composite liner system, or existing HDPE geomembrane liner under the composite liner system while placing Granular Materials, the Earthwork Contractor shall report the damage(s) to the Owner immediately so that repairs can be performed without delay.
- b. Repairs to a geosynthetic material shall be made as specified in the Section 319020. The Geosynthetics Contractor shall perform all geosynthetic repair work at no additional cost to the Owner.
- c. Repairs to components of the LCRS shall be repaired as specified herein. The Earthwork Contractor shall perform all LCRS repair work at no additional cost to the Owner.

TABLE 319050-2
ACCEPTABLE DEVIATIONS FROM DESIGN LINES AND GRADES

Type of Installation (Excavation or Fill)	Maximum Acceptable Deviation from Line (feet)	Maximum Acceptable Deviation from Grade ⁽¹⁾ (feet)
Granular Materials		
Top of Sand Filter Layer	±0.3	+0.1 to -0.0
Top of Protective Warning Layer		
Top of Riprap Bedding Layer		

END OF SECTION 319050

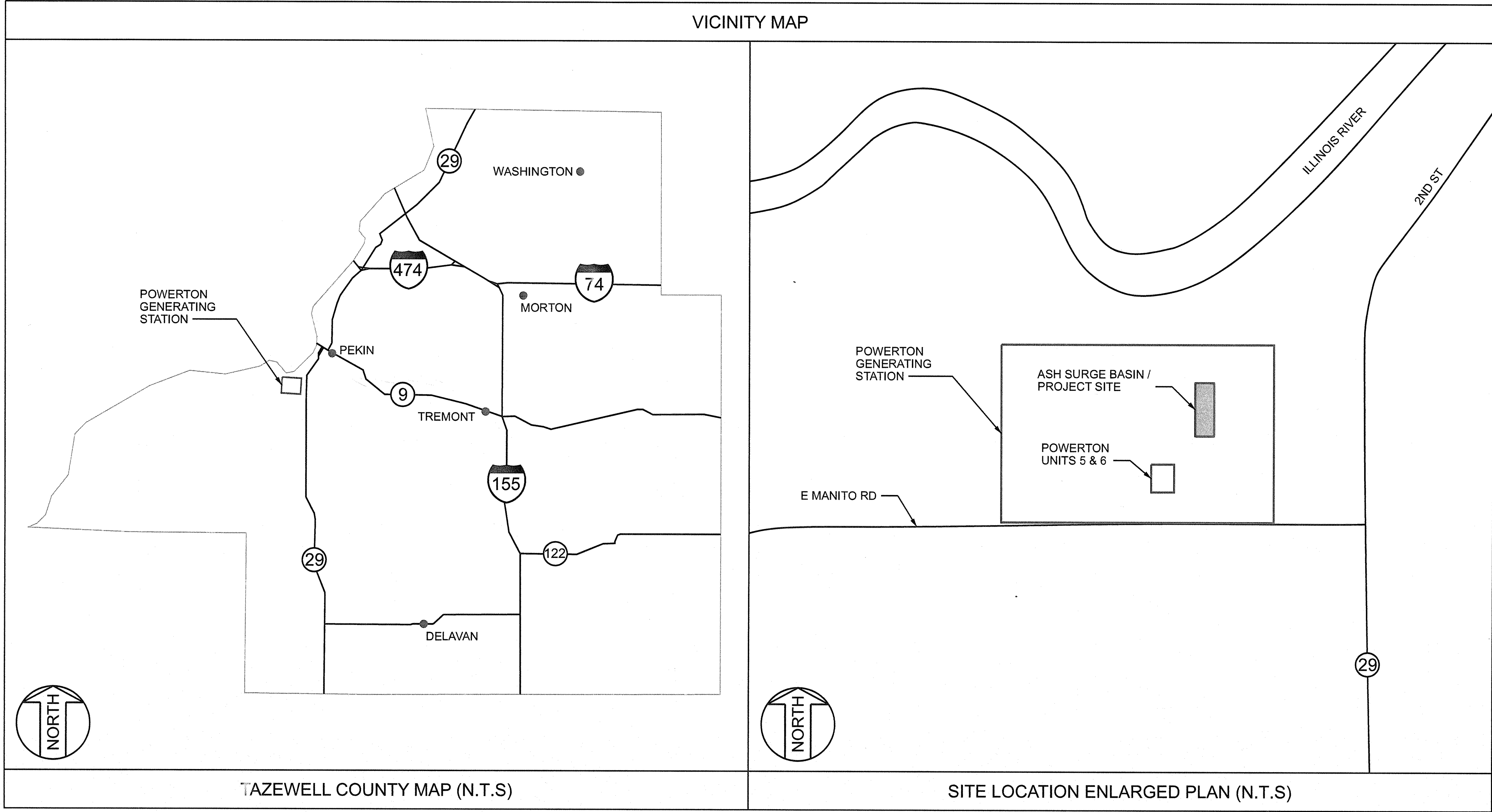


ATTACHMENT 1

DESIGN DRAWINGS

DRAWING NO.	REV.	TITLE
POW-ASB-CSK-001	0C	COVER SHEET
POW-ASB-CSK-002	0C	GENERAL NOTES
POW-ASB-CSK-003	0C	EXISTING CONDITIONS
POW-ASB-CSK-004	0C	EXCAVATION PLAN
POW-ASB-CSK-005	0C	EXCAVATION SECTIONS & DETAILS
POW-ASB-CSK-006	0C	STRUCTURAL FILL GRADING PLAN
POW-ASB-CSK-007	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM PLAN
POW-ASB-CSK-008	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS – SHEET 1
POW-ASB-CSK-009	0C	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS – SHEET 2

MIDWEST GENERATION, LLC
POWERTON GENERATING STATION
ASH SURGE BASIN RETROFIT PROJECT



PREPARED FOR:
MIDWEST GENERATION, LLC
POWERTON GENERATING STATION
13082 E. MANITO RD.
PEKIN, IL 61554

PREPARED BY:
SARGENT & LUNDY
55 E. MONROE ST.
CHICAGO, IL 60603

HOLD INFORMATION	
NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0A	03-21-2023	FOR CLIENT COMMENT
0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT

ISSUE PURPOSE: PERMIT
SPECIFICATION: P-1802
PROJECT NO.: 12661-152

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.

Thomas J. Dehlin
THOMAS DEHLIN
07-26-2023
MY LICENSE RENEWAL DATE IS: 11-30-2023
PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.



CAD FILE NAME: POW-ASB-CSK-001.DGN
PREPARED BY: M. KARNIA / J. CHAVEZ
REVIEWED BY: T. DEHLIN
APPROVED BY: T. DEHLIN
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.



PROJECT	
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT	
DRAWING TITLE	
COVER SHEET	
DRAWING NUMBER	REVISION
POW-ASB-CSK-001	0C
SHEET 1 OF 1	1

POWERTON ASH SURGE BASIN RETROFIT PROJECT DRAWING LIST	
DWG NO.	DRAWING TITLE
POW-ASB-CSK-001	COVER SHEET
POW-ASB-CSK-002	GENERAL NOTES
POW-ASB-CSK-003	EXISTING CONDITIONS
POW-ASB-CSK-004	EXCAVATION PLAN
POW-ASB-CSK-005	EXCAVATION SECTIONS & DETAILS
POW-ASB-CSK-006	STRUCTURAL FILL GRADING PLAN
POW-ASB-CSK-007	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM PLAN
POW-ASB-CSK-008	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 1
POW-ASB-CSK-009	COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 2

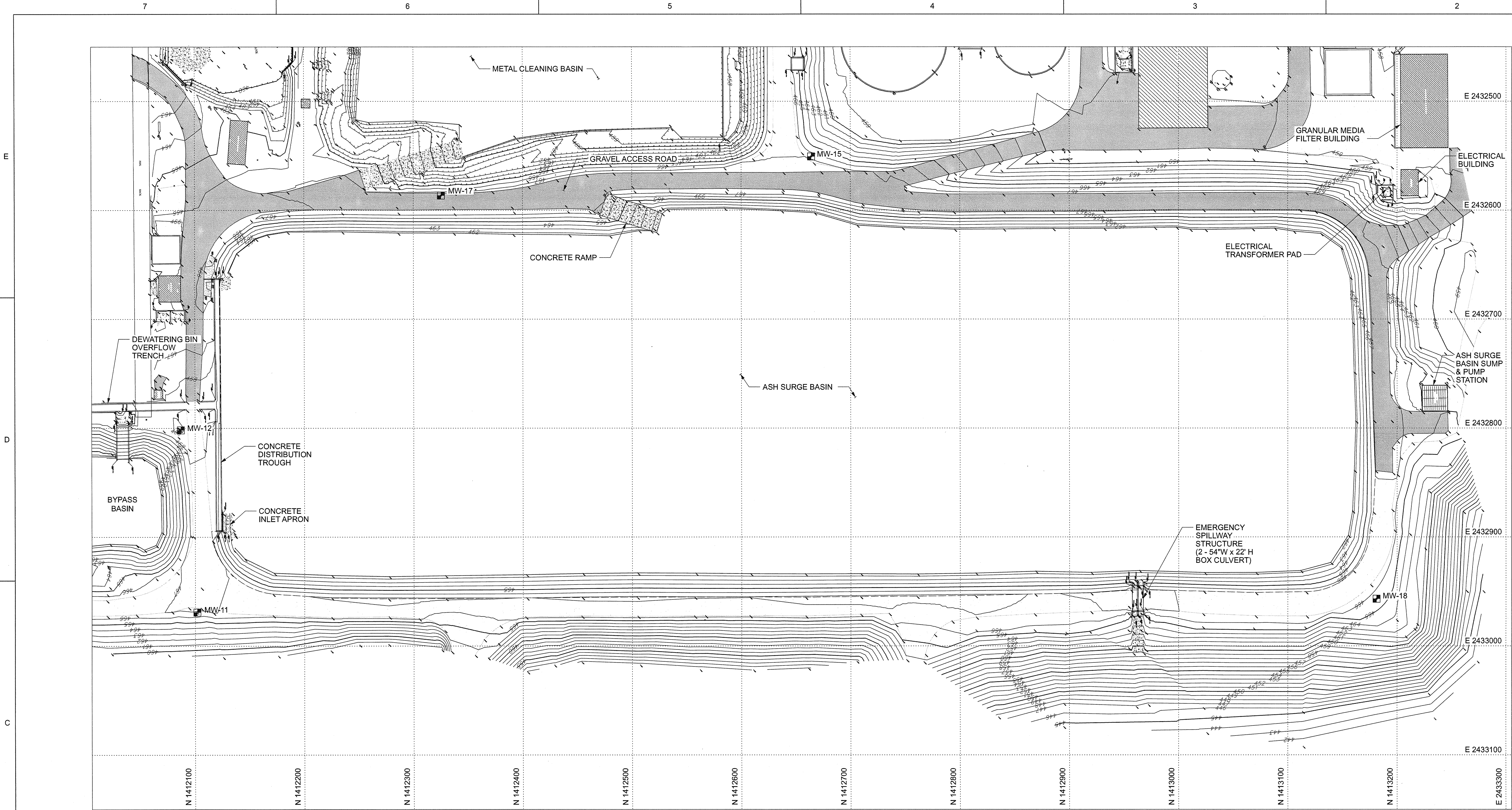
FOR PERMIT
NOT FOR CONSTRUCTION

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED. REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK. THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

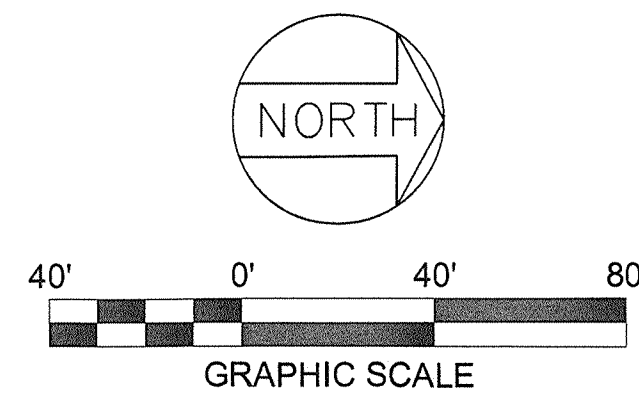
PL1403030\5344\Y:\Shared\INFO CENTER\DISCIPLINE REF MATERIAL\LOWVDESIGN\2-Powerton - CCR\Ash Surge Basin Closure Drawings\POW-ASB-CSK-002.dgn
Form c:\c-cad\c01\106 ANSI (Imperial) Microstation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010

7		6		5		4		3		2		1							
GENERAL NOTES				ABBREVIATIONS				SYMBOLS				SYMBOLS & ABBREVIATIONS				HOLD INFORMATION			
1. ALL WORK SHALL BE PERFORMED BY A GENERAL WORK (GW) CONTRACTOR ACCORDING TO THE REQUIREMENTS OF SPECIFICATION P-1802 UNLESS OTHERWISE NOTED ON THE DESIGN DRAWINGS.				ROAD AND GRADING				CENTERLINE OF NATURAL DRAINAGE PATTERN VALLEY LINE OR "V" DITCH SWALE CENTERLINE OF TRAPEZOIDAL DRAINAGE TRAPEZOIDAL DRAINAGE DITCH WITH BOTTOM WIDTH GREATER THAN 2'. BOTTOM WIDTH AND SIDE SLOPE SHOWN ON PLAN OR DETAIL RIPRAP EROSION PROTECTION PIPE CULVERT CULVERT NUMBER SHOWN TOP OF EMBANKMENT SLOPE OR DITCH SIDE SLOPE AND DIRECTION OF SLOPE HORIZONTAL TO VERTICAL SLOPE WHEN SLOPE IS CONSTANT SLOPE IS NOT CONSTANT DIRECTION OF ROAD OR AREA SLOPE. PERCENT OF SLOPE SHOWN WHERE APPLICABLE TOP OF DIKE RADIUS OF CURVATURE SECTION NUMBER (FIRST NUMBER=DRAWING SECOND NUMBER=SECTION NUMBER) CHAIN LINK FENCE WATER LINE BURIED GAS LINE BURIED ELECTRICAL CABLE INDEX CONTOUR INTERMEDIATE CONTOUR ELEVATION CONTOUR EXISTING DEPRESSION SPOT ELEVATION VERTICAL CONTROL POINT HORIZONTAL CONTROL POINT EXISTING FIRE HYDRANT EXISTING UTILITY POLE EXISTING UTILITY POLE WITH GUY WOOD OR BRUSH OUTLINE GRATING SINGLE SIGN ON POST DOUBLE SIGN ON POST GUARD POST				EROSION CONTROL SYMBOLS SILT FENCE INLET PROTECTION ROCK CHECK SEWERS AND UNDERGROUND PIPE CATCH BASIN CLEANOUT MANHOLE RIM ELEVATION CENTERLINE SLOPE BOTTOM OF PIPE POLY VINYL CHLORIDE PIPE HIGH DENSITY POLYETHYLENE PIPE REINFORCED CONCRETE PIPE CORRUGATED METAL PIPE CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CAST IRON SOIL PIPE DUCTILE IRON WATER PIPE CARBON STEEL PIPE IN PLACE STORM WATER SEWER OILY WATER SEWER SANITARY SEWER PROCESS WASTE SEWER CARBON STEEL ROAD, PAVEMENT AND SURFACING SYMBOLS ASPHALT OR CONCRETE PAVED ROAD. OUTER LINES SHOW OVERALL WIDTH. INTERIOR LINES SHOW EDGES OF PAVEMENT. ROCK SURFACED ROAD ISOLATION JOINT THICKENED EDGE ISOLATION JOINT THICKENED EDGE EXPANSION JOINT PAVEMENT THICKENED EDGE CONTRACTION JOINT CONCRETE PAVING CRUSHED ROCK SURFACING ASPHALT PAVEMENT 6" THICK CRUSHED STONE GROUND COVER SURFACING 4" THICK SEEDDED TOPSOIL				NO. DESCRIPTION			
2. THE GW CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND HAVE CONTROL AND CHARGE OF CONSTRUCTION MEANS, METHODS, TECHNIQUES, WORK SEQUENCING, AND PROCEDURES IN CONNECTION WITH THE WORK. THE GW CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, COMPOSED OF THE DESIGN DRAWINGS AND SPECIFICATIONS.				EL OR ELEV INV HP LP HPFS BC EC PI PT PC STA VC BVC EVC PVC PRC PCC R T L D I UN ROW OHL OC WL HWL YR DS US CL AC N.T.S. LWL				CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.				RELEASE INFORMATION							
												REV. DATE DESCRIPTION							
3. ALL WORK DONE BY GW CONTRACTOR PURSUANT TO THESE DRAWINGS SHALL: (A) CONFORM TO THE GOVERNING CONTRACT DOCUMENTS; (B) BE PERFORMED EXCLUSIVELY BY ITS TRAINED, COMPETENT PERSONNEL OR, WHERE PERMITTED, THAT OF ITS SUBCONTRACTOR(S); AND (C) COMPLY WITH ALL APPLICABLE SAFETY LAWS, REGULATIONS, PROGRAMS AND PRACTICES TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING THE GW CONTRACTOR'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.				3:1				SLOPE VARIES				0A 03-21-2023 FOR CLIENT COMMENT							
												0B 03-24-2023 FOR PUBLIC COMMENT							
4. THE GW CONTRACTOR SHALL PERFORM INSTALLATION AND REMOVAL WORK IN A NEAT AND SKILLFUL MANNER, CAREFULLY TERMINATING WORK NEAR MATERIAL TO REMAIN IN PLACE. PRECAUTIONS SHALL BE TAKEN NOT TO DAMAGE OR DEFACE WORK, EXISTING FACILITIES, AND/OR MATERIAL TO REMAIN IN PLACE. THE GW CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SUCH DAMAGE OR REPAIR THEREOF.				1%				SYMBOLS & ABBREVIATIONS				0C 07-26-2023 FOR PERMIT							
5. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF FEDERAL, STATE, OR LOCAL CODES, STANDARDS, AND SPECIFICATIONS.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
6. ANY WORK FOUND DEFECTIVE OR NOT IN COMPLIANCE WITH THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS OR THE DESIGN DRAWINGS SHALL BE REPLACED/FIXED AT NO ADDITIONAL COST TO THE OWNER.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
7. <u>COMPACTION:</u> SEE SPECIFICATION P-1802 FOR COMPACTION AND EARTHWORK REQUIREMENTS.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
8. <u>SOIL EROSION AND SEDIMENTATION CONTROL:</u> PROPER SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED TO MEET THE APPLICABLE REGULATORY CODES AND THE PERMIT REQUIREMENTS.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
9. <u>CONSTRUCTION QUALITY ASSURANCE:</u> A. MATERIALS AND CONSTRUCTION PROCEDURES WILL BE SUBJECT TO INSPECTION AND TESTING BY A CONSTRUCTION QUALITY ASSURANCE (CQA) CONTRACTOR EMPLOYED BY THE OWNER. SUCH INSPECTIONS AND TESTS WILL NOT RELIEVE THE GW CONTRACTOR OF THE RESPONSIBILITY FOR PROVIDING MATERIALS AND INSTALLATION IN COMPLIANCE WITH SPECIFIED REQUIREMENTS. B. THE OWNER RESERVES THE RIGHT, AT ANY TIME BEFORE FINAL ACCEPTANCE, TO REJECT MATERIALS OR WORKMANSHIP NOT COMPLYING WITH SPECIFIED REQUIREMENTS. THE GW CONTRACTOR SHALL CORRECT THE DEFICIENCIES WHICH THE INSPECTIONS AND TESTS HAVE INDICATED ARE NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS. C. CQA ACTIVITIES WILL BE PERFORMED AS DESCRIBED ON THE DESIGN DRAWINGS AND IN SPECIFICATION P-1803.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
10. <u>TOPOGRAPHIC MAP & COORDINATES:</u> A. EXISTING TOPOGRAPHY FOR THE PROJECT SITE SHOWN ON THE DESIGN DRAWINGS WAS PREPARED IN 2022 BY RUETTIGER, TONELLI & ASSOCIATES, INC. B. THE PLANT COORDINATE SYSTEM SHOWN ON THE DESIGN DRAWINGS IS BASED ON THE ILLINOIS STATE PLANE, WEST ZONE, NORTH AMERICAN DATUM OF 1983 (2011) (NAD 83/2011), U.S. SURVEY FEET.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
11. <u>HORIZONTAL AND VERTICAL CONTROL:</u> A. THE BASIS FOR HORIZONTAL CONTROL IS AS DESCRIBED IN NOTE 10. B. THE BASIS FOR VERTICAL CONTROL IS THE LOCAL PLANT DATUM. C. THE FOLLOWING PERMANENT BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL HAVE BEEN ESTABLISHED AT THE PROJECT SITE. THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY DISCREPANCIES IN EXISTING BENCHMARK LOCATIONS AND/OR ELEVATIONS. ID.# NORTHING EASTING ELEVATION 528 1,412,067.47 2,432,531.82 465.02 1193 1,412,960.21 2,432,343.81 459.51 D. GW CONTRACTOR IS RESPONSIBLE FOR SETTING ADDITIONAL MONUMENTS AND CONTROL POINTS THAT THEY DEEM NECESSARY FOR COMPLETION OF THE WORK.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
12. <u>GEOTECHNICAL WORK:</u> A STRUCTURAL STABILITY AND FACTOR OF SAFETY ASSESSMENT FOR THE ASH SURGE AND BYPASS BASINS WAS PREPARED BY GEOSYNTEC CONSULTANTS IN OCTOBER 2016. SITE SPECIFIC SOIL DATA AND GEOTECHNICAL RECOMMENDATIONS ARE PROVIDED AND REFERENCED THEREIN.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
13. <u>EXISTING CONDITIONS:</u> A. DIMENSIONS OF EXISTING WORK SHALL BE VERIFIED BY THE GW CONTRACTOR PRIOR TO THE START OF WORK IN ACCORDANCE WITH THE SPECIFICATION AS FIELD CONDITIONS MAY VARY FROM INFORMATION SHOWN ON THE DESIGN DRAWINGS. DIMENSIONS NOTED FOR REFERENCE (REF) INDICATE NOMINAL DIMENSIONS FOR THE EXISTING STRUCTURE, UTILITY, ETC. NEW WORK SHALL NOT BE LOCATED BASED ON THE REFERENCE DIMENSIONS. B. PRIOR TO COMMENCING THE WORK, THE GW CONTRACTOR SHALL EXAMINE THE AREAS AND CONDITIONS UNDER WHICH THE RETROFIT WORK IS TO TAKE PLACE, AND NOTIFY THE OWNER IN WRITING OF CONDITIONS WHICH MAY IMPACT THE PROPER AND TIMELY COMPLETION OF THE WORK. C. UNDERGROUND OR EMBEDDED UTILITIES MAY EXIST WITHIN THE AREA OF AND ADJACENT TO THE LIMITS OF THE WORK. THE LOCATION OR IDENTIFICATION OF SUCH UTILITIES HAS NOT BEEN VERIFIED BY THE OWNER OR BY S&L. GW CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND IDENTIFYING UNDERGROUND OR EMBEDDED UTILITIES AND ANY OTHER UNDERGROUND OR EMBEDDED UTILITY DIMENSIONS. D. REFERENCES USED HAVE BEEN IDENTIFIED ON EXCAVATION/FOUNDATION/DEMOLITION DRAWINGS AND HAVE BEEN PROVIDED TO ASSIST THE GW CONTRACTOR IN THE FIELD LOCATING EXISTING UTILITIES AND OTHER POTENTIAL UNDERGROUND OR EMBEDDED INTERFERENCES. THESE REFERENCES ONLY SHOW THE APPROXIMATE LOCATION OF POTENTIAL UNDERGROUND OR EMBEDDED UTILITIES AND MAY NOT INDICATE OR REFLECT ALL EXISTING UNDERGROUND OR EMBEDDED UTILITIES OR THEIR ACTUAL LOCATIONS. E. REFERENCES IDENTIFIED SHALL NOT SUBSTITUTE FOR THE GW CONTRACTOR'S OBLIGATION TO FIELD LOCATE ANY UNDERGROUND OR EMBEDDED UTILITIES OR INTERFERENCES THAT MAY AFFECT THE WORK. F. DUE CAUTION SHALL BE TAKEN DURING ANY EXCAVATION/FOUNDATION/DEMOLITION WORK WITHIN THE AREA OF, AND ADJACENT TO THE LIMITS OF THE WORK DUE TO POSSIBLE INTERFERENCES THAT MAY NOT BE REFLECTED ON THE REFERENCES IDENTIFIED. G. THE GW CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION AND RESTORATION OF THE EXISTING UTILITIES IF DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.				SLOPE VARIES				SYMBOLS & ABBREVIATIONS											
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Form GDC-001-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



NOTES	REFERENCE DRAWINGS	LEGEND
1. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION P-1802 UNLESS NOTED OTHERWISE. 2. FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-ASB-CSK-002. 3. GW CONTRACTOR SHALL TAKE ADEQUATE PRECAUTIONS TO PROTECT AND AVOID DAMAGE TO THE EXISTING MONITORING WELLS. GW CONTRACTOR SHALL REPAIR ANY DAMAGE TO THE EXISTING MONITORING WELLS CAUSED BY ITS OPERATIONS AT NO ADDITIONAL COST TO THE OWNER.		MW-17 MONITORING WELL



FOR PERMIT
NOT FOR CONSTRUCTION

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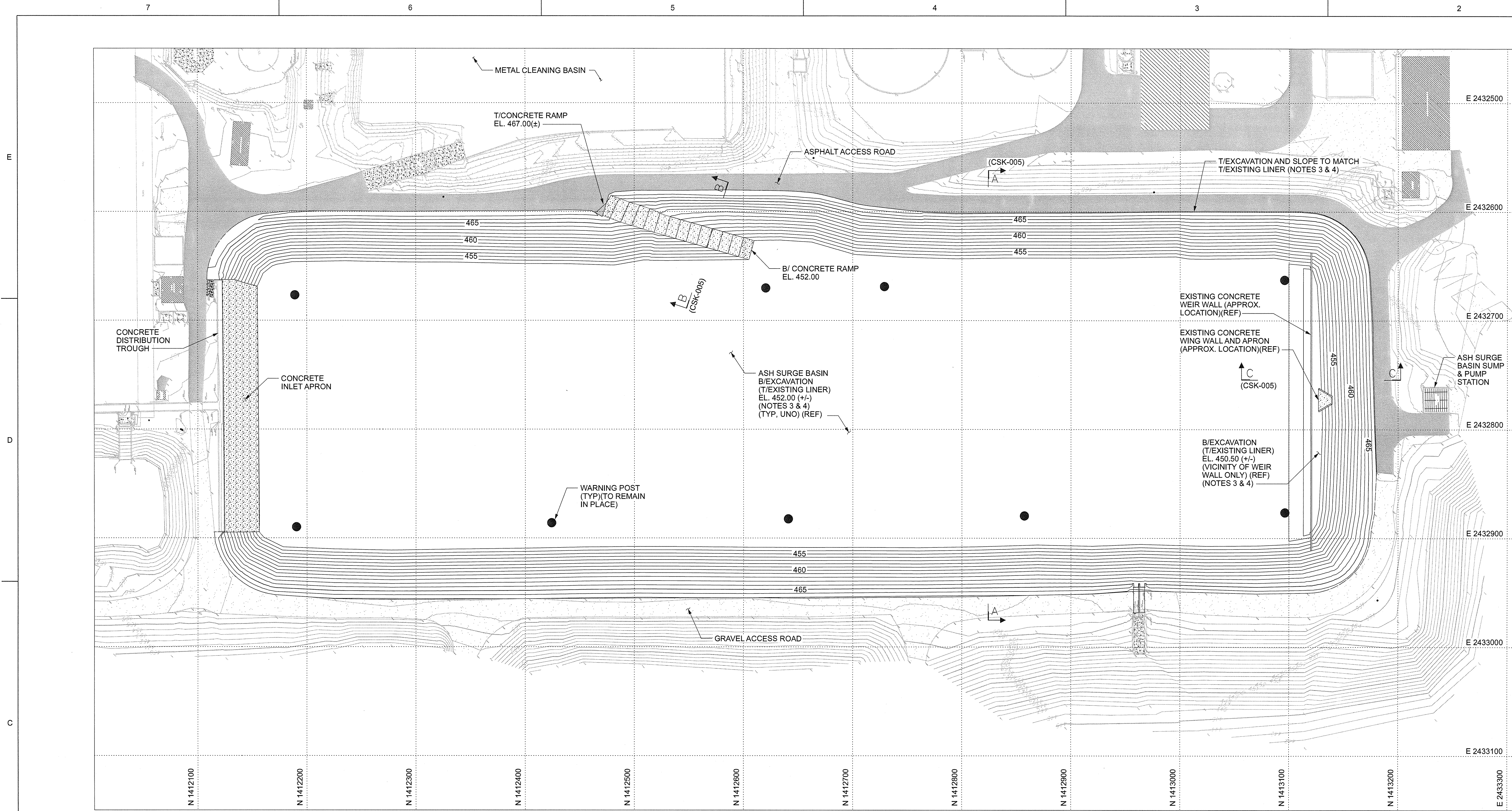
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RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
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0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: P-1802		
PROJECT NO.: 12661-152		
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.		
THOMAS DEHLIN 07-26-2023 PROFESSIONAL ENGINEER THOMAS J. DEHLIN 062-069314 OF ILLINOIS		
MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.		
CAD FILE NAME: POW-ASB-CSK-003.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
Sargent & Lundy^{LLC} SARGENT & LUNDY^{LLC} 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
EXISTING CONDITIONS		
DRAWING NUMBER		REVISION
POW-ASB-CSK-003		0C
SHEET	1 OF 1	

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PL:40030\53447\Share\Info\CENTER\DISCIPLINE REF MATERIAL\CIVIL\DESIGN\2-Powerton - CCR\Ash Surge Basin Closure Drawings\POW-ASB-CSK-004.dgn
Form: GDC-0001-01-08, ANSI (Imperial) MicroStation Border - Size: E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



NOTES

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- FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-ASB-CSK-002.
- MATERIAL REMOVAL / EXCAVATION:
 - ALL MATERIAL ABOVE THE EXISTING GEOMEMBRANE LINER SHALL BE REMOVED. BOTTOM-OF-EXCAVATION (I.E. TOP-OF-EXISTING LINER SURFACE) SHOWN ON THIS DRAWING IS APPROXIMATE.
 - DURING REMOVAL OF MATERIAL FROM THE ASH SURGE BASIN, GW CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO AVOID DAMAGING THE BASIN'S EXISTING GEOMEMBRANE LINER. GW CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY BALLASTING AS NECESSARY TO PREVENT UPLIFT OF THE GEOMEMBRANE BY WIND BY THE USE OF SANDBAGS AND/OR OTHER MEANS WHICH WILL NOT DAMAGE THE GEOMEMBRANE. FOR ALL AREAS OF EXISTING LINER THAT ARE DAMAGED, THE GW CONTRACTOR SHALL:
 - TAKE APPROPRIATE MEASURES TO PREVENT ANY FLUID OR SOLID MATERIALS FROM ENTERING THE SUBGRADE BELOW THE LINER.
 - NOTIFY THE OWNER IMMEDIATELY.
 - INSPECT THE EXPOSED SOILS BELOW THE LINER TO DETERMINE WHETHER ANY FLUIDS, CCR CONSTITUENTS, OR CCR-MIXED SOILS HAVE BEEN RELEASED INTO THE BASIN SUBGRADE. IF SUCH MATERIAL HAS BEEN RELEASED INTO THE BASIN SUBGRADE, THE GW CONTRACTOR SHALL REMOVE THE IMPACTED SOILS UNTIL THE AFFECTED AREA HAS BEEN DECONTAMINATED. CONTAMINATED SOILS REMOVED FROM THE BASIN SUBGRADE SHALL BE REPLACED WITH STRUCTURAL FILL IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
 - REPAIR THE DAMAGED GEOMEMBRANE LINER AREA IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
- MATERIAL REMOVAL FROM THE ASH SURGE BASIN AREA SHALL BE DISPOSED OF AS FOLLOWS:
 - ALL DRY WASTE SHALL BE DISPOSED OF IN AN OFF-SITE DISPOSAL FACILITY PERMITTED TO RECEIVE CCR WASTE. ALL OFF SITE TRANSPORTATION OF MATERIAL REMOVED FROM THE BYPASS BASIN SHALL BE PERFORMED IN ACCORDANCE WITH 35 ILL. ADM. CODE 845.740(C)(1).
 - ALL LIQUID WASTE SHALL BE DISPOSED OF IN THE BYPASS BASIN.
- GW CONTRACTOR SHALL DEVELOP AND IMPLEMENT FUGITIVE DUST CONTROLS DURING MATERIAL REMOVAL FROM THE BYPASS BASIN AREA IN ACCORDANCE WITH 35 ILL. ADM. CODE 845.740(C)(2).
- GW CONTRACTOR SHALL DEVELOP AND IMPLEMENT MEASURES TO PREVENT CONTAMINATION OF SURFACE WATER, GROUNDWATER, SOIL, AND SEDIMENTS DURING MATERIAL REMOVAL FROM THE ASH SURGE BASIN AREA IN ACCORDANCE WITH 35 ILL. ADM. CODE 845.740(C)(4).
- AT THE END OF EACH MONTH DURING WHICH MATERIAL REMOVAL FROM THE ASH SURGE BASIN AREA, GW CONTRACTOR SHALL PREPARE A REPORT DOCUMENTING THE GW CONTRACTOR'S PROGRESS IN REMOVING CCR AND CCR-MIXED SOILS FROM THE AREA. THE MONTHLY REPORT SHALL BE PREPARED IN ACCORDANCE WITH THE RECORDKEEPING REQUIREMENTS STIPULATED IN 35 ILL. ADM. CODE 845.740(D).

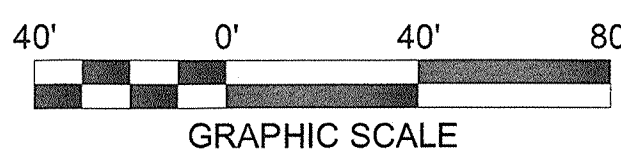
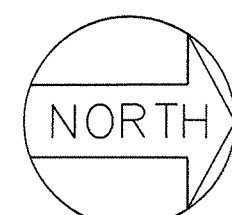
4. LINER & CONCRETE DECONTAMINATION:

- AFTER REMOVAL OF MATERIAL ABOVE THE EXISTING GEOMEMBRANE LINER AND REPAIR OF ANY DAMAGED AREAS, THE GW CONTRACTOR SHALL DECONTAMINATE THE LINER AND POND APPURTENANT STRUCTURES. AT A MINIMUM, THE EXPOSED GEOMEMBRANE SHALL BE PRESSURE WASHED IN A SYSTEMATIC MANNER TO REMOVE ALL CCR AND RESIDUALS OF CCR. WASH AND RINSE WATER SHALL BE COLLECTED AND DISPOSED OF IN THE BYPASS BASIN OR AS OTHERWISE DIRECTED BY THE OWNER.
- AS AN AREA WITHIN THE ASH SURGE BASIN IS DECONTAMINATED, THE GW CONTRACTOR AND CQA CONTRACTOR (P-1803) SHALL VISUALLY INSPECT THE SUBJECT AREA WITH THE OWNER'S REPRESENTATIVE(S) TO ENSURE THE AREA IS NO LONGER CONTAMINATED WITH CCR CONSTITUENTS AND REMAINS COMPETENT FOR RE-USE (I.E., NO REPAIRS ARE REQUIRED).
- UPON COMPLETION OF DECONTAMINATION ACTIVITIES FOR A GIVEN AREA OF EXISTING GEOMEMBRANE LINER BY THE GW CONTRACTOR, THE CQA CONTRACTOR (P-1803) SHALL:
 - PERFORM AN ELECTRICAL LEAK LOCATION SURVEY OVER THE DECONTAMINATED LINER AREA IN ACCORDANCE WITH ASTM D7953. IF THE SURVEY LOCATES A BREACH (HOLE, PUNCTURE, TEAR, DEFECT, ETC.) IN THE GEOMEMBRANE, THE CQA CONTRACTOR SHALL NOTIFY THE OWNER AND GW CONTRACTOR IMMEDIATELY, AND THE GW CONTRACTOR SHALL ADDRESS THE BREACH IN ACCORDANCE WITH NOTE 3.B.
 - CUT-OUT AND REMOVE A MINIMUM OF ONE SAMPLE PER ACRE OF THE DECONTAMINATED GEOMEMBRANE LINER. THE GW CONTRACTOR SHALL REPAIR THE GEOMEMBRANE LINER AT ALL SAMPLE LOCATIONS IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
 - ALL SAMPLES SHALL BE ANALYZED BY A CERTIFIED LABORATORY IN ACCORDANCE WITH EPA SW-846 TEST METHOD 1311: TOXICITY CHARACTERISTIC LEACHING PROCEDURE. IF THE CONCENTRATIONS OF CCR CONSTITUENTS MEASURED BY THIS TEST METHOD MEET THE GROUNDWATER PROTECTION STANDARDS SPECIFIED IN THE OPERATING PERMIT ISSUED BY THE ILLINOIS EPA FOR THE ASH SURGE BASIN, THEN THE AREA OF EXISTING GEOMEMBRANE LINER REPRESENTED BY THAT SAMPLE IS CONSIDERED TO BE DECONTAMINATED. OTHERWISE, THAT AREA OF EXISTING GEOMEMBRANE LINER IS NOT CONSIDERED TO BE DECONTAMINATED.

- GW CONTRACTOR SHALL RECLEAN ANY AREAS THAT ANALYTICAL TESTING INDICATES ARE NOT DECONTAMINATED (I.E., ANALYTICAL TESTING OF A COLLECTED SAMPLE DETECTS AT LEAST ONE CCR CONSTITUENT EXCEEDS THE CONSTITUENT'S GROUNDWATER PROTECTION STANDARD LISTED IN THE OPERATING PERMIT ISSUED BY THE ILLINOIS EPA FOR THE ASH SURGE BASIN). AFTER RECLEANING A GIVEN AREA, THE CQA CONTRACTOR (P-1803) SHALL COLLECT AND TEST ONE ADDITIONAL SAMPLE FROM THE AREA PER NOTE 4.C.
- LINER DECONTAMINATION IS CONSIDERED COMPLETE WHEN ALL COLLECTED LINER SAMPLES MEET THE DECONTAMINATION CRITERIA IN NOTE 4.C.III.

REFERENCE DRAWINGS

CSK-005
D21132C020-03
EXCAVATION SECTIONS & DETAILS
ASH SURGE BASIN LINER REPLACEMENT
LINER SUBGRADE PREPARATION



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NOT FOR CONSTRUCTION

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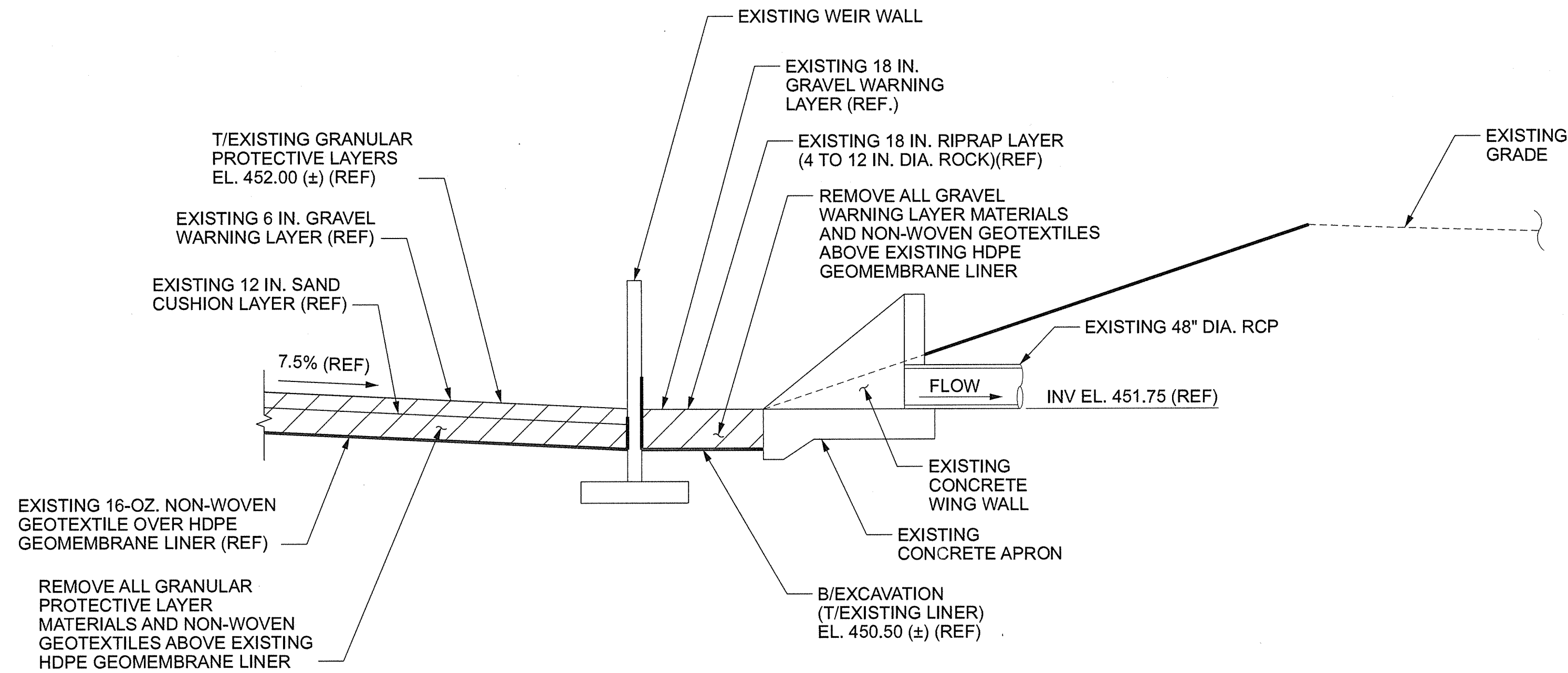
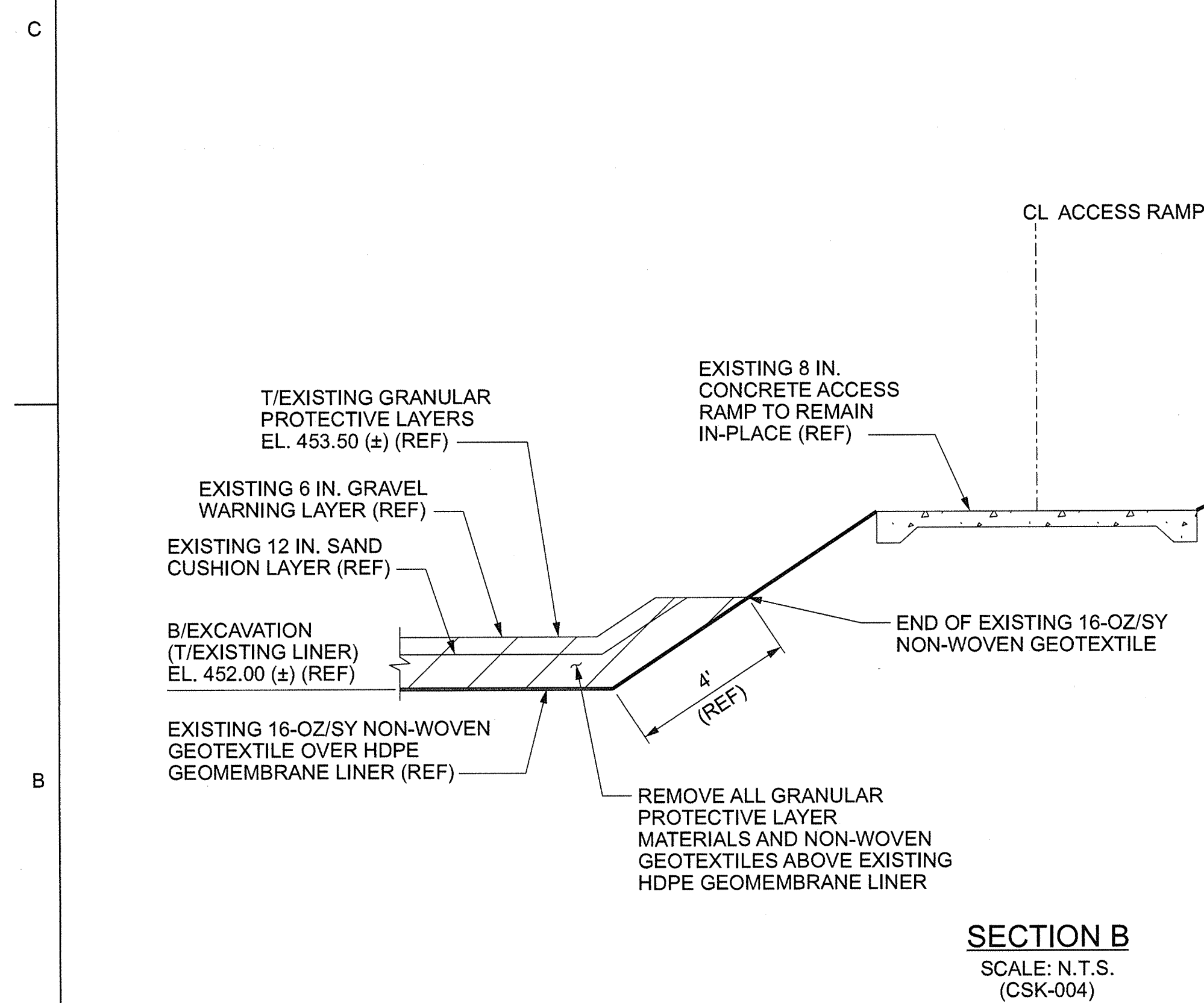
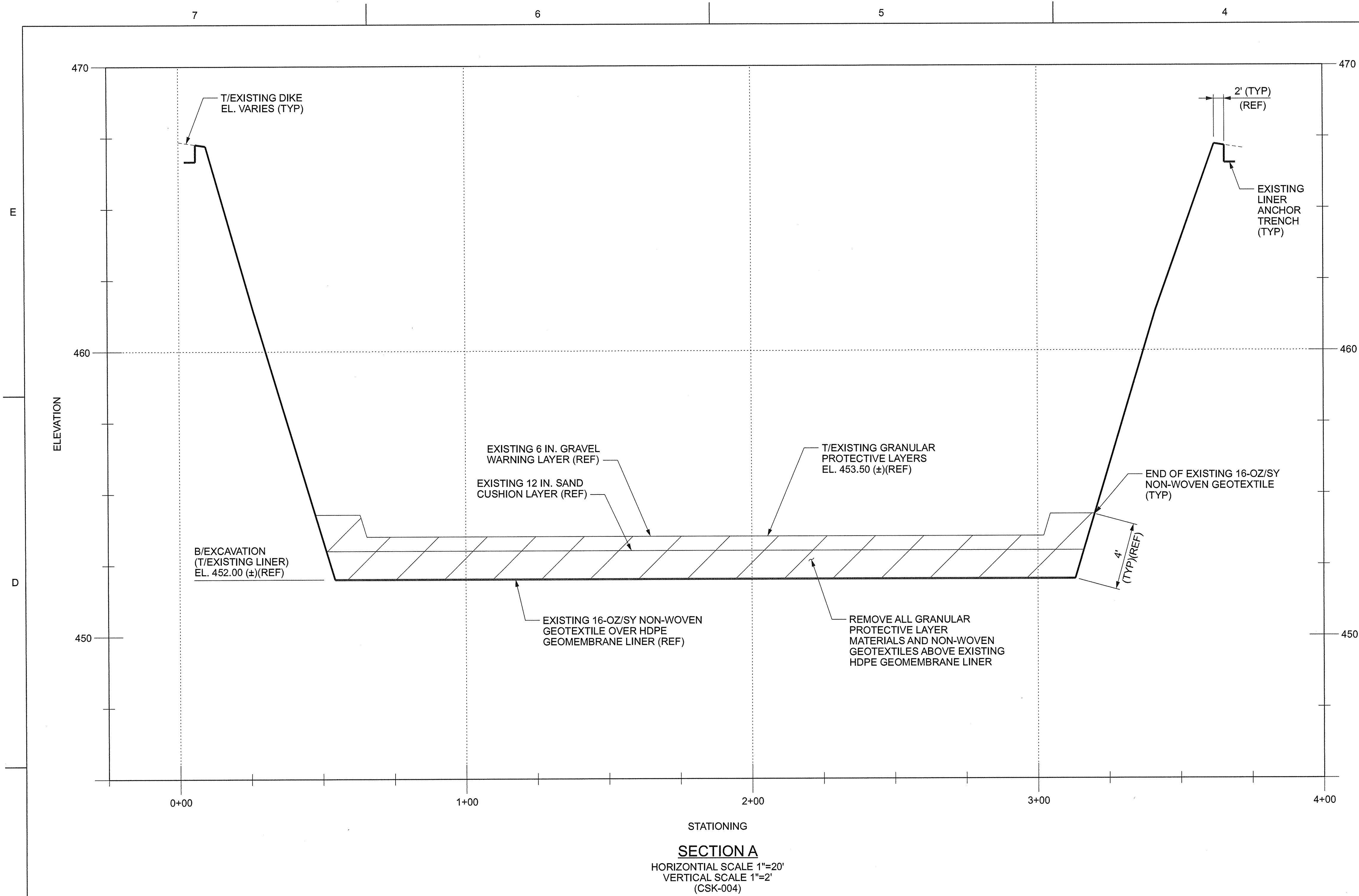
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RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
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0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: P-1802		
PROJECT NO.: 12661-152		
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.		
THOMAS DEHLIN 07-26-2023 THOMAS J. DEHLIN 062-068514 OF ILLINOIS		
MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.		
CAD FILE NAME: POW-ASB-CSK-004.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
Sargent & Lundy LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
EXCAVATION PLAN		
DRAWING NUMBER		REVISION
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Form:GDG-0101-01-06, ANSI (Imperial) MicroStation Border - Size: E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



SECTION C
SCALE: N.T.S.
(CSK-004)

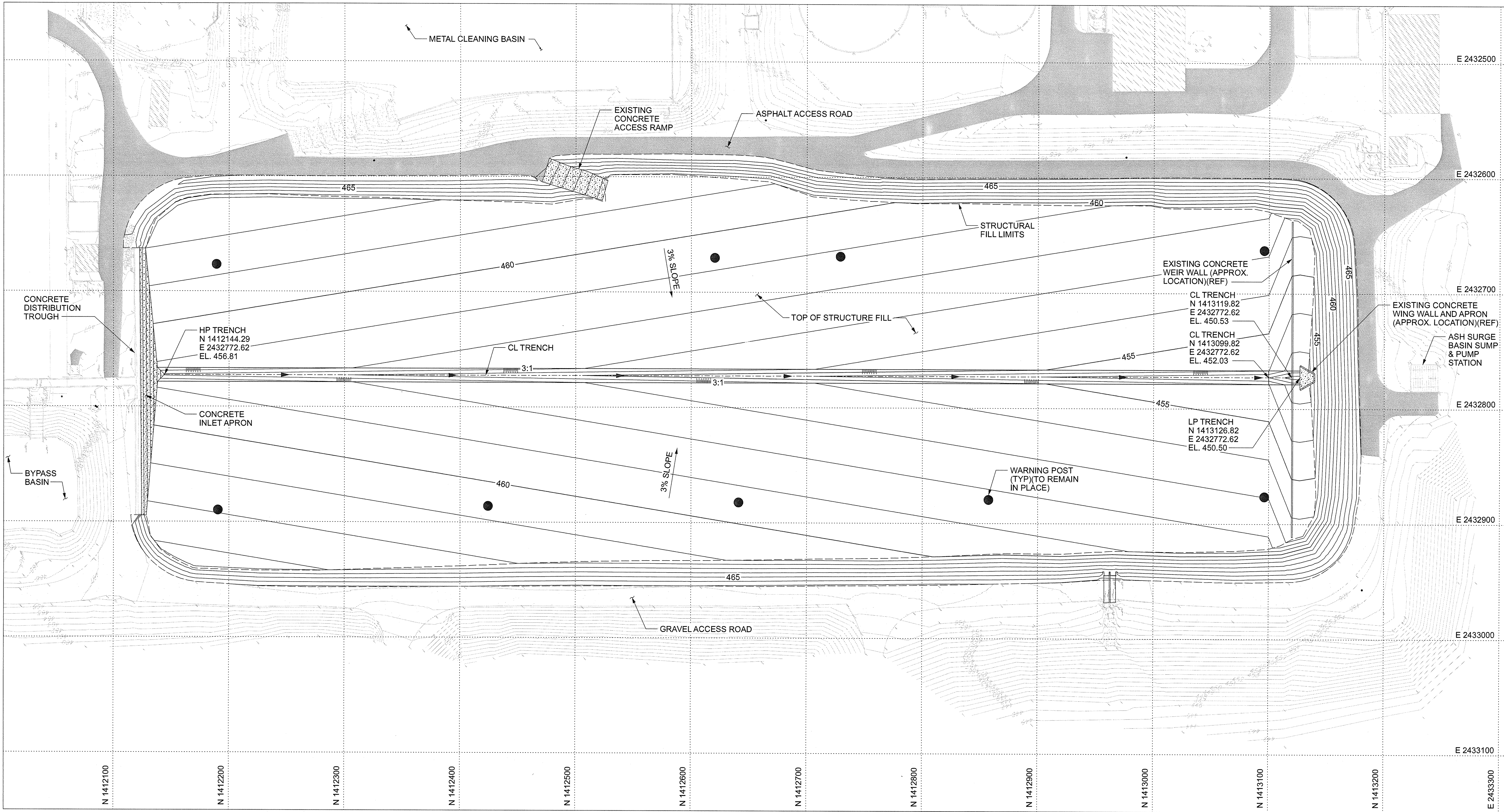
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2.	FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-ASB-CSK-002.
REFERENCE DRAWINGS	
CSK-004	ASH SURGE BASIN EXCAVATION PLAN
D211320C31-03	ASH SURGE BASIN LINER REPLACEMENT DETAILS AND SECTIONS
D211320C32-04	ASH SURGE BASIN LINER REPLACEMENT DETAILS AND SECTIONS
3B-0-2093	WASTE WATER TREATMENT FACILITY WING WALL PLANS, SECTIONS & DETAILS
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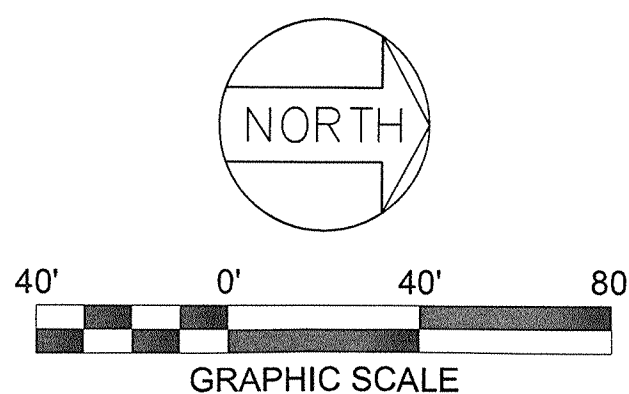
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CAD FILE NAME: POW-ASB-CSK-005.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
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Sargent & Lundy SARGENT & LUNDY LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
MWG Midwest Generation, LLC		
PROJECT POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE EXCAVATION SECTIONS & DETAILS		
DRAWING NUMBER POW-ASB-CSK-005		REVISION 0C
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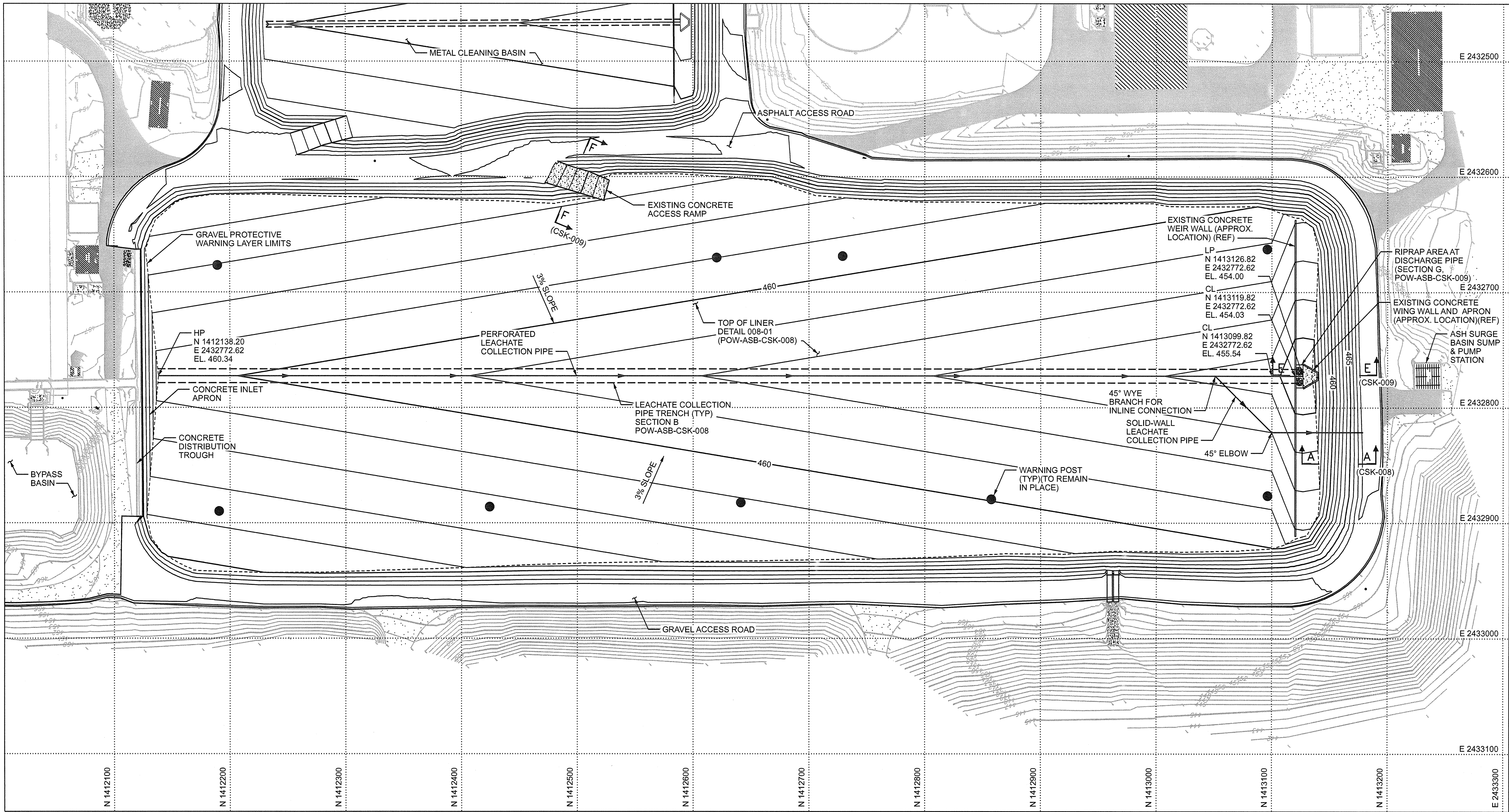


LEGEND	
— 460 —	MAJOR CONTOUR
— 459 —	MINOR CONTOUR
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REFERENCE DRAWINGS	
CSK-004	EXCAVATION PLAN
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PROJECT NO.: 12661-152		
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.		
 THOMAS DEHLIN 07-26-2023  MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.		
CAD FILE NAME: POW-ASB-CSK-006.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 Sargent & Lundy LLC SARGENT & LUNDY LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
 Midwest Generation, LLC		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
STRUCTURAL FILL GRADING PLAN		
DRAWING NUMBER		REVISION
POW-ASB-CSK-006		0C
SHEET 1 OF 1		

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PL17930M186Z\Shared\Info Center\DISCIPLINE REF MATERIAL\DWG\DESIGN2\PowerGen - CCR\Ash Surge Basin Closure Drawings\POW-ASB-CSK-007.dgn
Form: GGG-0401-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



LEGEND

— 460 —

MAJOR CONTOUR

— 459 —

MINOR CONTOUR

NOTES

1.

ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION P-1802 UNLESS NOTED OTHERWISE.

2.

FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-ASB-CSK-002.

REFERENCE DRAWINGS

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

FOR PERMIT

NOT FOR CONSTRUCTION

NORTH

40'

0'

40'

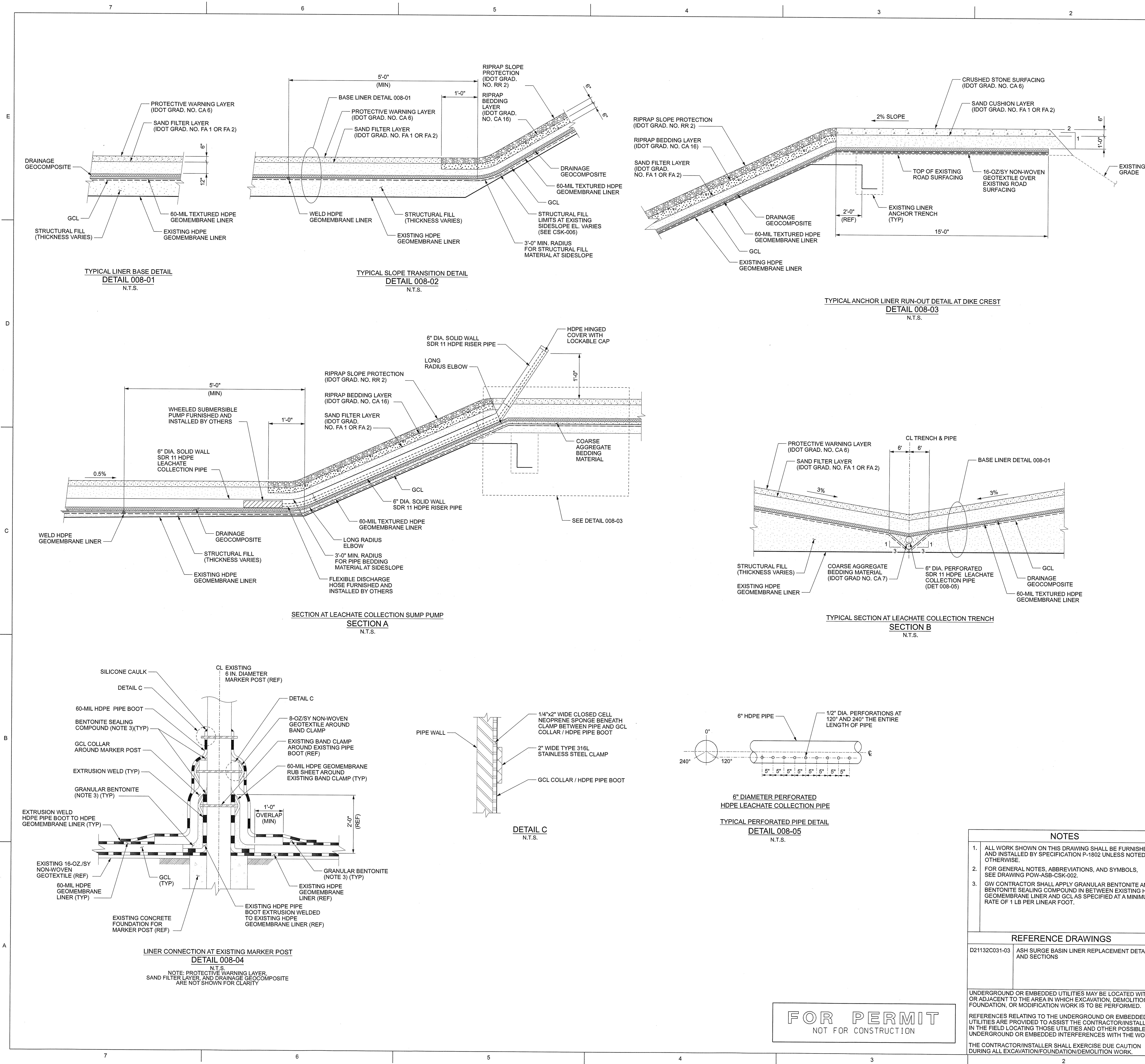
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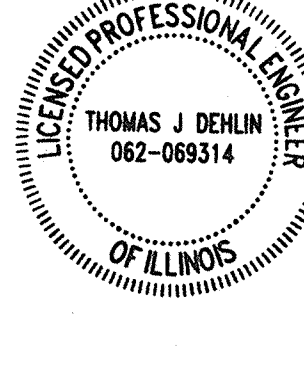
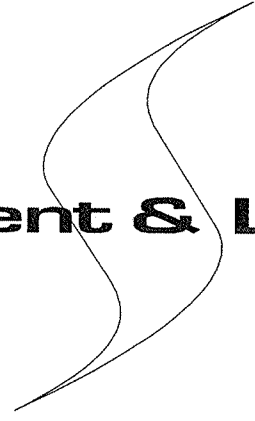
GRAPHIC SCALE

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0A	03-16-2023	FOR CLIENT COMMENT
0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: P-1802		
PROJECT NO.: 12661-152		
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.		
THOMAS J. DEHLIN 07-26-2023 MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY. THOMAS J. DEHLIN 062-069314 OF ILLINOIS		
CAD FILE NAME: POW-ASB-CSK-007.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
Sargent & Lundy SARGENT & LUNDY LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780 MWG Midwest Generation, LLC		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
COMPOSITE LINER & LEACHATE COLLECTION SYSTEM PLAN		
DRAWING NUMBER		REVISION
POW-ASB-CSK-007		0C
SHEET	1 OF 1	

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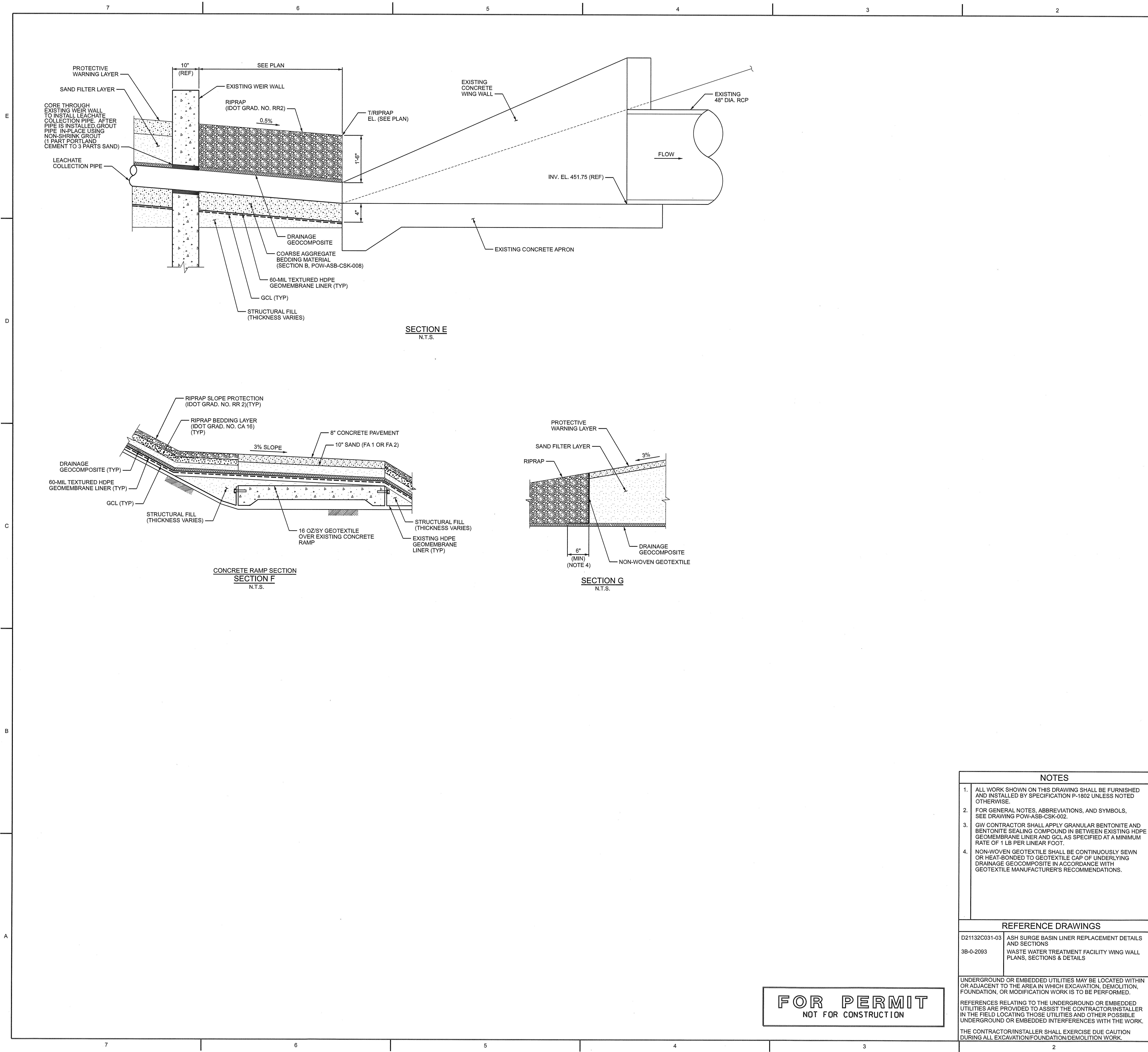
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Form: GCG04001-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010



HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0A	03-16-2023	FOR CLIENT COMMENT
0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: P-1802		
PROJECT NO.: 12661-152		
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.		
 THOMAS DEHLIN 07-26-2023  MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY.		
CAD FILE NAME: POW-ASB-CSK-008.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 Sargent & Lundy LLC SARGENT & LUNDY LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
MWG Midwest Generation, LLC		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 1		
DRAWING NUMBER		REVISION
POW-ASB-CSK-008		0C
SHEET	1 OF 1	

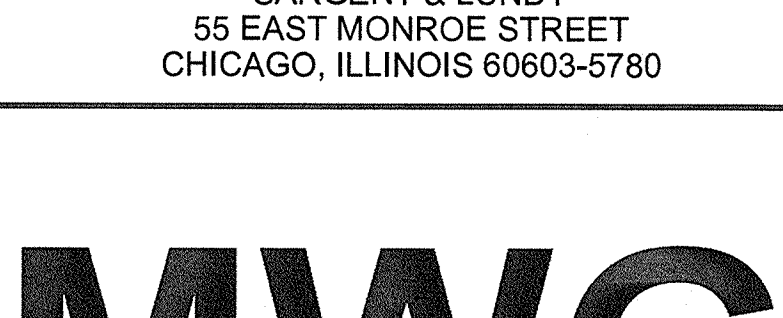
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Form: GGS-0401-01_08_ANSI (Imperial) Microstation Border - Size E - 31 x 44
Revision 11A, Revision Date: 04-30-2010



FOR PERMIT
NOT FOR CONSTRUCTION

NOTES	
1.	ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION P-1802 UNLESS NOTED OTHERWISE.
2.	FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING POW-ASB-CSK-002.
3.	GW CONTRACTOR SHALL APPLY GRANULAR BENTONITE AND BENTONITE SEALING COMPOUND IN BETWEEN EXISTING HDPE GEOMEMBRANE LINER AND GCL AS SPECIFIED AT A MINIMUM RATE OF 1 LB PER LINEAR FOOT.
4.	NON-WOVEN GEOTEXTILE SHALL BE CONTINUOUSLY SEWN OR HEAT-BONDED TO GEOTEXTILE CAP OF UNDERLYING DRAINAGE GEOCOMPOSITE IN ACCORDANCE WITH GEOTEXTILE MANUFACTURER'S RECOMMENDATIONS.
REFERENCE DRAWINGS	
D21132C031-03	ASH SURGE BASIN LINER REPLACEMENT DETAILS AND SECTIONS
3B-0-2093	WASTE WATER TREATMENT FACILITY WING WALL PLANS, SECTIONS & DETAILS
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.	
REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.	
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.	

1		
HOLD INFORMATION		
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RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0A	03-16-2023	FOR CLIENT COMMENT
0B	03-24-2023	FOR PUBLIC COMMENT
0C	07-26-2023	FOR PERMIT
ISSUE PURPOSE: PERMIT		
SPECIFICATION: P-1802		
PROJECT NO.: 12661-152		
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 THOMAS DEHLIN 07-26-2023 MY LICENSE RENEWAL DATE IS: 11-30-2023 PAGES OR SHEETS COVERED BY THIS SEAL: THIS DOCUMENT ONLY. 		
CAD FILE NAME: POW-ASB-CSK-009.DGN		
PREPARED BY: M. KARNIA / J. CHAVEZ		
REVIEWED BY: T. DEHLIN		
APPROVED BY: T. DEHLIN		
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
 Sargent & Lundy LLC 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
 MWG Midwest Generation, LLC		
PROJECT		
POWERTON GENERATING STATION ASH SURGE BASIN RETROFIT		
DRAWING TITLE		
COMPOSITE LINER & LEACHATE COLLECTION SYSTEM SECTIONS & DETAILS - SHEET 2		
DRAWING NUMBER		REVISION
POW-ASB-CSK-009		0C
SHEET	1 OF 1	
1		

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ATTACHMENT 2

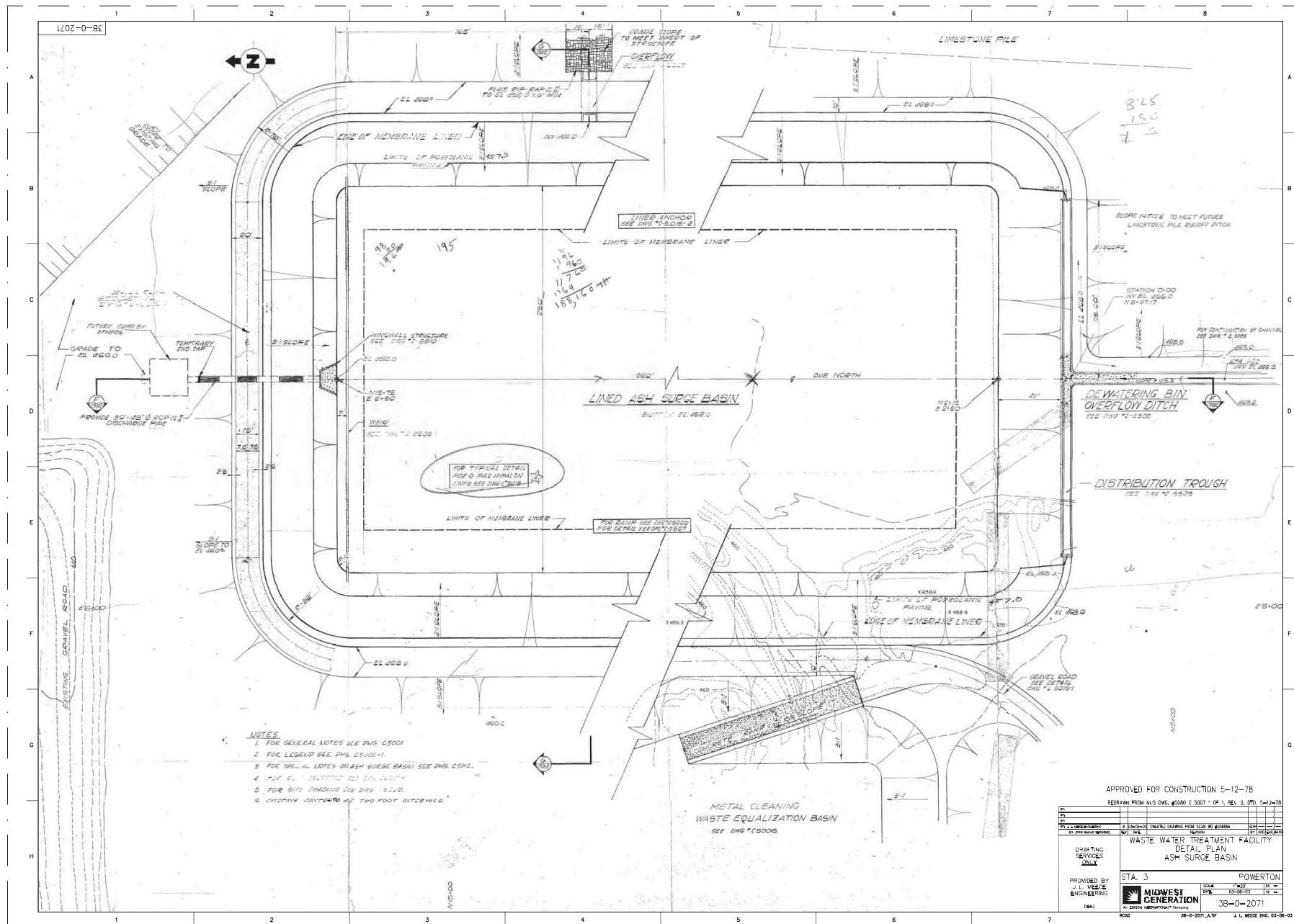
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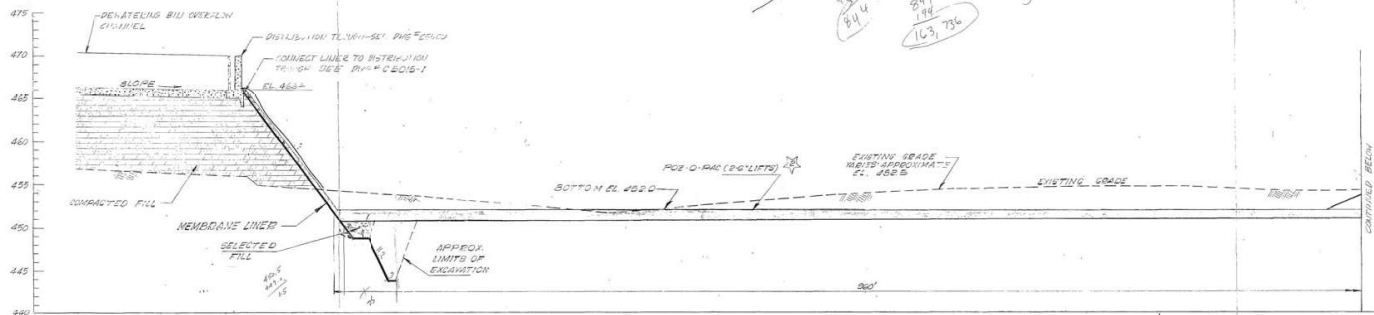
ATTACHMENT 2-1

1978 CONSTRUCTION DRAWINGS

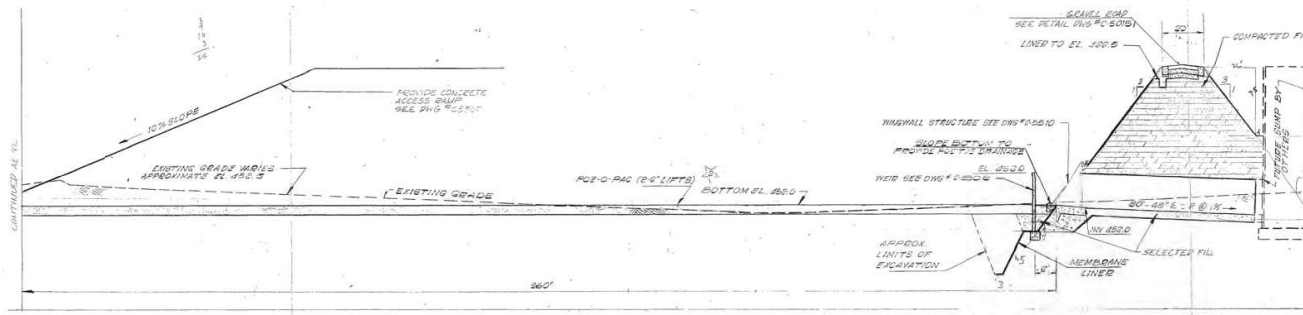
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3B-0-2071	DETAIL PLAN, ASH SURGE BASIN
3B-0-2075	ASH SURGE BASIN, SECTIONS & DETAILS
5080-C-5015	MISCELLANEOUS SECTIONS & DETAILS
3B-0-2089	SLUDGE WEIRS, SECTIONS & DETAILS
3B-0-2090	RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE
3B-0-2092	ASH SURGE BASIN & LIMESTONE BASIN DIST. TROUGHS – SECTIONS & DET.
3B-0-2093	WING WALL PLANS, SECTIONS & DETAILS
3B-0-2094	DEWATERING BIN OVERFLOW CHANNEL SECTIONS & DETAILS



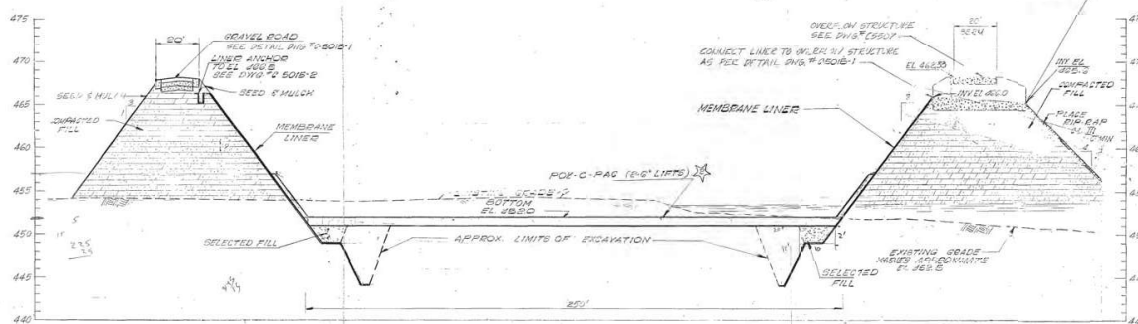
5202-0-B1



SECTION F (1/20)



SECTION F (1/20)



SECTION F (1/20)

SCALE: HORIZ. 1"=20'
VERT. 1"=5'

NOTES

1. SEE DWG. C5010 FOR DETAILS.
2. FOR LEGEND SEE DWG. C5001-1.
3. CONTRACTOR TO DETERMINE CONSTRUCTION AREA TO EL. 445.0 BY APPROVED METHODS PRIOR TO BEGIN CONSTRUCTION.
4. FOR ROAD SECTIONS SEE DWG. C5015-1.
5. FOR SITE GRADING SEE DWG. C5000.

FOR TYPICAL DETAILS
POC-C-PAC HYDRAULIC
LINER SEE DWG. C5000

APPROVED FOR CONSTRUCTION 5-12-78

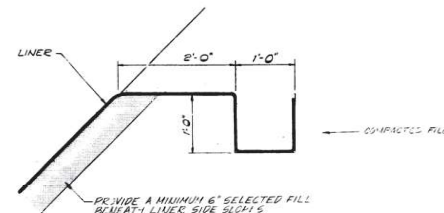
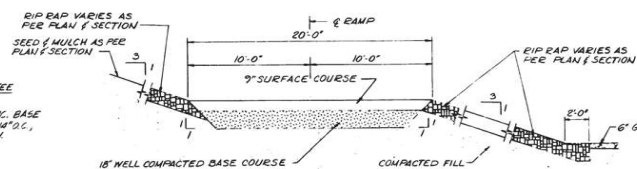
DESIGNED BY: J. L. WEEGE, INC. DRAWN BY: J. L. WEEGE, INC. CHECKED BY: J. L. WEEGE, INC. DATE: 5-12-78

NO.	DESCRIPTION	DATE	BY	CHECKED
1	DESIGNED	5-12-78	J. L. WEEGE	J. L. WEEGE
2	DRAWN	5-12-78	J. L. WEEGE	J. L. WEEGE
3	CHECKED	5-12-78	J. L. WEEGE	J. L. WEEGE

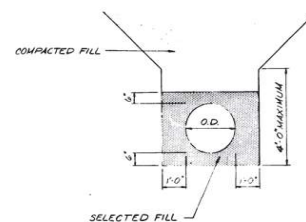
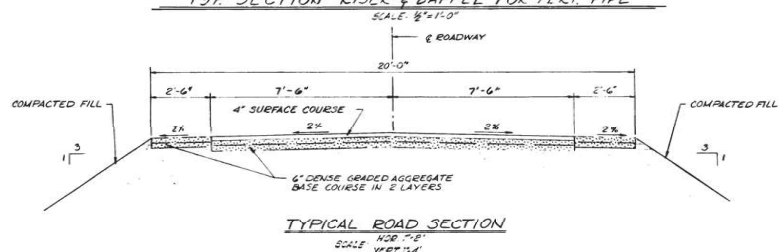
WASTE WATER TREATMENT FACILITY
AS SURGE BASIN
SECTIONS & DETAILS

PROVIDED BY: J. L. WEEGE, INC.
ENGINEERING
3B-D-2075
STA. 3
POWERTON
SCALE: AS SHOWN
DATE: 5-12-78
BY: J. L. WEEGE
CHECKED BY: J. L. WEEGE

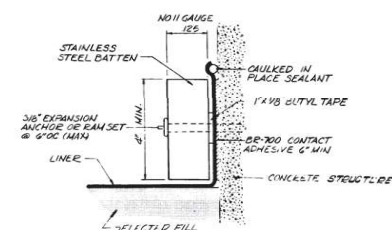
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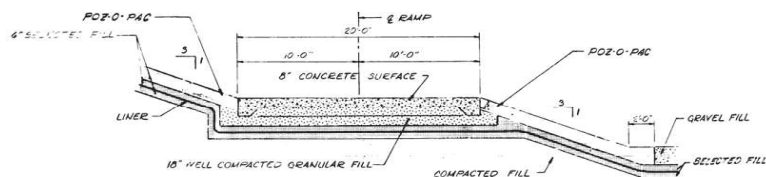
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GRAVEL RAMP



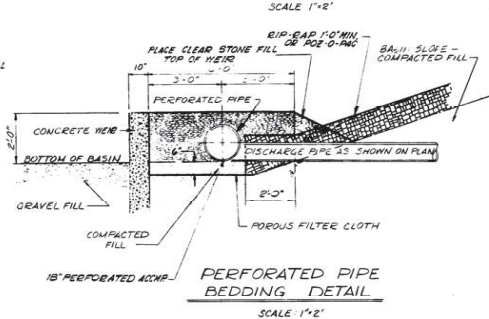
PIPE BEDDING DETAIL



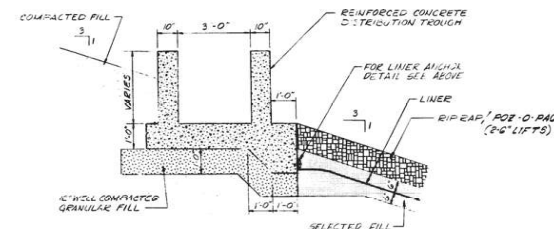
LINER ANCHOR DETAILS
NO. SCALE



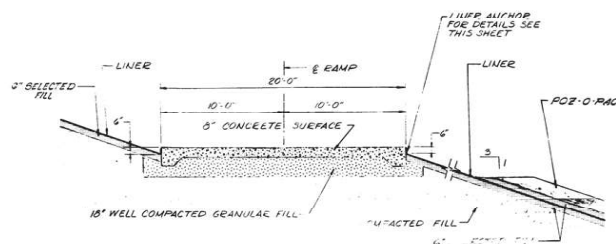
TYPICAL CONCRETE RAMP SECTION
LINER BELOW RAMP



PERFORATED PIPE
BEDDING DETAIL



LINER ANCHORAGE FOR
DISTRIBUTION TROUGH



TYPICAL CONCRETE RAMP SECTION
LINER ON GRADE

NOTES:

- NOTES:
1. FOR GENERAL NOTES SEE DWG. C-5000
 2. FOR LEGEND SEE DWG. C-5000-1



Sudhanar A. Venma
5/1/78

APPROVED FOR CONSTRUCTION

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

MISCELLANEOUS SECTIONS & DETAILS

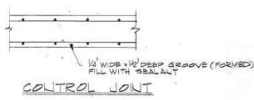
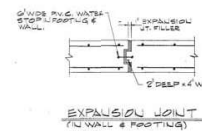
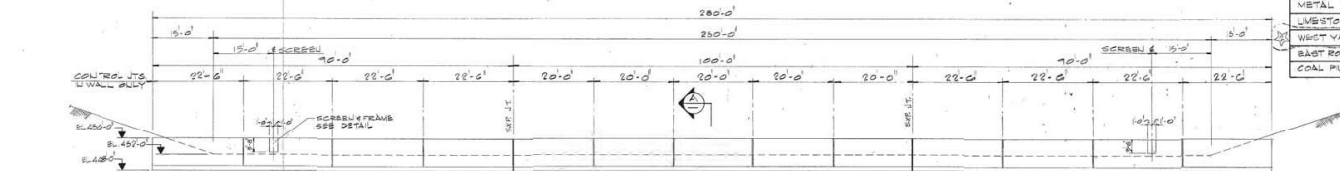
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NUS 5080 C 5015

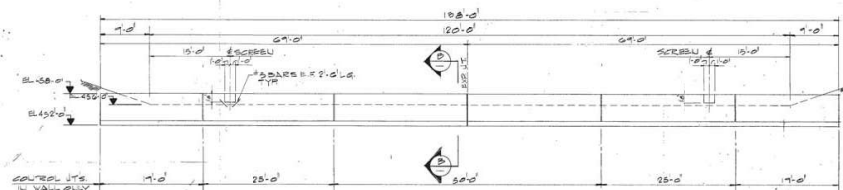
ROCKVILLE, MD.	SCALE: AS SHOWN	SHEET 1 OF 2
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6802-0-B1

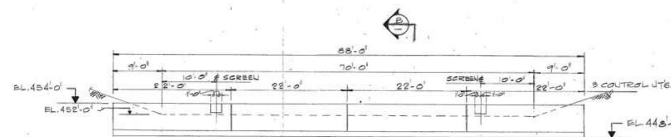
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ASH SURGE BASIN	5080 C 5007
METAL CLEANING	5080 C 5008
LIVESTOCK BASIN	5080 C 5009
WEST YARD BASIN	5080 C 5010
EAST ROOF YARD BASIN	5080 C 5011
COAL PILE	5080 C 5012



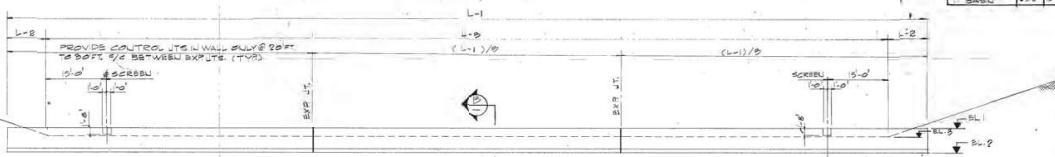
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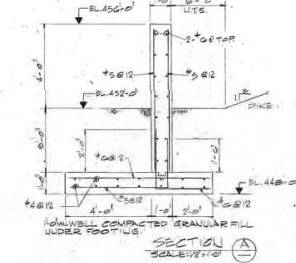
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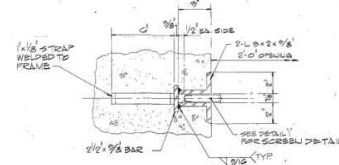
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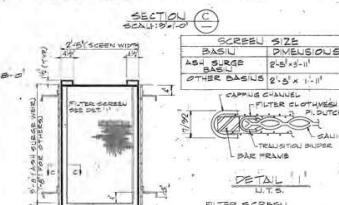
TYPICAL WEIR FOR
WEST YARD BASIN
EAST ROOF YARD BASIN
COAL PILE BASIN
SCALE: 1/8\"/>



ASH SURGE BASIN WEIR
SCALE: 1/8\"/>



NOTES: ALL EXPOSED STEEL TO BE GALVANIZED



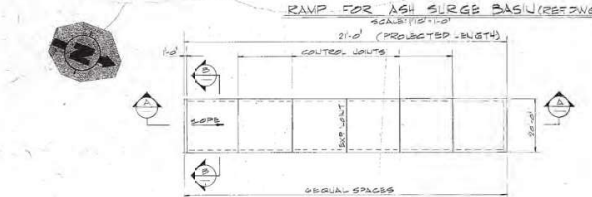
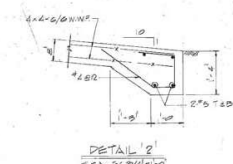
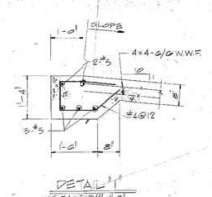
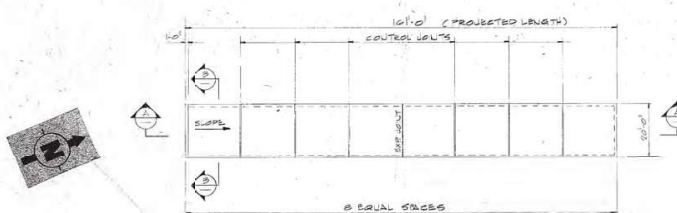
WEIR SCREEN FRAME DETAIL
SCALE: 1/8\"/>

NOTES:
1. FOR GENERAL NOTES SEE DWG. C 501

WEIR TABLE	
WEIR BASIN	1'-0\"/>

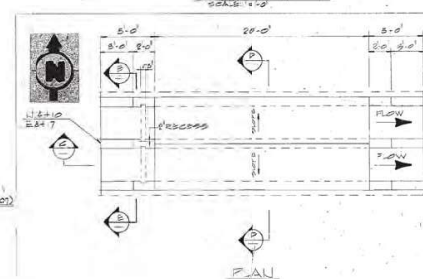
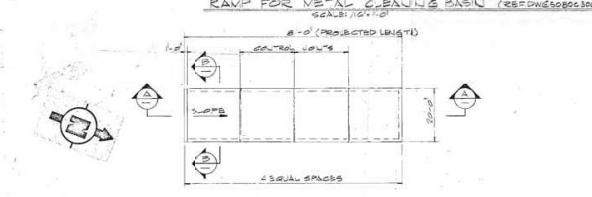
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PROVIDED BY J. L. WEEGE ENGINEERING (SEA)	STA. 3 POWERTON WASTE WATER TREATMENT FACILITY SLUDGE WEIRS SECTIONS & DETAILS 38-0-2088-1A1F 1. L. WEEGE ENG. 03-06-03

0602-0-B1

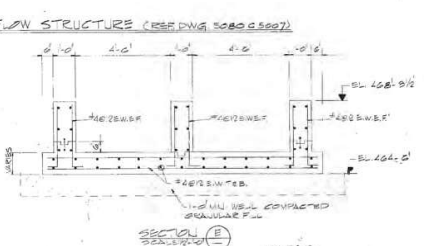
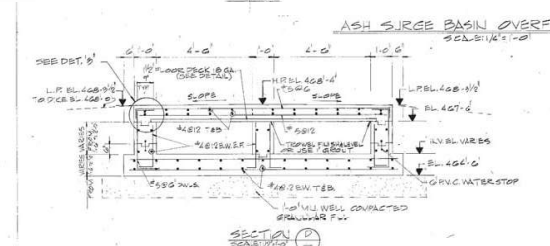
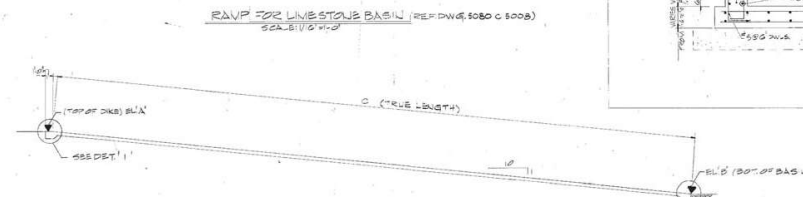


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EXPANSION JOINT
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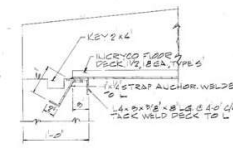


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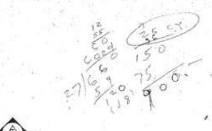


NOTES:
1. FOR GENERAL NOTES SEE DWG C500

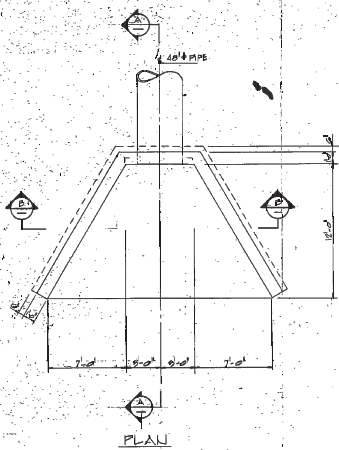
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STEEL	100.0	LB	
GRANULAR FILL	100.0	CU YD	
WALL COMPLETED	100.0	CU YD	



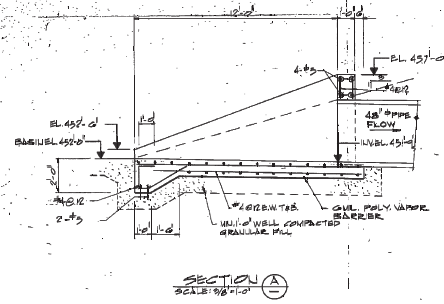
APPROVED FOR CONSTRUCTION 4/17/78	
DESIGNED BY: [Signature] CHECKED BY: [Signature] DATE: 4/17/78	SCALE: AS SHOWN DATE: 03-01-78 BY: [Signature]
WASTE WATER TREATMENT FACILITY RAMP & ASH SURGE BASIN OVERFLOW STRUCTURE	
PROVIDED BY: [Signature] ENGINEERING: [Signature] DATE: 03-01-78	STA. 3 POWERTON 3B-D-2090



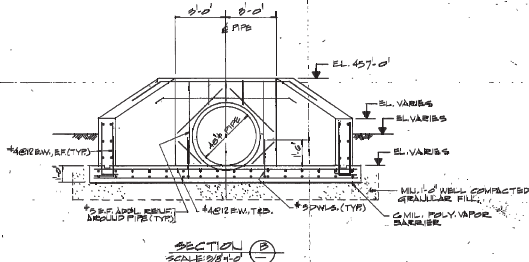
38-0-2093



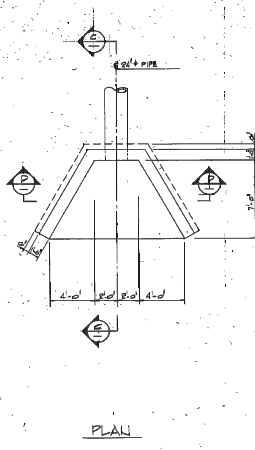
ASH SURGE BASIN WING WALL FOR 48" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5007)



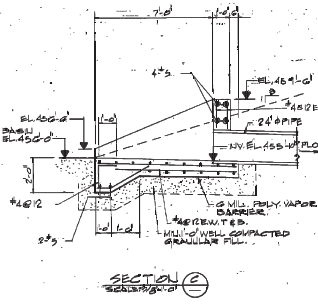
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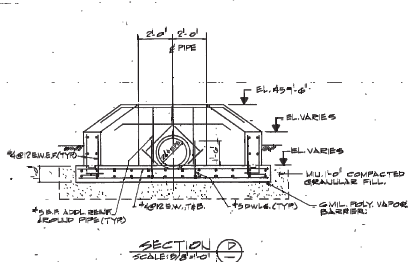
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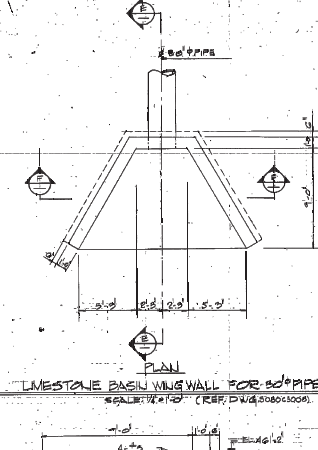
METAL CLEANING BASIN WING WALL FOR 24" PIPE
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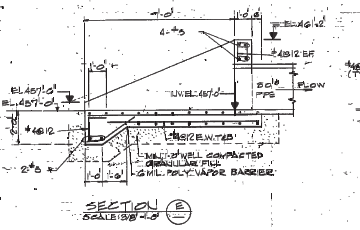
SECTION C
SCALE: 3/8" = 1'-0"



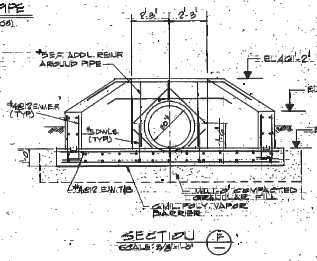
SECTION D
SCALE: 3/8" = 1'-0"



LIMESTONE BASIN WING WALL FOR 30" PIPE
SCALE: 1/8" = 1'-0" (REF DWG. 5080 C 5009)

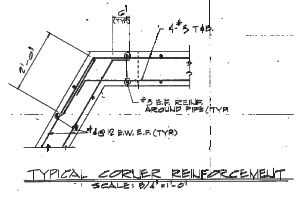


SECTION E
SCALE: 3/8" = 1'-0"



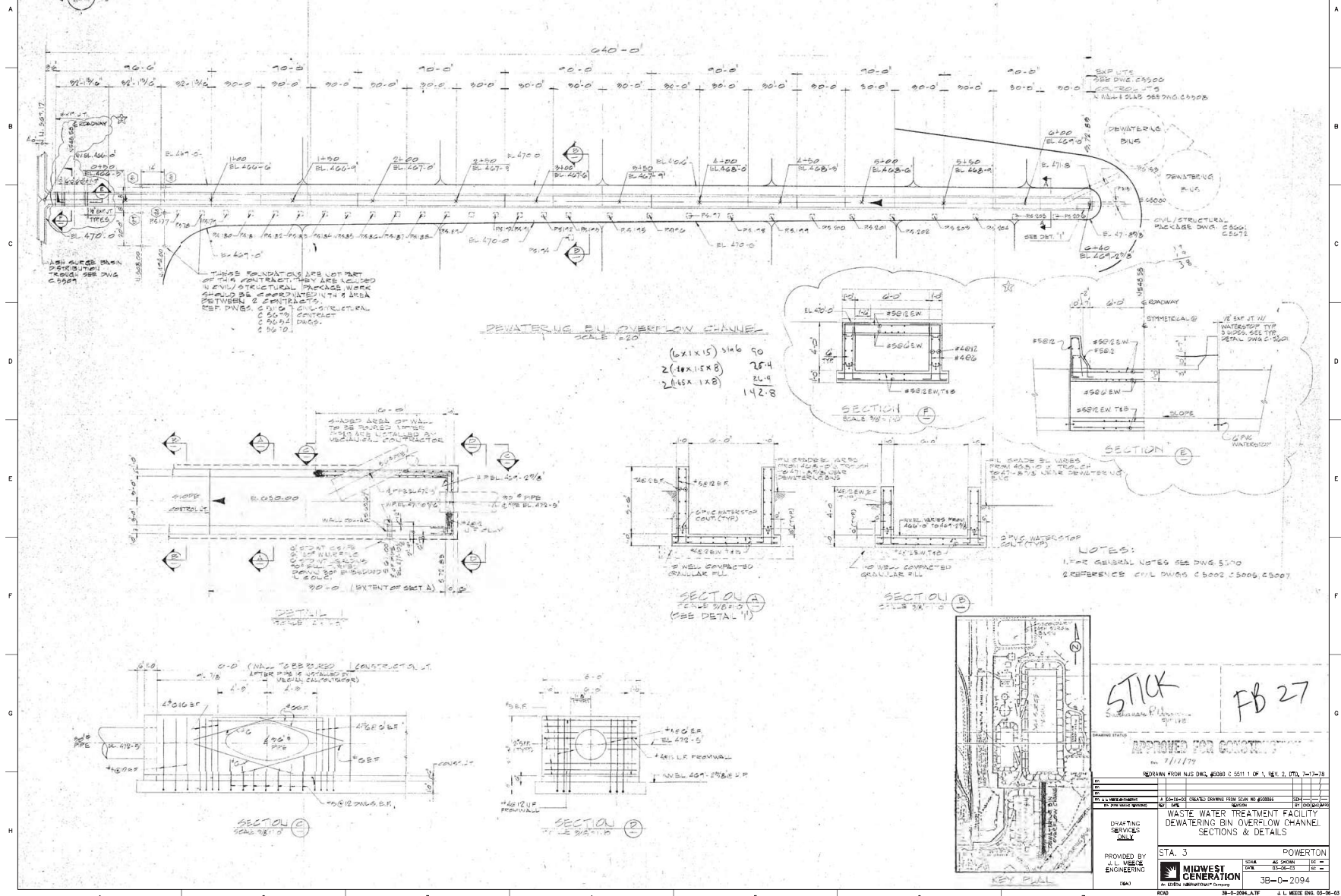
SECTION F
SCALE: 3/8" = 1'-0"

NOTES:
1. FOR GENERAL NOTES SEE DWG. C 5501.



TYPICAL CORNER REINFORCEMENT
SCALE: 1/4" = 1'-0"

4/19/14 APPROVED FOR CONSTRUCTION	
WASTE WATER TREATMENT FACILITY WING WALL PLANS SECTIONS & DETAILS	
STATION: 3 POWER TON	SCALE: AS SHOWN DATE: 03-26-09
PROVIDED BY: J.L. MEDE ENGINEERING	MIDWEST GENERATION AN OGE ENERGY COMPANY
38-0-2093	38-0-2093



STICK FB 2-

APPROVED FOR CONSTRUCTION

REDRAWN FROM NUS DWG. 45060 C 5511 1 OF 1, REV. 2, UTD. 7-17-

[illegible][illegible]

IN THE MATTER OF THE	STATE OF	NEW YORK	IN SENATE
JANUARY 11, 2017			
WASTE WATER TREATMENT FACILITY			

DRAFTING WASTE WATER TREATMENT FACILITY
DEWATERING BIN OVERFLOW CHANNE

SERVICES ONLY	SECTIONS & DETAILS
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OT: 1	DOWNST
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PROVIDED BY	STA. 3	POWER
11. MISC.		

ENGINEERING MIDWEST GENERATION DATE 03-06-03

38-0-2094

RCAO 3B-0-2094_ATF J. L. WEECE ENG.

_____ @ _____



ATTACHMENT 2-2

2013 LINER REPLACEMENT DRAWINGS

DRAWING NO.	TITLE
D21132TS-03	TITLE SHEET
D21132C010-03	PRE-CONSTRUCTION SITE CONDITIONS
D21132C020-03	LINER SUBGRADE PREPARATION
D21132C021-00	GEOMEMBRANE PANEL LAYOUT
D21132C030-03	WARNING LAYER PLAN
D21132C031-03	DETAILS AND SECTIONS
D21132C032-04	DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON GENERATING STATION PEKIN, ILLINOIS

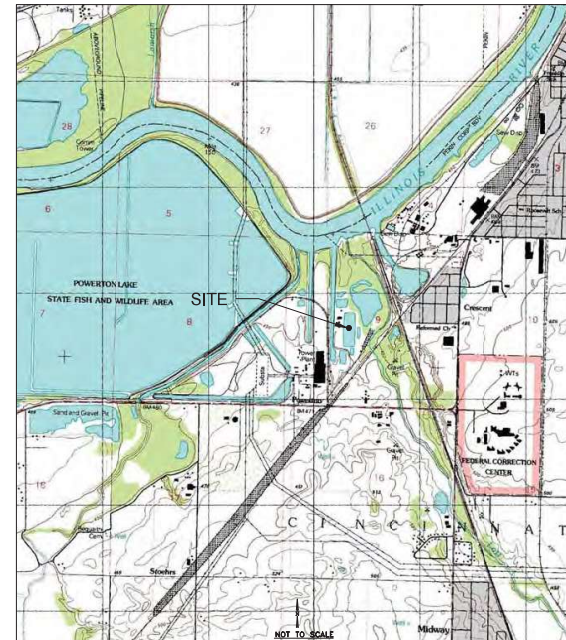
LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21132TS-03
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21132C010-03
C020	LINER SUBGRADE PREPARATION	D21132C020-03
C021	GEOMEMBRANE PANEL LAYOUT	D21132C021-00
C030	WARNING LAYER PLAN	D21132C030-03
C031	DETAILS AND SECTIONS	D21132C031-03
C032	DETAILS AND SECTIONS	D21132C032-03



ILLINOIS

RECORD DRAWING LEGEND	
PROPOSED	CROSSED OUT TEXT INDICATES CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
<u>PRE-CONSTRUCTION</u>	UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CROSS OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION



SITE LOCATION

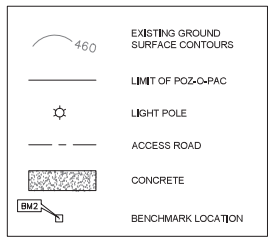
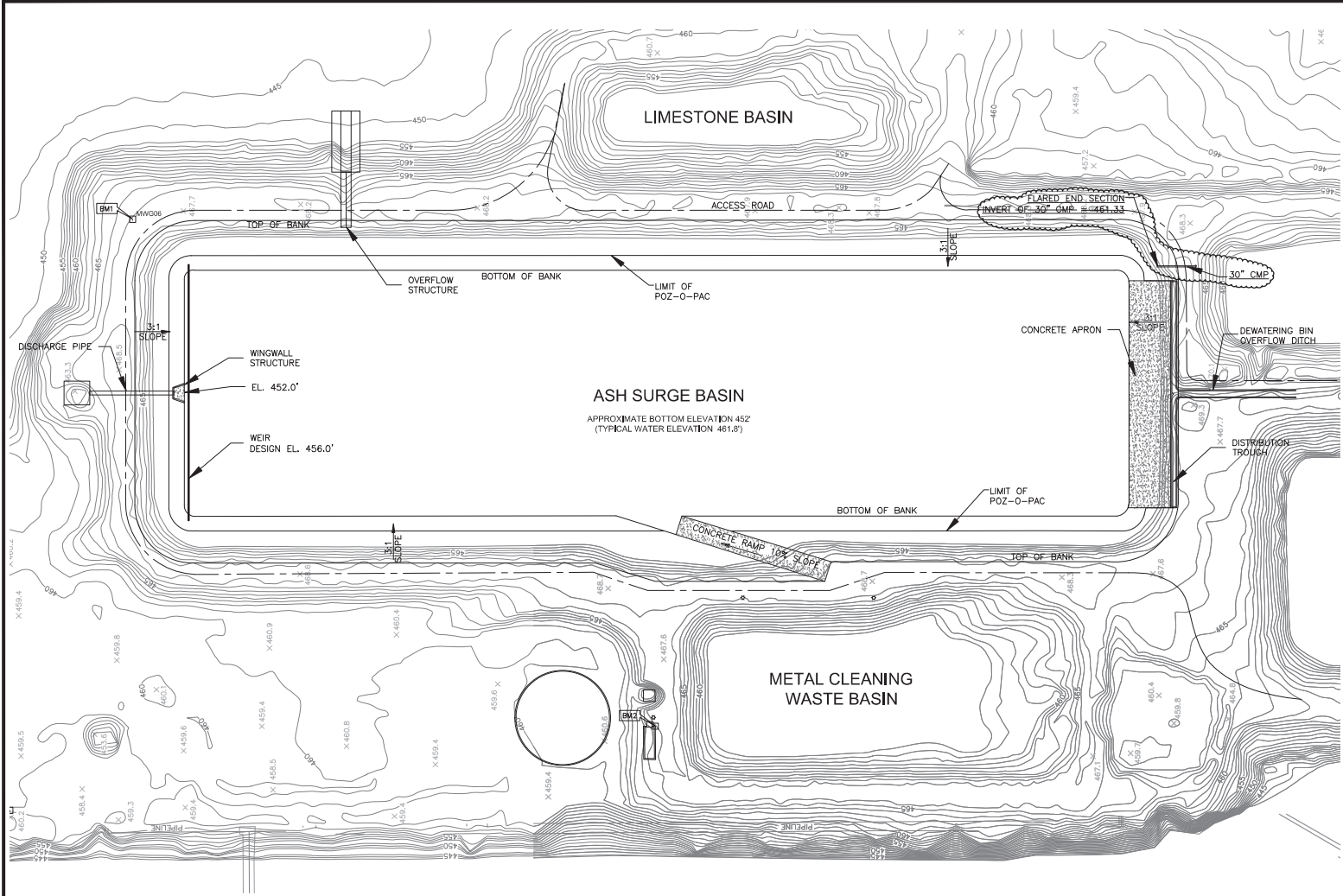
JULY 2014

TITLE SHEET			
ASH SURGE BASIN LINER REPLACEMENT DOCUMENTATION MIDWEST GENERATION POWERTON GENERATING STATION PEKIN, ILLINOIS			
PROJECT NO.	21132POWERED	DRAWN BY	RH/DTM/3
CHECKED BY	HMS/DTM/3	APPROVED BY	HMS/DTM/3
DRAWING NO.	D21132TS-03	REFERENCE	
SHEET NO.	19		

REV	DATE	DESCRIPTION
1	07/09/14	ISSUED FOR RECORD DOCUMENTATION
2	09/25/13	ISSUED FOR CONSTRUCTION
3	02/28/13	ISSUED FOR BID
4	07/15/13	ISSUED FOR PERMIT

PREPARED FOR:
MIDWEST GENERATION, LLC
13082 EAST MANITO ROAD
PEKIN, IL 61554

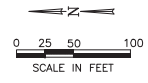
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C:\Users\jgordon\Documents\11-12-2014\PowerGen\ASH SURGE BASIN\RECORD.DWG (11/12/2014 12:57:00) - 03.dwg C010
NAME: JGORDON



NOTES:
1. SITE BENCHMARK 1 (BMG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.08 FEET (NGVD 29).

CONTRACTOR NOTES:
1. ACCUMULATED ASH, SLOTTED SCREEN, AND DEBRIS TO BE REMOVED BY CONTRACTOR, AS DIRECTED BY OWNER.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83 FEET.
VERTICAL DATUM:
PLANT DATUM

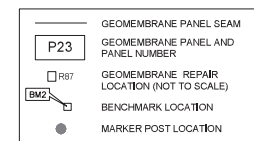


SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 38-0-2071, DATED 5-12-78.
3. LOCATION OF 30\"/>

5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
2.	ISSUED FOR CONSTRUCTION	09/18/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION		DATE	APPRO BY



PROJECT NO. 2113.2	PRE-CONSTRUCTION SITE CONDITIONS ASH SURGE BASIN LINER REPLACEMENT POWERTRON GENERATING STATION MIDWEST GENERATION PEKIN, ILLINOIS	
DRAWN BY: RLH 01/14/13		
CHECKED BY: HMS 01/14/13	DRAWING NO.: 0211320210-03	SHEET NO. C010
APPROVED BY: HMS 01/15/13	REFERENCE:	



NOTES:

1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD WITH ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.08 FEET (NGVD 29).



HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM,
WEST ZONE, NAD83 FEET.

VERTICAL DATUM:
BLM DATUM.

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM SURVEY DATA BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

6.			
5.			
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0.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
REVISION:		DATE:	APPD BY:



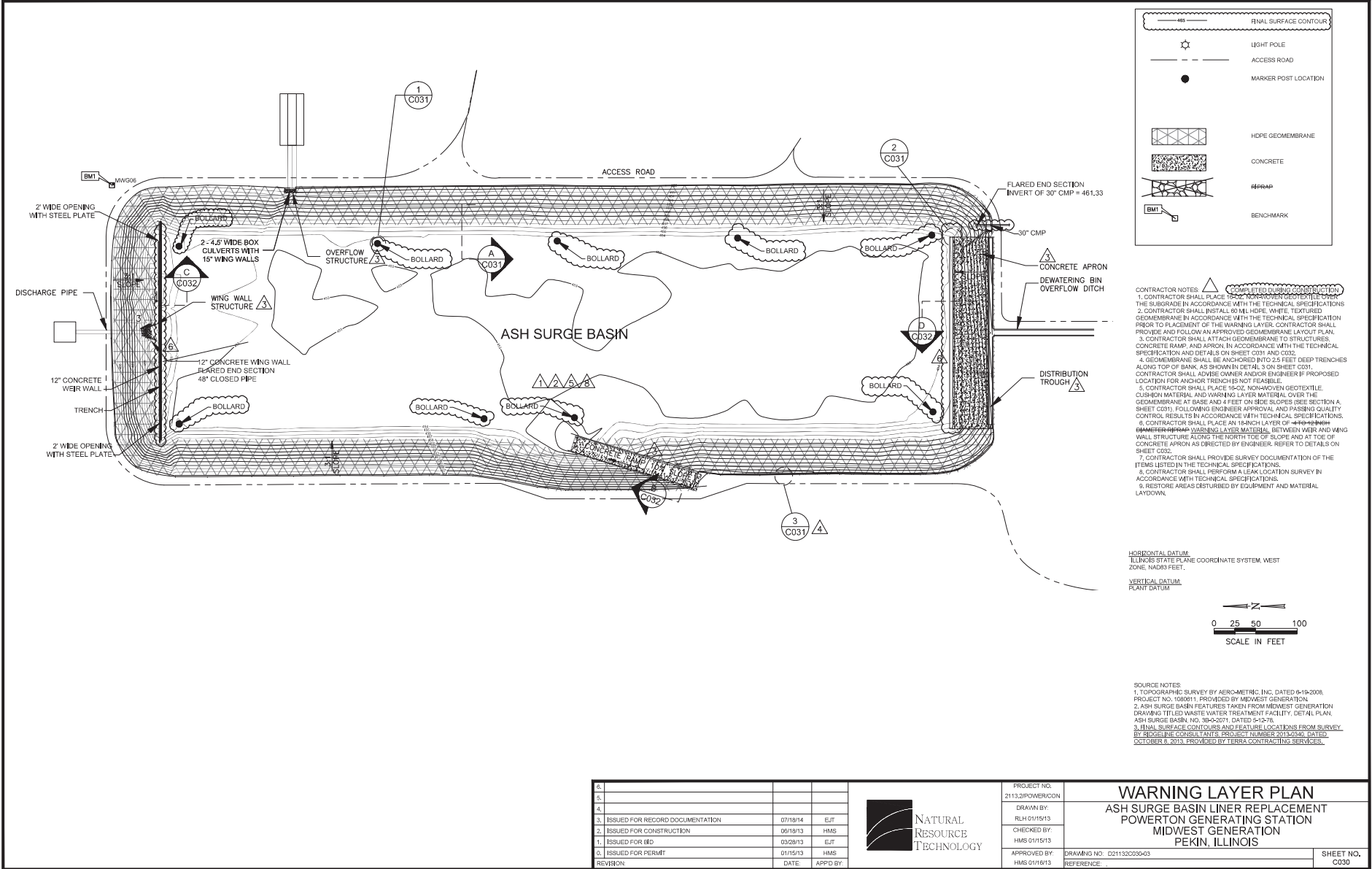
APPROVED BY
EJT 07/17/14

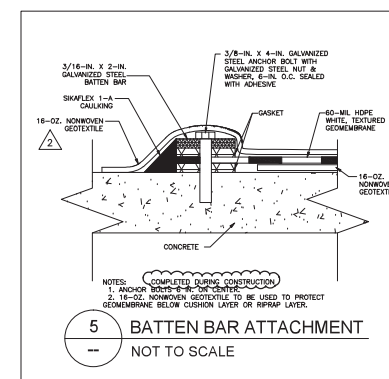
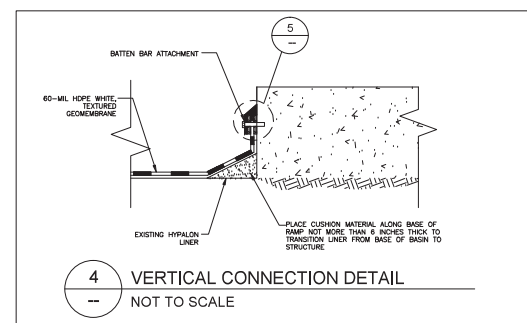
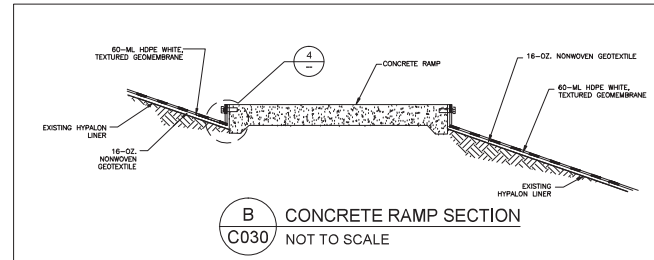
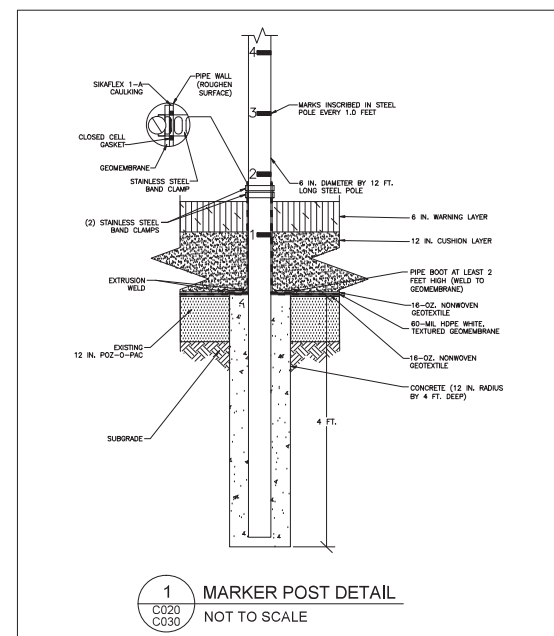
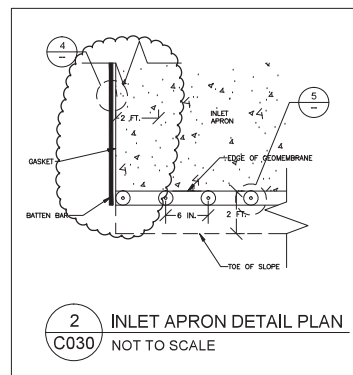
ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO:	D211320021-00
REFERENCE:	

SHEET NO.	C021
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11/18/2014 1:22:56pm C:\ITD\117_ashsurge\SWAT\BIM\ashsurge.dwg





6.			
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3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APPROVED BY:

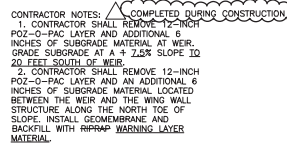


PROJECT NO:	2113.2/POWER/CON
DRAWN BY:	RLH 01/14/13
CHECKED BY:	HMS 01/14/13
APPROVED BY:	HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

SHEET NO.	C031
-----------	------



5
C031

2 FT. 4 FT.

18 INCHES OF WARNING
LAYER MATERIAL

16-OZ. NONWOVEN
GEOTEXTILE

60-MIL. HDPE WHITE
TEXTURED GEOMEMBRANE

6 IN. WARNING LAYER

12 IN. CUSHION LAYER

EXISTING P.O.S.-G-PAC

16-OZ. NONWOVEN
GEOTEXTILE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APP'D BY:



PROJECT NO. 2113.2/POWER/CON
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
 POWERTON GENERATING STATION
 MIDWEST GENERATION
 PEKIN, ILLINOIS

SHEET NO.
C032



ATTACHMENT 3

2016 STRUCTURAL STABILITY & FACTOR OF SAFETY ASSESSMENT

**STRUCTURAL STABILITY AND FACTOR OF SAFETY ASSESSMENT
ASH SURGE BASIN AND BYPASS BASIN
POWERTON STATION
OCTOBER 2016**

This report presents documentation of the initial periodic structural stability and initial safety factor assessments for the Ash Surge Basin and Bypass Basins (the Basins) at the Powerton Station (Site) in Pekin, Illinois (Figure 1). This report addresses the initial structural stability and safety factor assessment requirements of the Coal Combustion Residuals (CCR) regulations, Code of Federal Regulations Title 40, Part 257, Subpart D (referred to as the CCR Rule). These regulations were published in the Federal Register on 17 April 2015 and became effective on 19 October 2015. The Powerton Station is owned and operated by Midwest Generation, LLC (Midwest Generation). Based on the results provided in this report, the Ash Surge Basin and Bypass Basin meet the requirements of §257.73(d) and §257.73(e) of the CCR Rule.

The work presented in this report was performed under the direction of Ms. Jane Soule, P.E., of Geosyntec Consultants Inc. (Geosyntec) in accordance with §257.73(d) and §257.73(e). Mr. Robert White reviewed this report in accordance with Geosyntec's senior review policy.

1. Regulation Requirements - §257.73

Structural integrity criteria for existing CCR impoundments is described in §257.73 and includes structural stability and factor of safety assessments. The Ash Surge Basin and Bypass Basin meet the minimum size and capacity criteria under §257.73(b) and are subject to the structural stability and safety factor assessments required.

2. Site Conditions

The Ash Surge Basin is located east of the Main Wastewater Building, the cylindrical concrete clarifier and thickener structures, and the Metal Cleaning Basin, west of the inactive Limestone Basin, north of the Bypass Basin and East Roof and Yard Runoff (ERYR) Basin. The Ash Surge Basin is approximately 1,050 feet by 335 feet in plan dimensions (total plan area of approximately 8.1 acres). The surface impoundment is surrounded by a paved and a gravel perimeter access road around the western and eastern half of the impoundment, respectively.

The Bypass Basin is located east of the ERYR Basin and south of the southeast corner of the Ash Surge Basin. The Bypass Basin is approximately 160 feet by 255 feet in plan dimensions (total plan area of approximately 0.9 acres). A gravel perimeter access road is located along the northern and eastern boundaries of the Bypass Basin. A concrete-lined dewatering bin overflow

channel is located along the crest of the berm between the Bypass Basin and the ERYR Basin. A temporary construction staging area is located south of the surface impoundment.

The Ash Surge Basin and the Bypass Basin are both lined with a 60-mil high density polyethylene (HDPE) geomembrane.

Based on available documentation and discussions with site personnel, the Basins, in their current configuration, were constructed in the late 1970s and early 1980s. A history of construction for the basins was prepared in accordance with §257.73(c) and describes the design of the basins and their construction (Geosyntec, 2016a).

3. Structural Stability Assessment

The following subsections address the components of §257.73(d)(1).

3.1 Foundations and Abutments – §257.73(d)(1)(i)

The Ash Surge Basin and the Bypass Basin consist of embankments on all sides. Because no formational materials provide lateral structural support for the embankments, the Basins do not include abutments. The remainder of this section addresses the foundation materials for the Basins.

Previous subsurface investigations performed at the Site indicate foundation materials underlying the embankments for the Ash Surge Basin and Bypass Basin generally consists of approximately 17 to 28 feet of fat and lean clay overlying approximately 35 to 40 feet of loose to very dense poorly graded sand and silty sand with some gravel associated with the Henry Formation (Geosyntec, 2016b).

Elastic settlement of the clay and sand layers underlying the embankments likely occurred very soon after construction in the late 1970s and early 1980s. Because of the age of the embankments (approximately 35 years old), the majority of consolidation and secondary compression settlement of the clay layer has likely already occurred. The initial annual inspection performed for the Basins in accordance with §257.83(b) did not identify any adverse effects on the Basins or their appurtenant structures resulting from settlement that may have occurred since construction (Geosyntec, 2016c). There are no proposed changes in operation which would increase loading conditions on the foundation materials; therefore, no significant settlement of the foundation materials underlying the embankments is anticipated to occur in the future. Further, the embankments of the Basins were not constructed with abutments or separate engineered zones that would be most susceptible to the adverse effects of differential settlement. Therefore, potential settlement of the foundation is not anticipated to impact the integrity of the impoundment embankments.

A factor of safety against the triggering of liquefaction was calculated for saturated foundation materials underlying the Ash Surge Basin and Bypass Basin embankments. The factor of safety was calculated based methods outlined in Idriss and Boulanger (2008) using information obtained from field explorations, including borings, Cone Penetration Test (CPT) soundings, laboratory data (Geosyntec, 2016b) and seismic data (Geosyntec, 2016g). Overall, the foundation materials underlying the Ash Surge Basin and Bypass Basin have a low susceptibility to liquefaction and liquefaction-induced strength loss (Geosyntec, 2016d).

3.2 Upstream Slope Protection – §257.73(d)(1)(ii)

The Ash Surge Basin and Bypass Basin are lined with a 60-mil HDPE geomembrane that protects the interior basin slopes from erosion, the effects of wave action, and mitigates potential effects of rapid drawdown.

3.3 Dike Compaction – §257.73(d)(1)(iii)

Documentation of as-built construction conditions for the Ash Surge Basin and Bypass Basin embankments was not available at the time of this report. Samples of embankment fill materials obtained during Geosyntec's geotechnical investigations at the Site indicate that the Ash Surge Basin embankments are compacted to relative densities on the order of 95 percent based on Standard Proctor testing (Geosyntec, 2016b). No quantitative evaluation of the degree of compaction of the embankments for the Bypass Basin was performed for the embankments in their current state. Slope stability analyses show that the embankments for the Ash Surge Basin and Bypass Basin are sufficient to withstand the range of loading conditions in the CCR units (Geosyntec, 2016e).

3.4 Downstream Slope Vegetation – §257.73(d)(1)(iv)

Downstream slopes of the Ash Surge Basin and Bypass Basin have erosion protection from either vegetation or geomembrane liners located on the interior slopes of adjacent basins.

3.5 Spillway – §257.73(d)(1)(v)

The Ash Surge Basin and the Bypass Basin both contain emergency spillway structures. A description of these structures and the design storm event identified for the Basins is included in the Inflow Design Flood Control System Plan (IDFCSP) prepared for the site in accordance with §257.82(c) (Geosyntec, 2016f). The IDFCSP identifies the design event for the Site as the 1,000 year flood. Because the Ash Surge Basin and Bypass Basin do not impound water from a natural stream and do not impound stormwater flows, except for direct precipitation that falls on the embankment crest or within the Basins, the IDFCSP identifies the design event as the 24-hour, 1,000-year precipitation event. When the operating freeboard for the Basins is taken

into account, the water levels in the Basins estimated after the design precipitation event are estimated to be lower than the invert elevations of the emergency spillways and no discharge from the Basins is anticipated (Geosyntec, 2016f). Therefore, the hydraulic capacity of the spillways was not calculated.

3.6 Structural Integrity of Hydraulic Structures – §257.73(d)(1)(vi)

Hydraulic structures passing through or beneath the embankments of the Bypass Basin and Ash Surge Basin consist of several pipes and conveyance structures associated with the inlet and outlet structures of the Basins. These structures and pipes were inspected periodically between 10 May 2016 and 24 May 2016 by a company specializing in video camera pipe inspections. The inspected structures and pipes related to the Basins included are presented on Figure 2. The video inspections did not identify significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris that would negatively affect operation of the pipes was observed.

3.7 Downstream Slopes Adjacent to Water Bodies – §257.73(d)(1)(vii)

Ponds or water bodies near downstream slopes of the Ash Surge Basin and Bypass Basin are identified on Figure 3 and include:

- The Metal Cleaning Basin located west of the Ash Surge Basin. This basin is lined with an HDPE geomembrane.
- The ERYR Basin located west of the Bypass Basin and south of the Ash Surge Basin;
- The inactive Limestone Basin located east of the Ash Surge Basin; and
- The FAB located northeast of the Ash Surge Basin.

For stability analyses performed, a “low pool” condition where the modeled groundwater depth is lowered so there is little or no stabilizing force present on the downstream slope of the Ash Surge Basin or Bypass Basin embankments was evaluated for the water bodies presented above (Geosyntec, 2016e).

Stability during rapid drawdown was also evaluated for the embankments affected by the ERYR Basin and the FAB. Rapid drawdown was not evaluated for the embankments affected by the Metal Cleaning Basin because its HDPE geomembrane minimizes potential inundation of the slopes and mitigates effects of rapid drawdown. Similarly, embankments affected by the inactive Limestone Basin were not evaluated for rapid drawdown because the volume of water in this basin is anticipated to be minimal (inflow is limited to direct precipitation) and there is no outlet structure associated with this basin that could create a rapid drawdown condition for the adjacent Ash Surge Basin embankment.

Slope stability analyses show that the embankments are designed and constructed to maintain structural stability during “low pool” and rapid drawdown conditions (Geosyntec, 2016e).

3.8 Structural Stability Assessment Deficiencies - §257.73(d)(2)

No structural stability deficiencies associated with the Ash Surge Basin and Bypass Basin were identified in this initial structural stability assessment and no corrective measures are required.

3.9 Annual Inspection Requirement - §257.83(b)(4)(ii)

In accordance with §257.83(b)(4)(ii), submittal of this structural stability assessment precludes the requirement of an annual inspection under §257.83(b) for the Ash Surge Basin and Bypass Basin during the 2016 calendar year. One deficiency identified in the initial annual inspection (Geosyntec, 2016c) for the Bypass Basin was corrected as documented in the Notice of Remedy prepared in response to the initial annual inspection.

4. Safety Factor Assessment

This section describes the initial safety factor assessment for the Ash Surge Basin and Bypass Basin and the methodology used to perform the assessment in accordance with §257.73(e)(1). This assessment includes slope stability analyses of the critical embankment cross-section for each basin, shown in Figure 3.

4.1 Slope Stability Methodology

Limit equilibrium slope stability analyses were performed to evaluate the stability of the embankments for the Ash Surge Basin and Bypass Basin. The process involved performing two-dimensional analyses on the critical cross-section for each basin using Spencer’s Method as coded in the computer program SLOPE/W (Version 8.15.4.11512, www.geoslope.com) which satisfies vertical and horizontal force equilibrium and moment equilibrium. For each cross section analyzed, the program searches for the sliding surface that produces the lowest factor of safety (FS). Factor of safety is defined as the ratio of the shear forces/moments resisting movement along a sliding surface to the forces/moments driving the instability.

Subsurface stratigraphy, groundwater conditions, and engineering parameters for the embankment and foundation materials were developed based on previous subsurface investigations performed at the Site (Geosyntec, 2016b and Geosyntec, 2016e).

4.2 Slope Stability Analyses

Four cases were analyzed to satisfy the safety factor assessment requirements in §257.73(e) (Geosyntec, 2016e).

4.2.1 Static, Long-Term Maximum Storage Pool Loading – §257.73(e)(1)(i)

Pursuant to §257.73(e)(1)(i) a static, long-term condition with the maximum operating pool loading on the embankments was evaluated. For the Ash Surge Basin and Bypass Basin, this condition included a pool elevation at 465 feet MSL¹ for the Ash Surge Basin and 465.5 feet MSL for the Bypass Basin, and a groundwater elevation of 451.8 feet MSL (Geosyntec, 2016e).

4.2.2 Static, Maximum Storage Pool Loading – §257.73(e)(1)(ii)

The conditions for §257.73(e)(1)(ii) are identical to §257.73(e)(1)(i) with the exception of the pool elevation, which is set at the lowest points of the embankment crest (Geosyntec, 2016e).

4.2.3 Seismic – §257.73(e)(1)(iii)

Pursuant to §257.73(e)(1)(iii), a seismic condition for Ash Surge Basin and Bypass Basin was also analyzed. Seismic stability was evaluated with a pseudostatic analysis that uses constant horizontal accelerations to represent the effects of earthquake shaking. The horizontal accelerations are represented in SLOPE/W by a horizontal seismic coefficient. The horizontal seismic coefficient used for analysis was based on a peak ground acceleration with a 2 percent probability of exceedance in 50 years (Geosyntec, 2016g).

4.2.4 Liquefaction – §257.73(e)(1)(iv)

The majority of the embankment soils for the Ash Surge Basin and Bypass Basin are not considered susceptible to liquefaction because saturation of the embankment soils is unlikely based on the presence of a geomembrane liner system. Based on the design phreatic surface discussed in Geosyntec (2016b), a limited portion of the bottom of the embankments may become saturated from groundwater. Liquefaction triggering analyses of these saturated embankment soils show that liquefaction and associated post-liquefaction shear strength loss is unlikely for the seismic design event (Geosyntec, 2016d). Because the likelihood of liquefaction and associated shear strength loss of the embankment soils is very low, post-liquefaction conditions are represented by the static factor of safety analyses.

4.3 Results

The results of the slope stability analysis for the critical cross sections of the Ash Surge Basin and Bypass Basin embankments are summarized in Table 1 below and presented in Figures 4 through 9 (Geosyntec 2016e).

¹ Mean Sea Level based on local plant vertical datum.

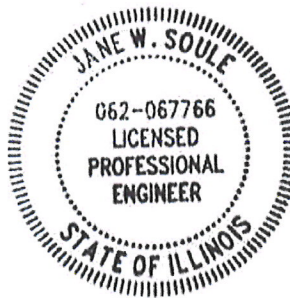
Table 1: Safety Factor Results

Section	Safety Factor			
	257.73(e)(1)(i)	257.73(e)(1)(ii)	257.73(e)(1)(iii)	257.73(e)(1)(iv)
1	≥ 1.50	≥ 1.40	≥ 1.00	≥ 1.20
2	≥ 1.50	≥ 1.40	≥ 1.00	≥ 1.20

These results meet the factor of safety requirements presented in §257.73(e)(1)(i) through §257.73(e)(1)(iv).

5. Limitations and Certification

This initial periodic structural stability and safety factor assessment meets the requirements of §257.73(d) and §257.73(e) of the Code of Federal Regulations Title 40, Part 257, Subpart D, and was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



A handwritten signature in blue ink that reads "Jane W. Soule".

Jane W. Soule, P.E.

Illinois Professional Engineer No. 062-067766

Expiration Date: 11/30/2017

6. References

- Das, 2007. "Principles of Foundation Engineering," Sixth edition. Thomson Canada Limited.
- Geosyntec, 2016a. History of Construction Report, Ash Surge Basin and Bypass Basin, Powerton Station, October.
- Geosyntec, 2016b. Ash Surge Basin and Bypass Basin – Soil Properties Calculation, Powerton Station, October.
- Geosyntec, 2016c. Annual Inspection Report, Ash Surge Basin and Bypass Basin, Powerton Station, 18 January 2016.
- Geosyntec, 2016d. Ash Surge Basin and Bypass Basin – Liquefaction Calculations, Powerton Station, October.
- Geosyntec, 2016e. Ash Surge Basin and Bypass Basin – Slope Stability Calculations, Powerton Station, October.
- Geosyntec, 2016f. Inflow Design Flood Control System Plan, Ash Surge Basin and Bypass Basin, Powerton Generating Station, October.
- Geosyntec, 2016g. Ash Surge Basin and Bypass Basin – Seismic Coefficient Calculations, Powerton Station, October.
- Idriss and Boulanger, 2008. "Soil Liquefaction During Earthquakes". Earthquake Engineering Research Institute, MNO-12.

Attachments

- Figure 1 – Site Location
- Figure 2 – Hydraulic Structure Locations
- Figure 3 – Stability Sections
- Figure 4 – Slope Stability Output, Section 1 - 257.73(e)(1)(i)
- Figure 5 – Slope Stability Output, Section 1 - 257.73(e)(1)(ii)
- Figure 6 – Slope Stability Output, Section 1 - 257.73(e)(1)(iii)
- Figure 7 – Slope Stability Output, Section 2 - 257.73(e)(1)(i)
- Figure 8 – Slope Stability Output, Section 2 - 257.73(e)(1)(ii)
- Figure 9 – Slope Stability Output, Section 2 - 257.73(e)(1)(iii)



2,000 1,000 0 2,000 Feet

Site Location
 Ash Surge and Bypass Basins
 Powerton Station
 Pekin, Illinois

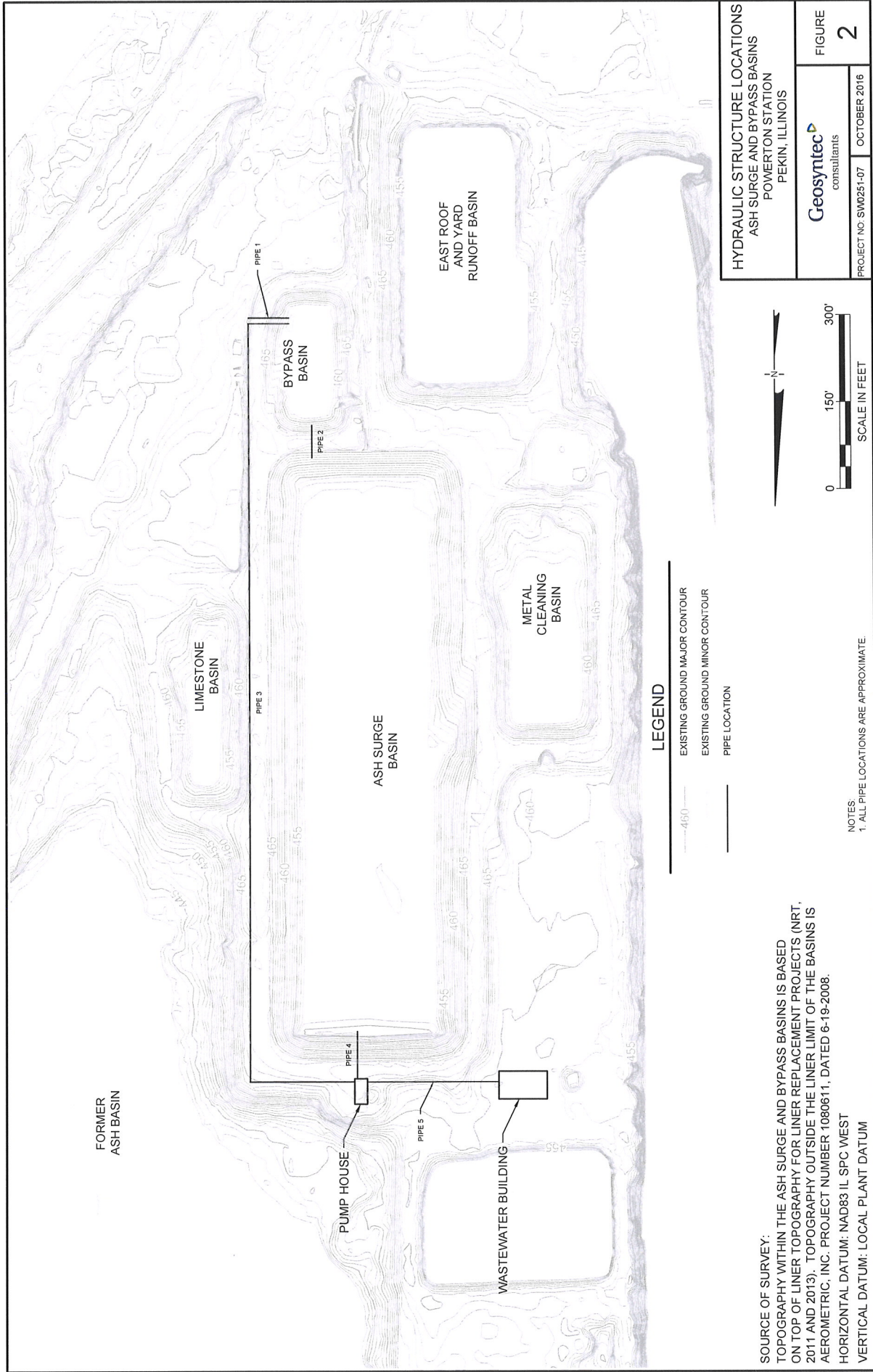
Geosyntec
 consultants

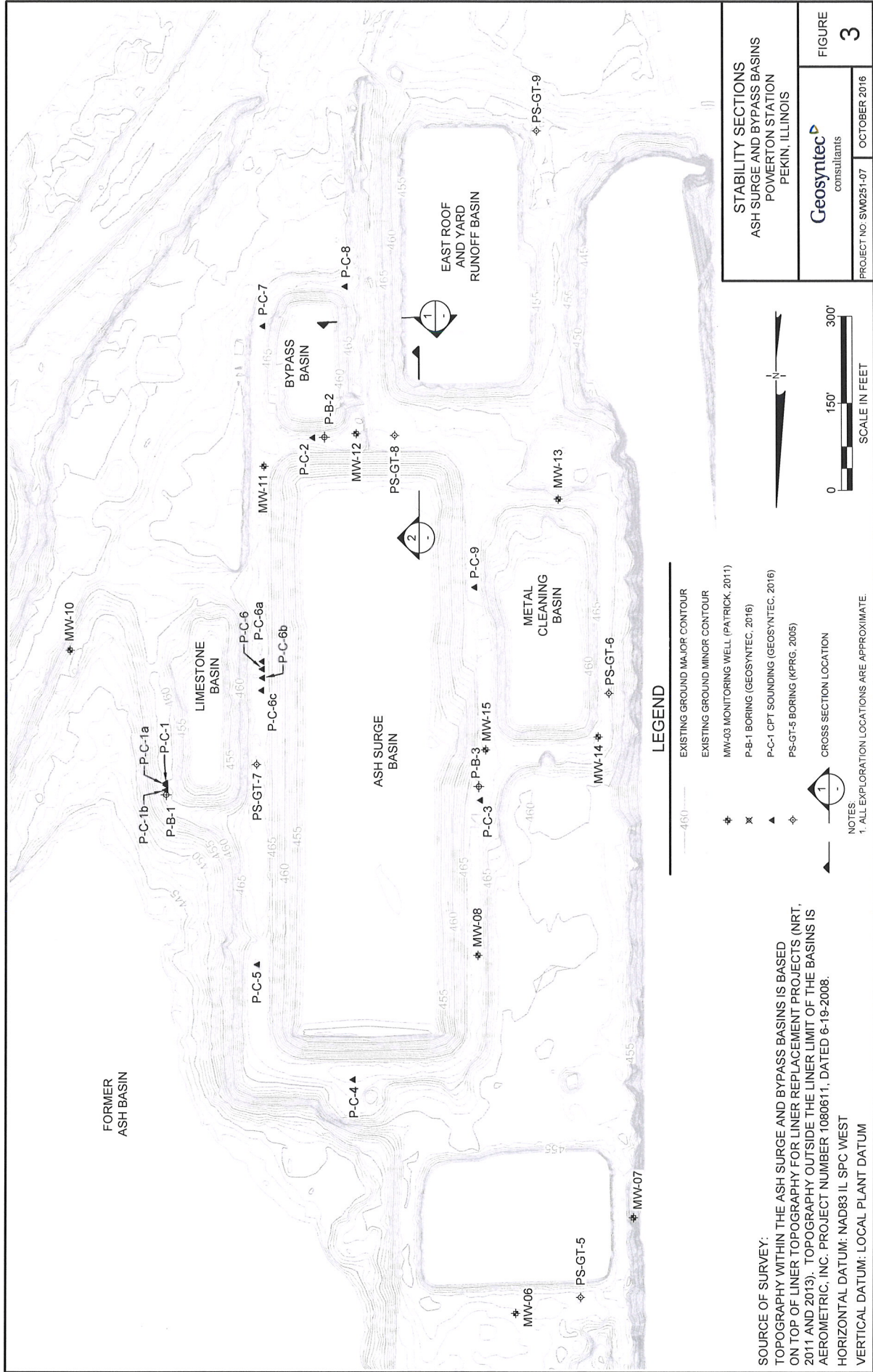
Figure

San Diego

October 2016

1





SOURCE OF SURVEY:
TOPOGRAPHY WITHIN THE ASH SURGE AND BYPASS BASINS IS BASED ON TOP OF LINER TOPOGRAPHY FOR LINER REPLACEMENT PROJECTS (NRT, 2011 AND 2013). TOPOGRAPHY OUTSIDE THE LINER LIMIT OF THE BASINS IS AEROMETRIC, INC. PROJECT NUMBER 1080611, DATED 6-19-2008.
HORIZONTAL DATUM: NAD83 IL SPC WEST
VERTICAL DATUM: LOCAL PLANT DATUM

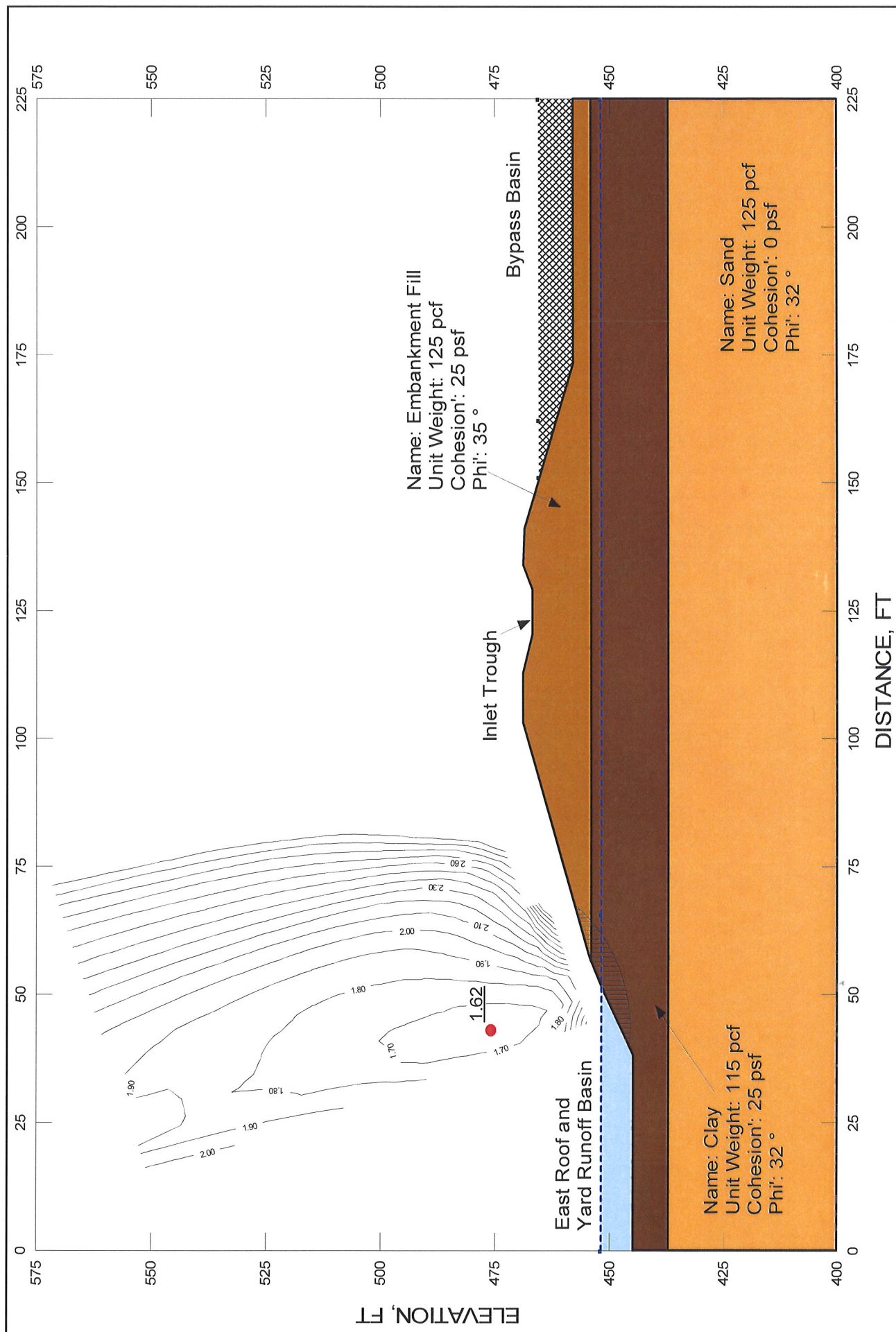
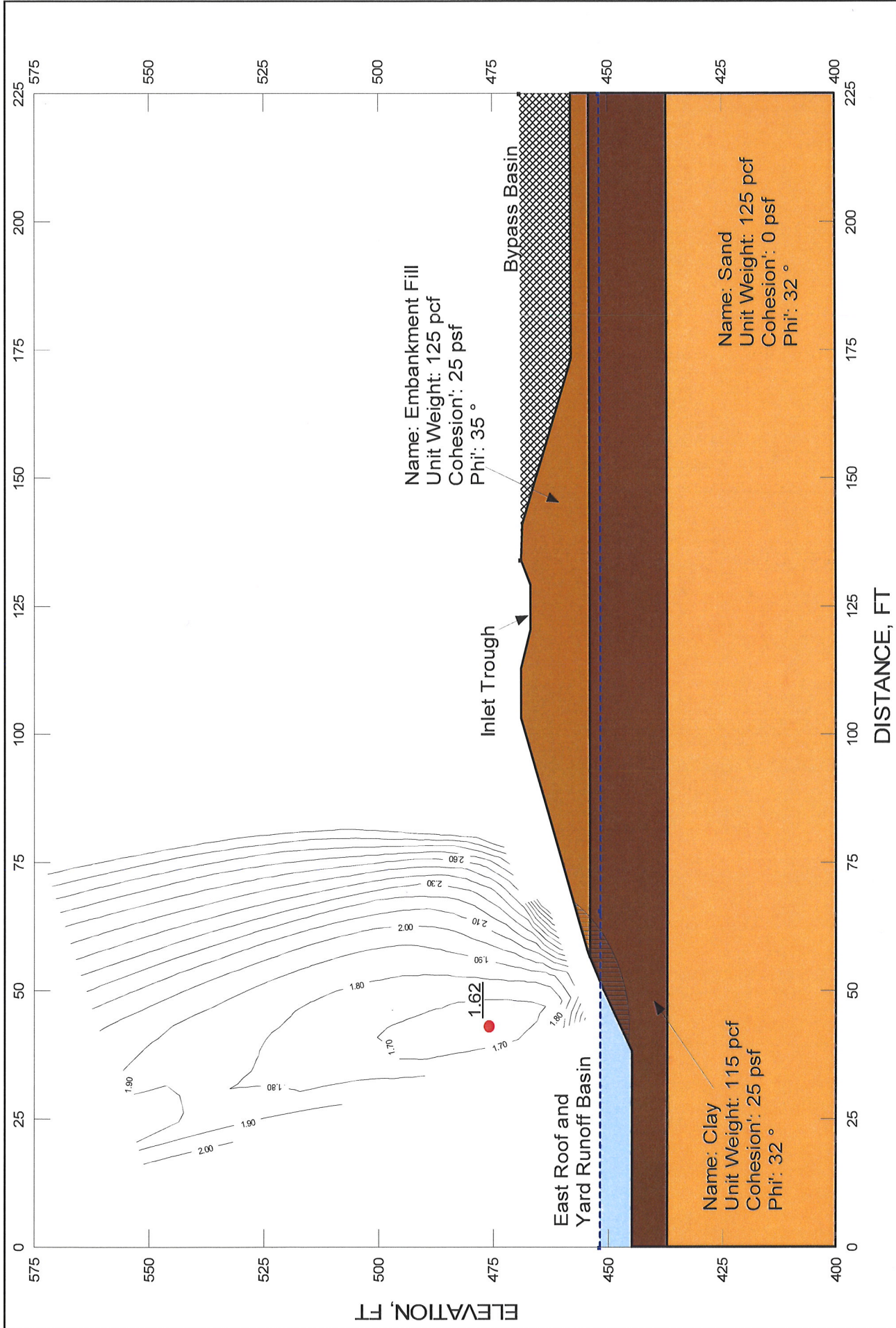
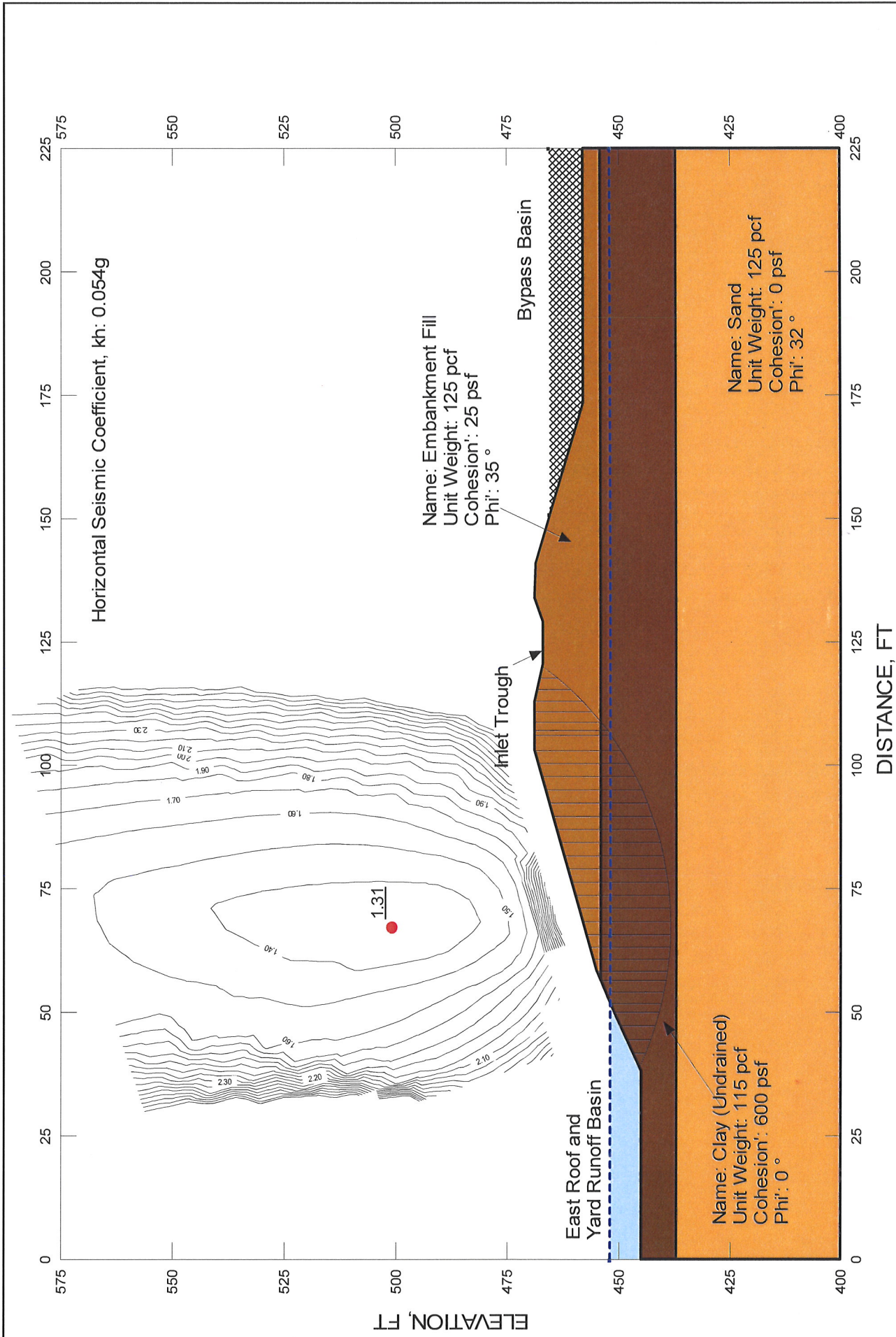
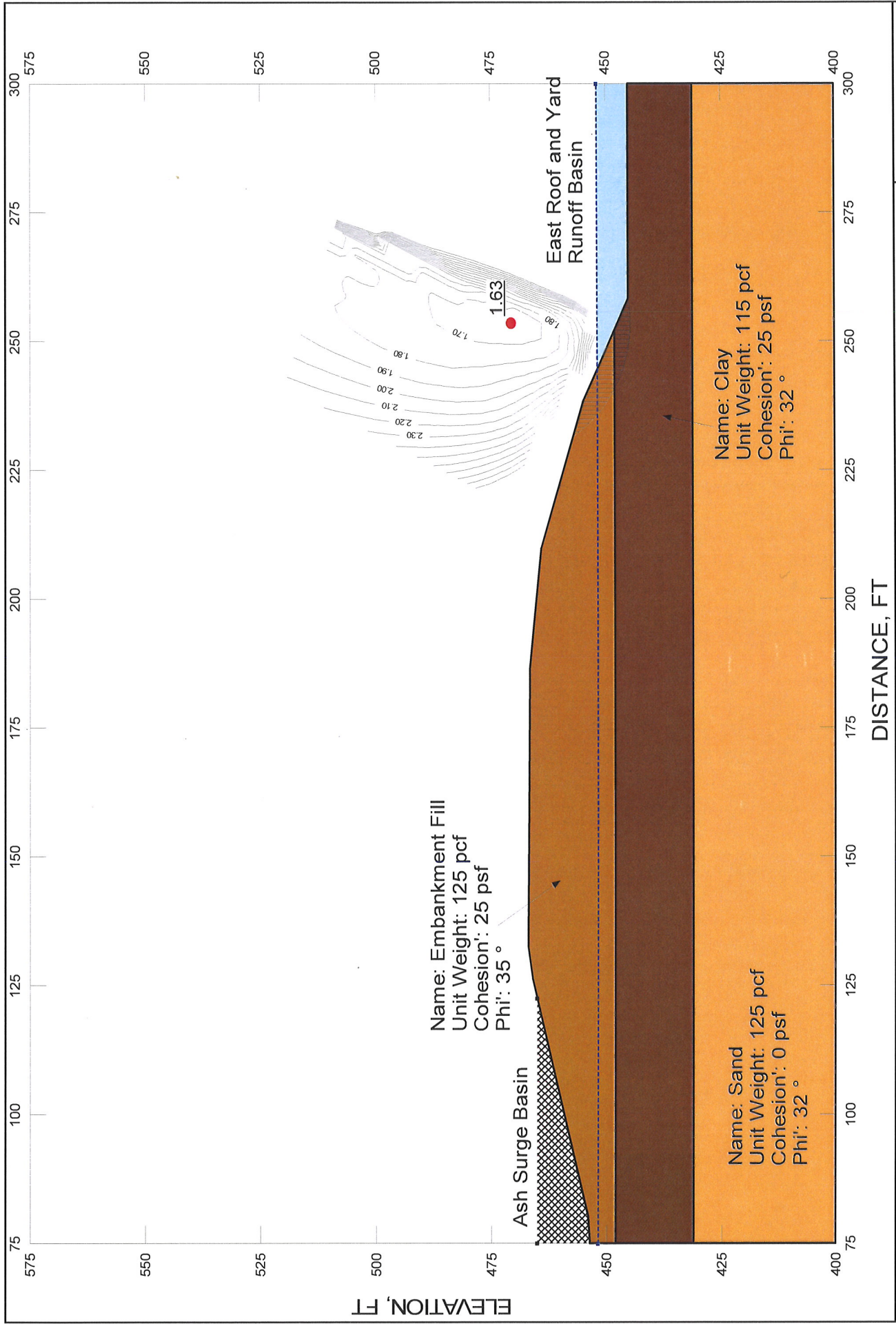
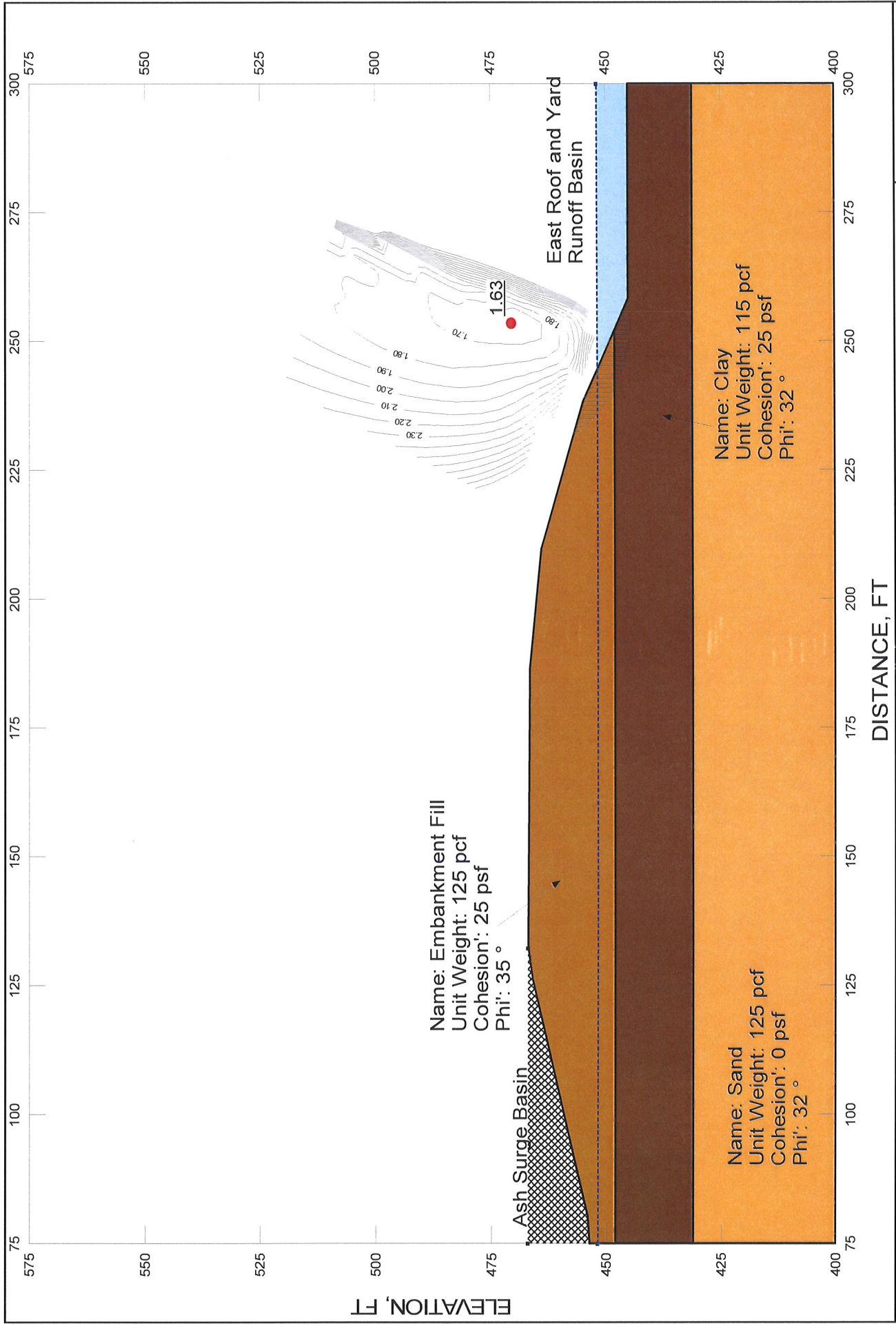


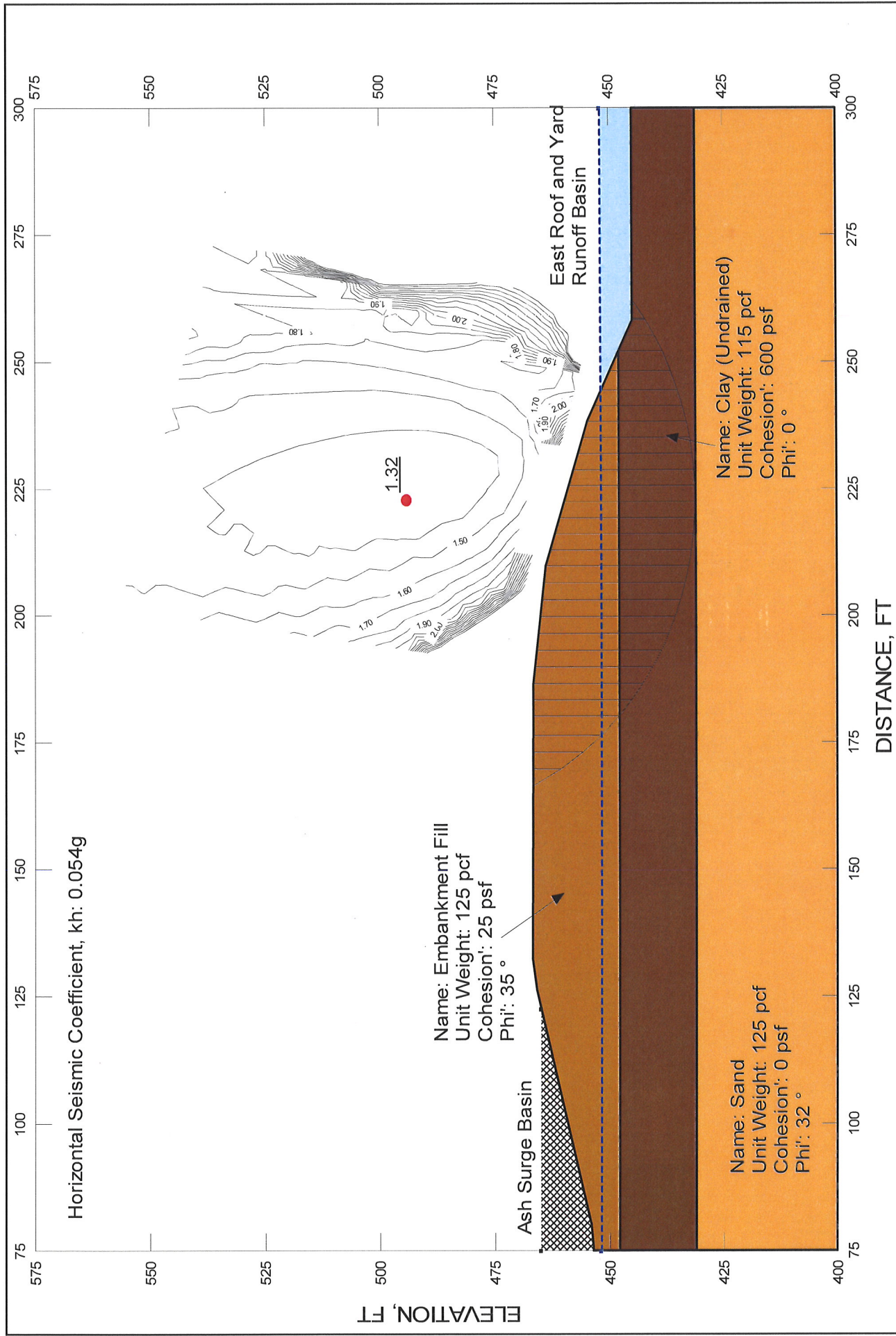
FIGURE 4











ATTACHMENT 5-2
CQA SPECIFICATIONS



Midwest Generation, LLC

POWERTON GENERATING STATION

SPECIFICATION P-1803

**CONSTRUCTION QUALITY ASSURANCE
FOR
ASH SURGE BASIN RETROFIT**

S&L PROJECT NO.: 12661-152

REVISION 0C

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-26-2023





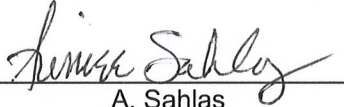
SECTION 000106

ISSUE SUMMARY AND APPROVAL PAGE

<u>Rev.</u>	<u>Purpose of Issue</u>	<u>Date</u>	<u>Sections Affected</u>
0A	Client Comment	03-14-2023	All
0B	Public Comment	03-24-2023	All
0C	Permit	07-26-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications and Bills of Materials, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

<u>Rev.</u>	<u>Prepared By</u>	<u>Reviewed By</u>	<u>Approved By</u>
0A	A. Sahlas	T. Dehlin	--
0B	A. Sahlas	T. Dehlin	--
0C	 A. Sahlas	 T. Dehlin	 T. Dehlin



SECTION 000107
CERTIFICATION PAGE

Sargent & Lundy (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin Date: July 26, 2023

Seal:



Th. J. Dehlin
7/26/2023
EXP. 11/30/2023



SECTION 000110

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DIVISION 00 – PROCUREMENT AND CONTRACTING

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DIVISION 01 – GENERAL REQUIREMENTS

Section 011100	Summary of Work
Section 014362	Construction Quality Assurance for Fill, Liner, and Leachate Collection Materials

END OF SECTION 000110



SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

- | | | |
|-------|-------------------|---|
| 101.1 | Owner: | Midwest Generation, LLC (MWG) |
| 101.2 | Design Engineer: | Sargent & Lundy (S&L) |
| 101.3 | Project Name: | Construction Quality Assurance for Ash Surge Basin Retrofit |
| 101.4 | Project Location: | Powerton Generating Station
13082 E. Manito Rd.
Pekin, IL 61554 |

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

- 102.1 The purpose of this project is to retrofit the Ash Surge Basin at Midwest Generation, LLC's Powerton Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845, and with the U.S. Environmental Protection Agency's (EPA) CCR Rule, 40 CFR Part 257 Subpart D.
- 102.2 The Ash Surge Basin will be retrofitted by first removing all CCR and CCR-mixed materials remaining in the basin; removing the basin's existing gravel warning, sand cushion, and riprap layers; and decontaminating the basin's existing geomembrane liner and appurtenant structures, which will remain in place. Following material removal and decontamination of the basin facilities remaining in-place, a new composite liner system and a new leachate collection and removal system (LCRS) will be installed within the Ash Surge Basin over the basin's existing decontaminated and leak-tested geomembrane liner.

103. SCOPE OF WORK

- 103.1 In general, this Specification covers the field and laboratory activities for a Construction Quality Assurance (CQA) Contractor to provide assurance and documentation that the Ash Surge Basin at the Powerton Generating Station is retrofitted in accordance with the General Work (GW) Specification (P-1802), the Design Drawings, and permit requirements.
- 103.2 The CQA Work shall include, but not be limited, to the following activities:
- a. Prepare a CQA Plan that provides a detailed description of the activities that will be performed by the CQA Contractor in accordance with the Design Drawings and this Specification.
 - b. Verify and document that all appropriate measures are taken by the GW Contractor to protect the Ash Surge Basin's existing geomembrane liner from damage during material removal and liner decontamination activities at the basin.
 - c. Verify and document decontamination of the Ash Surge Basin's existing geomembrane liner as specified in Section 014362 following material removal and liner decontamination activities performed by the GW Contractor.



- d. Perform earthwork inspection and testing work specified in Section 014362 to:
 - d1. Verify compliance of materials with the GW Specification and Design Drawings.
 - d2. Perform specified field material and installation tests.
 - d3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.
 - d4. Perform inspections during construction as specified.
- e. Perform geosynthetics inspection and testing work specified in Section 014362 to:
 - e1. Verify compliance of materials with the GW Specification and Design Drawings.
 - e2. Perform field material and installation tests.
 - e3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.
 - e4. Witness field testing and audit field test results as specified.
 - e5. Perform inspections during construction.
- f. Identify non-conforming work.
- g. Meetings, Documentation, and Reports:
 - g1. Participate in project meetings.
 - g2. Prepare CQA records and documents.
 - g3. Prepare CQA reports, including:
 - g3.1 Preparing an Index Report listing all CQA reports prepared throughout the project.
 - g3.2 Preparing and certifying Weekly Summary Reports until the end of the project.
 - g3.3 Preparing and certifying a Final Report at the end of the project.
- 103.3 The CQA Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The CQA Work shall be performed exclusively by the CQA Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of those located on the work site and associated laboratories, including the CQA Contractor's personnel (or that of its subcontractor(s)) performing the CQA Work.
- 103.4 Performance of the CQA Work shall include all the labor, supervision, administration, management, tools, testing equipment, and consumables to execute the CQA Work identified herein.
- 103.5 Inspection and tests specified in this Specification shall be performed by personnel qualified to perform such inspections and tests.



104. RESPONSIBILITY AND AUTHORITY

104.1 The responsibilities and authority are described below for the organizations that will be involved in the design, permitting, and construction activities associated with the project.

a. Permitting Authority – Illinois EPA:

a1. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit application for retrofitting the Ash Surge Basin to assure compliance with state regulations and for granting the construction permit for the project.

a2. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm the Ash Surge Basin was retrofitted as specified in Project Specifications and the Design Drawings.

b. Owner:

b1. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor.

b2. The Owner will ultimately be responsible for the retrofit construction for the Ash Surge Basin and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings. The Owner will accomplish this by retaining a CQA Contractor for the project.

c. Design Engineer:

c1. S&L is the Design Engineer and is responsible for designing the retrofitted features for the Ash Surge Basin.

c2. The Design Engineer will assure that the retrofit design meets or exceeds the construction and operational requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.

c3. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.

d. GW Contractor:

d1. The GW Contractor shall be responsible for constructing the facility in accordance with the GW Specification (P-1802) and the Design Drawings and shall implement additional quality control and quality assurance procedures and techniques as necessary during construction.

d2. The GW Contractor will consist of an Earthwork Contractor performing the earthwork and a Geosynthetics Contractor installing the geosynthetic materials for the Ash Surge Basin's new composite liner system and new leachate collection and removal system. The GW Contractor may self-perform or subcontract the duties of the Earthwork Contractor and/or Geosynthetics Contractor.



e. CQA Contractor:

e1. The CQA Contractor shall be the company employed by the Owner who is responsible for performing the CQA Work. The CQA Contractor shall be objective, competent, and independent from the GW Contractor whose work is being inspected. The CQA Contractor shall remain independent throughout the duration of the project.

e2. The CQA Contractor's team shall include the CQA Officer and two or more CQA Inspectors.

f. CQA Officer:

f1. The CQA Officer shall be a professional engineer licensed in the State of Illinois who shall be responsible for implementation of the CQA Work. The CQA Officer shall be responsible to the Owner.

f2. The CQA Officer shall be responsible for the performance of activities specified herein such as auditing, inspecting, sampling, testing, documenting, and for preparing and certifying the Final Report. In addition, the CQA Officer and/or its inspectors shall have the responsibility of daily coordination with CQA Inspectors, the GW Contractor and its subcontractors, and the Owner to discuss daily progress, review completed work, plan for upcoming work, perform visual inspections, review test results, and discuss and assist in resolving any current or potential construction problems.

f3. Except as provided by Paragraph 104.1f4, the CQA Officer shall be present to provide supervision and assume responsibility for performing all inspections of the following activities, when applicable:

f3.1 Compaction of subgrade materials.

f3.2 Installation of the new composite liner system.

f4. If the CQA Officer is unable to be present as required by Paragraph 104.1f3, the CQA Officer shall provide the following in writing:

f4.1 The reasons for the CQA Officer's absence.

f4.2 A designation of a person who must exercise professional judgment in carrying out the duties of the CQA Officer-in-Absentia.

f4.3 A signed statement that the CQA Officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-Absentia during the absence of the CQA Officer.

g. CQA Inspectors:

g1. The CQA Inspectors shall be responsible for performing visual examinations and for performing or obtaining field and laboratory tests. The CQA Inspectors shall be under the direct supervision of the CQA Officer.

g2. The CQA Inspectors shall be responsible for reporting to the CQA Officer and the Owner's representative the results of any inspections or tests indicating materials or installed work are of unacceptable quality or do not meet specified design requirements.

g3. Throughout the project, at least one CQA inspector for earthwork (CQA Earthwork Inspector) and at least one CQA inspector for geosynthetics work (CQA Geosynthetics Inspector), each with specialized knowledge and training, shall be present at the site. However, each inspector only needs to be present at the project site if the GW Contractor



is conducting work associated with their scope of responsibility (e.g., the CQA Geosynthetics Inspector only needs to be present when the Geosynthetics Contractor is performing work).

105. QUALIFICATIONS

105.1 CQA Officer:

- a. The CQA Officer shall be a registered professional engineer in the State of Illinois with at least 10 years of experience in design/construction/permitting/licensing, at least 5 years of which is CQA experience as a certifying engineer on landfills or ponds with geomembrane liner systems.
- b. The CQA Officer shall be qualified by education, technical knowledge, and experience to complete the technical certifications required by this Specification.

105.2 CQA Inspectors:

- a. The CQA Inspectors shall have adequate formal academic training and sufficient practical and technical experience needed to execute and record auditing and inspection activities conducted at the site and perform all required laboratory and field testing. This includes a demonstrated knowledge of the various aspects of the type of work being conducted.
- b. As required, different CQA Inspectors, each with specialized knowledge and experience, shall be employed for different portions of the work.
- c. CQA Earthwork Inspectors:
 - c1. The lead CQA field inspector for earthwork (Lead CQA Earthwork Inspector) shall have at least 5 years of experience as an earthwork inspector.
 - c2. All CQA Earthwork Inspectors shall be knowledgeable in:
 - c2.1 Field practices relating to construction techniques used for the type of earthwork being performed.
 - c2.2 Construction and compaction equipment.
 - c2.3 All codes and regulations concerning material installation.
 - c2.4 Observation procedures for earthwork construction.
 - c2.5 Sampling and earthwork testing procedures.
 - c2.6 Testing equipment.
 - c2.7 Documentation procedures.
 - c2.8 Site safety.
- d. CQA Geosynthetics Inspectors:
 - d1. The lead CQA field inspector for geosynthetics (Lead CQA Geosynthetics Inspector) shall have at least 5 years of CQA experience as a field inspector on projects with a geomembrane lining system including two years as a CQA inspector.



- d2. All CQA Geosynthetics Inspectors shall be knowledgeable in:
 - d2.1 Field practice relating to techniques used for the installation of geosynthetic clay liners (GCLs), high-density polyethylene (HDPE) geomembranes, pipes, HDPE geonets, and non-woven geotextiles.
 - d2.2 Correct procedures for seaming GCL.
 - d2.3 HDPE geomembrane welding equipment and the correct operating procedures for seaming HDPE geomembranes, including but not limited to:
 - d2.3.1 Non-destructive seam testing procedures and failure criteria.
 - d2.3.2 Sampling for destructive testing of samples of seams and laboratory testing procedures.
 - d2.3.3 Laboratory testing equipment.
 - d2.4 Geotextile seaming equipment and the correct procedures for splicing geotextiles and joining HDPE geonets.
 - d2.5 All codes and regulations concerning material installation.
 - d2.6 Documentation procedures for field and laboratory tests.
 - d2.7 Site safety.

106. DEFINITIONS

- 106.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.
- 106.2 The term "Work" means the services furnished to complete the CQA activities specified herein.
- 106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material or equipment that has been accepted by the Owner.

107. PROJECT MEETINGS

- 107.1 Project meetings will be held on a periodic basis during the lifetime of the project. The meetings will include:
 - a. A preconstruction meeting.
 - b. Progress meetings.
 - c. Additional meetings as required to discuss problems or work deficiencies.
- 107.2 Preconstruction Meeting:
 - a. The preconstruction meeting will be organized by the Owner. In addition to the Owner, the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), the Lead CQA Inspectors, and any other interested party designated by the Owner shall attend the preconstruction meeting.
 - b. The preconstruction meeting shall be used to discuss:
 - b1. Site specific safety requirements.



- b2. Requirements of the Design Drawings, GW Specification, and CQA Specification.
 - b3. The CQA Contractor's CQA Plan and the responsibilities of each party.
 - b4. The lines of authority and communication.
 - b5. Procedure for submittal of manufacturer QA/QC documents for audit.
 - b6. Procedures for examination of materials delivered to the site.
 - b7. Location of material storage area(s).
 - b8. Field and laboratory test requirements and sample sizes.
 - b9. Procedures for observance of field tests.
 - b10. Coordination between each contractor and the CQA Inspector to obtain timely field samples and tests.
 - b11. Procedure for handling construction deficiencies, repairs, and retesting.
 - b12. Work area security and safety protocol.
 - b13. Work days and work hours.
 - b14. Coordination with other contractors or trades.
 - b15. Site visits.
- 107.3 Weekly Progress Meetings:
- a. Weekly progress meetings will be scheduled by the Owner. In addition to the Owner, the meetings shall be attended by the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and the Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), and the Lead CQA Inspectors.
 - b. If needed, daily meetings shall be held each day to review the work schedule, work completed, results of tests, and to discuss potential construction problems.
 - c. The Owner or its designee will document each meeting and distribute copies of meeting minutes to all responsible parties.
- 107.4 Additional Meetings:
- a. Additional meetings between one or more contractors, the Lead CQA Inspector(s), and the CQA Officer (or the CQA Officer-in-Absentia) shall be held immediately after a work deficiency is identified or a problem arises. These meetings shall be used to define and resolve the problem.
 - b. Any supervisor/superintendent can request such a meeting through their line of authority.
 - c. Possible solutions to the problem shall be discussed, and an acceptable solution shall be selected. This solution shall be implemented provided it does not conflict with or require a change to the Design Drawings, in which case the solution shall be submitted to the Design Engineer for review.
 - d. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes from the permitted design shall require approval by the Owner and Design Engineer to ensure



that the original design objectives are maintained. All changes shall meet the requirements of the Permitting Authority and may include regulations approved by the Permitting Authority.

- e. The CQA Contractor shall document each special meeting and distribute copies of minutes to all responsible parties.

108. PERFORMANCE AUDITS AND CQA DOCUMENTATION

108.1 As a minimum, the CQA Officer shall conduct the following reviews and performance audits:

- a. Full review and audit of results of preconstruction testing or GW Contractor's material certificates used to qualify earthwork materials for construction use.
- b. Full review and audit of manufacturer certificates that qualify composite liner system and LCRS materials for construction use.
- c. Weekly audit of reports and test data sheets during and after construction of the earthwork until completion of work.
- d. Weekly audit of reports and test data sheets during and after installation of composite liner system materials until completion of the work.
- e. Weekly audit of reports and test data sheets during and after installation of LCRS materials until completion of the work.

108.2 CQA documentation shall be well-documented and include at least the following:

- a. Daily records, which shall include:
 - a1. Inspection data sheets.
 - a2. Data sheets listing the number and types of construction equipment used by the GW Contractor, including applicable construction equipment data.
 - a3. Problem identification reports and corrective action reports. Problem identification reports and corrective action reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be cross-referenced to specific inspection data sheets where the problem was identified and corrected.
- b. Testing records, which shall include:
 - b1. Material shipping and manufacturer QA/QC data sheets.
 - b2. Data sheets describing field samples taken.
 - b3. Laboratory data sheets.
 - b4. Field test data sheets.
 - b5. Notes, charts, drawings, or sketches identifying the location and elevation of field tests, location of failures and repairs or retests, and where samples were obtained.
 - b6. Non-destructive test reports including location of failures, records of repairs, and results of retests.



- c. Photographic records, which shall include:
 - c1. Digital photographs, each with a unique identifying number.
 - c2. Figure indicating the location from which each photograph was taken.
 - c3. Summary list giving the date and time of each photograph.
- 108.3 All records shall, at a minimum, bear the following:
 - a. Unique identifying sheet number.
 - b. The date.
 - c. Project name, project number, and location.
 - d. Descriptive remarks.
 - e. Data sheets for tests.
 - f. Written text descriptions for visual observations
 - g. Signature of the preparer of designated authority.

END OF SECTION 011100



SECTION 014362

QUALITY ASSURANCE FOR FILL, LINER, AND LEACHATE COLLECTION MATERIALS

PART 1 – GENERAL

101. EXTENT

- 101.1 The intent of this section is to define the requirements for Construction Quality Assurance (CQA) activities to ensure that the quality of materials and installation procedures used to retrofit the Ash Surge Basin are in accordance with the General Work (GW) Specification P-1802, Design Drawings, permit requirements, and as specified herein.
- 101.2 The Work specified within this Specification is the responsibility of the CQA Contractor and shall include, but not be limited to, the following items:
- a. Attend project meetings and site visits scheduled by the Owner or GW Contractor for coordination between the Owner, GW Contractor, subcontractors, and CQA Contractor.
 - b. Perform pre-construction material certification activities to ensure materials meet or exceed GW Specification requirements that include but are not limited to:
 - b1. Testing for suitability of material prior to use.
 - b2. Perform pre-construction audits of material certifications prior to material use.
 - c. Perform CQA activities during construction to ensure materials meet or exceed GW Specification requirements that include but are not limited to:
 - c1. Perform audits of material certifications.
 - c2. Perform field observations, inspections, and tests and review test results.
 - c3. Perform laboratory tests and review test results.
 - c4. Material sampling.
 - d. Documentation of all observations, findings, and testing, and of conformance of work to the GW Specification to be submitted by the Owner to the Permitting Authority.
 - e. Preparation of an Index Report, Weekly Summary Reports, and a Retrofit Completion Report
 - f. Submit a draft version of the Retrofit Completion Report to the Owner and Design Engineer for their review and comment. Upon resolution of all comments, submit a final version of the Retrofit Completion Report, sealed and certified by the CQA Officer, to the Owner and Design Engineer.
- 101.3 Definitions:
- a. The following definitions of terms shall apply throughout this section:
 - a1. GCL Manufacturer: The manufacturer who is, pursuant to Specification P-1802, responsible for manufacturing and transporting GCL materials to the site.
 - a2. GM/GC Manufacturer: The manufacturer who is, pursuant to Specification P-1802, responsible for manufacturing and transporting geomembrane and drainage geocomposite materials to the site.

- a3. Pipe Manufacturer: The manufacturer who is, pursuant to Specification P-1802, responsible for manufacturing and transporting LCRS pipe materials and fittings to the site.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 CQA Specification P-1803:

- a. Section 011100 – Summary of Work.

102.2 GW Specification P-1802:

- a. Section 319005 – Earthwork.
- b. Section 319020 – High-Density Polyethylene Geomembrane Liner with Geocomposite.
- c. Section 319025 – Geosynthetic Clay Liner (GCL).
- d. Section 319050 – Leachate Collection and Removal System.

103. REFERENCE DOCUMENTS

- 103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein.

- 103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

- 103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

- a. D422 Standard Test Method for Particle-Size Analysis of Soils.
- b. D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- c. D1004 Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- d. D1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- e. D1556 Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
- f. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- g. D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- h. D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
- i. D2434 Standard Test Method for Permeability of Granular Soils (Constant Head).

- j. D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- k. D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).
- l. D4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- m. D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- n. D4643 Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating.
- o. D4716 Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- p. D4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- q. D4959 Standard Test Method for Determination of Water Content of Soil By Direct Heating.
- r. D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
- s. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
- t. D5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- u. D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
- v. D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual-Seamed Geomembranes.
- w. D5887 Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.
- x. D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
- y. D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
- z. D5993 Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners.
- aa. D5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes.
- bb. D6243 Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.
- cc. D6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.

- dd. D6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
 - ee. D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.
 - ff. D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - gg. D7005 Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.
- 103.5 GRI – Geosynthetic Research Institute:
- a. GM6 Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembrane.
- 103.6 ITP – Illinois Test Procedure:
- a. 27 Sieve Analysis of Fine and Coarse Aggregates
104. SUBMITTALS
- 104.1 Submittals with Bid Proposal:
- a. Documentation to substantiate that the CQA Contractor's and its laboratory's Accreditation Certifications are current.
 - b. Detailed resumes on all CQA laboratory and field personnel proposed for the Work, including:
 - b1. A complete description of their qualifications and previous experience in the same type of work.
 - b2. Documentation of certification to perform required testing.
- 104.2 Submittals During the Course of the Work:
- a. Certifications and submittals as specified herein.
 - b. An Index Report, Weekly Summary Reports, and a Retrofit Completion Report as described below shall be prepared.
 - b1. Index Report:
 - b1.1 An Index Report shall be prepared listing all records and reports.
 - b1.2 The Index Report shall be assembled in chronological framework for recording and identifying all reports.
 - b2. Weekly Summary Reports:
 - b2.1 At the end of each week of construction, until construction is complete, a Weekly Summary Report must be prepared by either the CQA Officer or under the supervision of the CQA Officer and submitted to the Owner and the Design Engineer. The CQA Officer must review and approve each Weekly Summary Report.
 - b2.2 The Weekly Summary Report shall contain descriptions of the weather, locations where construction occurred during the previous week, materials used, results of testing, inspection reports, and procedures used to perform inspections.



b3. Retrofit Completion Report:

- b3.1 After the GW Contractor completes retrofit construction activities, the CQA Officer shall prepare a Retrofit Completion Report that demonstrates the Ash Surge Basin was retrofitted in conformance with Project Specifications, the Design Drawings, and permit requirements. At a minimum, this report shall include:
 - b3.1.1 All data sheets, testing records, manufacturer data sheets, and reports concerning items that were installed and tested.
 - b3.1.2 Photographs of the liner system and leachate collection system and any other photographs relied upon to document construction activities. All photographs shall include time, date, and location information.
 - b3.1.3 Any designations of CQA officers-in-absentia in accordance with Section 011100, Paragraph 104.1f4.
 - b3.1.4 Certification that the GW Contractor's work is in compliance with Project Specifications, the Design Drawings, and permit requirements.
 - b3.1.5 Certifications that:
 - b.3.1.5.1 Pipe bedding material contains no undesirable objects.
 - b.3.1.5.2 The anchor trench and backfill are constructed to prevent damage to a geosynthetic membrane.
 - b.3.1.5.3 All tears, rips, punctures, and other damage to geosynthetic materials are repaired.
 - b.3.1.5.4 All geomembrane seams are properly constructed and tested in accordance with the manufacturer's specifications.
 - b.3.1.5.5 Proper filter material consisting of uniform granular fill, to avoid clogging, is used in construction.
 - b.3.1.5.6 The filter material, as placed, possesses structural strength adequate to support the maximum loads imposed by the overlying materials and equipment used at the facility.
- b3.2 The first draft version of the Retrofit Completion Report shall be submitted to the Owner and Design Engineer for their review and comment within one week after completion of CQA Work.
- b3.3 Within one week of resolving all comments, the final version of the Retrofit Completion Report shall be sealed and certified by the CQA Officer and submitted to the Owner and Design Engineer.

105. CONSTRUCTION QUALITY ASSURANCE REQUIREMENTS

105.1 Organizations Involved:

- a. The organizations involved in the design, permitting, and construction activities associated with the Ash Surge Basin Retrofit project are defined in Section 011100.
- b. The responsibilities and authorities of the organizations and personnel associated with the Ash Surge Basin Retrofit project are described in Section 011100.

105.2 Qualifications:

- a. The qualifications of the CQA Contractor personnel are described in Section 011100.

- 105.3 Project Meetings:
 - a. The requirements for project meetings and audits are described in Section 011100.
- 105.4 Performance Audits, CQA Documentation, and CQA Reports:
 - a. The requirements for performance audits and CQA documentation are described in Section 011100.
 - b. The requirements for CQA reports are described in Paragraph 104.2 of this section.

PART 2 – PRODUCTS

- 201. PRODUCTS
- 201.1 The requirements for the various products used for retrofitting the Ash Surge Basin are specified in their respective technical specification sections in the GW Specification.
- 201.2 All permanent materials to be used in the Ash Surge Basin Retrofit project will be supplied by the GW Contractor. The CQA Contractor shall coordinate with the GW Contractor on obtaining material certifications and samples for performing the audits and tests required by this Specification.

PART 3 – EXECUTION

- 301. GENERAL CQA TESTING AND INSPECTION REQUIREMENTS
- 301.1 Record daily weather conditions.
- 301.2 Field tests shall document the elevation and coordinate location for each test. The locations may be determined by survey, taping, or pacing off distances or hand-held GPS receiver provided the receiver indicates an error of 20 ft or less at the time the coordinates are recorded. All locations should be reported in appropriate significant figures. Locations of seams, damage to geosynthetics, and repairs to geosynthetics shall be obtained through quality survey methodologies.
- 301.3 Material Source Testing: Material source testing activities include visual observations and laboratory and field testing at the material source to control material quality and material preparation prior to transport of the material to the project site.
- 302. CQA TESTING AND INSPECTION REQUIREMENTS FOR EXISTING LINER DECONTAMINATION ACTIVITIES
- 302.1 Testing During Construction:
 - a. CQA activities during removal of material from and decontamination of the Ash Surge Basin's existing geomembrane liner shall include visual observations and field testing to verify the liner has been decontaminated in accordance with the Design Drawings.
 - b. Visual Observations:
 - b1. Observe and record method(s) of material removal and decontamination.
 - b2. Verify and document that the GW Contractor is taking necessary precautions to avoid damaging the geomembrane liner. Identify any locations where damage to the existing geomembrane liner has occurred and record the method(s) used to repair such damage.



- b3. Verify and document that the GW Contractor has developed and is implementing fugitive dust controls in accordance with 35 Ill. Adm. Code 845.740(c)(2), which must include:
 - b3.1 A water spray or other commercial dust suppressant to suppress dust in CCR handling areas and haul roads.
 - b3.2 Handling of CCR to minimize airborne particulates and offsite particulate movement during any weather event or condition.
- b4. Verify and document that the GW Contractor has developed and is implementing measures to prevent contamination of surface water, groundwater, soil, and sediments in accordance with 35 Ill. Adm. Code 845.740(c)(4).
 - b4.1 If CCR and CCR-impacted material removed from the Ash Surge Basin is temporarily stored, verify and document the material is stored in a lined landfill, CCR surface impoundment, enclosed structure, or CCR storage pile.
 - b4.2 If CCR and/or CCR-impacted material are temporarily stored in a CCR storage pile, verify and document the pile is:
 - b4.2.1 Tarped or constructed with wind barriers to suppress dust and to limit stormwater contact with the pile.
 - b4.2.2 Is periodically wetted and/or has periodic application of dust suppressants.
 - b4.2.3 Has a storage pad or a geomembrane liner that:
 - b.4.2.3.1 Has a hydraulic conductivity no greater than 1×10^{-7} cm/sec.
 - b.4.2.3.2 Is properly sloped to allow appropriate drainage.
 - b4.2.4 Is tarped over the edge of the storage pad where possible.
 - b4.2.5 Is constructed with fixed and/or mobile berms, where appropriate, to reduce run-on and run-off of stormwater to and from the storage pile, and minimize stormwater-CCR contact.
 - b4.2.6 Is located within the groundwater monitoring system in-place for the Ash Surge Basin, Bypass Basin, and/or Metal Cleaning Basin.
- b5. Verify and document that all material removal and decontamination work is performed in a systematic manner to remove all ash and ash residuals from the liner surface.
- b6. Verify and document that the GW Contractor is providing adequate temporary ballasting on exposed liner areas to prevent uplift of the geomembrane by wind by the use of sandbags and/or other means which will not damage the geomembrane.
- b7. For areas of geomembrane that are damaged, verify and document that the GW Contractor addresses and repairs the damaged areas as specified on the Design Drawings.
- b8. Verify and document that the GW Contractor repairs all locations of the geomembrane from which samples are obtained for verification of decontamination.
- c. Laboratory and Field Tests:
 - c1. Perform an electrical leak location survey over decontaminated liner areas as specified on the Design Drawings.



- c2. Collect samples of the existing geomembrane liner for verification of decontamination by laboratory testing as specified on the Design Drawings.
- c3. Perform laboratory testing of existing geomembrane liner samples as specified on the Design Drawings.
- d. Test Acceptance Criteria:
 - d1. Laboratory and field test acceptance criteria shall be as specified on the Design Drawings.
 - d2. If the results from any of the laboratory and field tests do meet the respective pass/fail thresholds, then the CQA Officer shall reject all existing geomembrane liner areas corresponding to the failed test(s) as decontaminated.

303. CQA TESTING AND INSPECTION REQUIREMENTS FOR STRUCTURAL FILL MATERIAL

303.1 Initial Material Certification:

- a. Prior to shipment of any Structural Fill material, the CQA Contractor shall assemble, document the receipt of, and audit the material supplier's test results and certifications that the properties of the material meet GW Specification requirements.

303.2 Inspections and Testing During Construction:

- a. CQA activities during placement of Structural Fill shall include visual observations and laboratory and field testing to ensure that Structural Fill is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-1 and the following paragraphs.
- b. Visual Observation of the Material Source for Structural Fill Material During Construction:
 - b1. Inspect materials to ensure that they are uniform.
 - b2. Visually inspect the material in accordance with ASTM D2488.
 - b3. Inspect to ensure that only suitable material is transported to the site, observe segregation operations if unsuitable materials are present, and observe (if necessary) the removal of organic soils, roots, stumps, and stones.
 - b4. Observe changes in color or texture that can be indicative of a change in material type or moisture content.
 - b5. Observe moisture conditioning activities to ensure that any required substantial changes in moisture content are made at the source.
- c. Visual Observation of Fill Placement:
 - c1. Record the placement method(s) the GW Contractor is utilizing for installing the Structural Fill.



- c2. In instances where the GW Contractor is transporting material into the basin, the CQA Contractor shall:
 - c2.1 Verify no equipment (wheeled or tracked) is traversing the Ash Surge Basin area when less than 10 inches of earthen material are above the basin's existing geomembrane liner.
 - c2.2 Document the receipt of and audit the GW Contractor's demonstration(s) that equipment entering the basin will not exert a ground pressure greater than 8 psi.
 - c2.3 Verify equipment operating within the basin does not hard brake on the ramp, make sharp turns, nor make quick stops that could pinch or tear the Ash Surge Basin's existing geomembrane liner.
- c3. Record type and size of compaction equipment in use:
 - c3.1 For rubber-tired rollers, record the tire inflation pressure, spacing of tires, and empty and ballasted wheel loads.
 - c3.2 For hand tampers, record make, model number, size, and compactive effort.
 - c3.3 Observe and record compactive effort, uniformity of compaction, and scarification and connection between compacted lifts. Record number of passes of a roller by type, size, and weight of roller.
 - c3.4 For proofrolling, record the type, size, and weight of compaction equipment or other vehicles used for proofrolling.
- c4. Observe removal of roots, rocks, rubbish, or out-of-specification soil from the borrow material.
- c5. Observe and record changes in soil characteristics necessitating a change in construction procedures.
- c6. Observe fill placement and procedures for proper lift thickness.
- c7. Observe procedures to be followed to adjust the soil moisture content to obtain uniform moisture content.
- c8. Observe and record final finishing procedures.
- c9. Observe and record that final grade is consistent with the design grade specified on the Design Drawings.
- d. Laboratory and Field Tests:
 - d1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-1.
- e. Test Acceptance Criteria:
 - e1. Acceptance criteria shall be as specified in GW Specification Section 319005.

304. CQA TESTING AND INSPECTION REQUIREMENTS FOR GEOSYNTHETIC CLAY
LINER COMPONENT OF COMPOSITE LINER SYSTEM

304.1 Initial Material Certification:

- a. Prior to shipment of any geosynthetic clay liner (GCL) materials, the CQA Contractor shall assemble, document the receipt of, and audit the GCL Manufacturer's submittals listed below for conformance with the GW Specification.
 - a1. Certificates describing the origin and identification of the raw materials.
 - a2. Copy of the GCL Manufacturer's QA/QC certificates on tests performed on the material and a summary of results of the tests.
 - a3. Certification and guarantee by the GCL Manufacturer that the properties of the manufactured material meet GW Specification requirements.
 - a4. Certification that the GCL was continuously inspected during the manufacturing process for, as a minimum, the following:
 - a4.1 Lack of uniformity.
 - a4.2 Damage.
 - a4.3 Imperfections.
 - a4.4 Holes.
 - a4.5 Tears.
 - a4.6 Thin spots.
 - a4.7 Foreign materials.
- b. GCL Panel Layout:
 - b1. Document receipt of the GCL Manufacturer's proposed GCL panel layout.

304.2 Transportation, Handling, and Storage:

- a. Documentation of Delivery:
 - a1. Document arrival of rolls of GCL.
 - a2. Document that each roll is labeled and that each label identifies the following information:
 - a2.1 Name of GCL Manufacturer.
 - a2.2 Product identification (brand name, product code).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 GCL thickness.
 - a2.7 Roll identification number.

- a2.8 Roll dimensions (i.e., length and width) and weight.
- a2.9 Panel number, which shall be referenced to the proposed GCL panel layout drawing prepared by the GCL Manufacturer.
- a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
- a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
- b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.
 - b6. Report all damage to the Owner.
- c. Handling:
 - c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.
 - c2. Inspect the handling of materials by installing personnel to ensure that care is used.
- d. Storage:
 - d1. Inspect the storage facility.
 - d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth and free of rocks, holes, and debris.
 - d3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 304.3 Preconstruction Testing:
 - a. Prior to material shipment to the site, the GCL Manufacturer shall submit to the CQA Contractor representative samples of the GCL materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the GCL materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing of the received GCL samples in accordance with Table 014362-3. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-3.
 - b. Test acceptance criteria shall be as specified in GW Specification Section 319025. If the results from any of the tests in Table 014362-3 do not meet the respective pass/fail



thresholds, then the CQA Officer shall reject all GCL material for which the failed test(s) represent(s) for use in the project.

304.4 Inspections During Construction:

- a. CQA activities during placement of the GCL component of the Ash Surge Basin's new composite liner system shall include visual observations and field testing to ensure that the GCL is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-3 and the following paragraphs.
- b. Weather Conditions for Placement:
 - b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure that they are appropriate for GCL placement. The GW Specification describes acceptable weather conditions.
 - b2. If the weather becomes unacceptable for installation of GCL, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.
- c. GCL Placement:
 - c1. Supporting Surface:
 - c1.1 Prior to placement of the GCL, visually inspect the Structural Fill surface to ensure that it meets the requirements of the GW Specification. Confirm that it is compacted and is free from clods of soil, rocks larger than specified, roots, sudden or sharp changes in grade, and standing water. Field observations shall be performed in accordance with the requirements specified in Table 014362-4.
 - c1.2 Provide documentation of daily inspection of the Structural Fill surface for the area of GCL to be placed that day.
 - c2. Panel Deployment, Seams, and Repairs:
 - c2.1 As each panel is unrolled, visually inspect the GCL to ensure there are no flaws or damage. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the GCL for repair.
 - c2.2 Document that the location of the seams meet the general requirements for seaming contained in GW Specification Section 319025.
 - c2.3 At the time of placement, make measurements to confirm that required overlap of adjacent GCL panels has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the GCL is being placed in a relaxed (nonstressed) state.
 - c2.4 Document any liner damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Any damage shall be documented on a drawing and marked on the GCL for repair.
 - c2.5 Document improper GCL panel placement and, as a result, inadequate coverage with the available materials or an excess number of field seams.
 - c2.6 Document inadequate sheet overlap resulting in poor quality seams.

c2.7 Document unseamed or cut panels.

c2.8 Document repair of damage. Documentation shall include location, type, and method of repair.

305. CQA TESTING AND INSPECTION REQUIREMENTS FOR GEOMEMBRANE COMPONENT OF COMPOSITE LINER SYSTEM

305.1 Initial Material Certification and Inspection of Installation Plans:

a. Prior to shipment of any geomembrane materials, the CQA Contractor shall assemble, document the receipt of, and audit the GM/GC Manufacturer submittals listed below for conformance with the GW Specification.

a1. Geomembrane Resin:

a1.1 Certificate that the resin meets GW Specification requirements.

a1.2 Certificate of the origin of the resin and that all resin is from the same supplier (including resin supplier's name, identification brand name, and number).

a1.3 Copies of the GM/GC Manufacturer's and resin supplier's QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index, and percent carbon black.

a2. Geomembrane Sheeting:

a2.1 Certification that the properties of the manufactured sheeting meet GW Specification requirements and are guaranteed by the GM/GC Manufacturer.

a2.2 Statement certifying that no reclaimed polymer has been added to the resin. Note: Polymer recycled during the manufacturing process may be permitted provided that it does not exceed 10% by weight.

a2.3 Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).

a2.4 Copies of all of the GM/GC Manufacturer's QA/QC certificates for the geomembrane sheeting. The certificates shall include test results.

a3. Extrudate Resins or Rod for Seaming Geomembrane:

a3.1 Certification from the GM/GC Manufacturer that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.

b. Review of GW Contractor's Installation Plans:

b1. Geomembrane Field Installation Quality Assurance Plan:

b1.1 Document receipt of the GW Contractor's QA plan for installing geomembrane.

b1.2 Review the plan for compliance with the GW Specification and document where the plan is not in compliance.

b2. Geomembrane Panel Layout:

b2.1 Document receipt of the GW Contractor's panel layout for geomembrane.



- 305.2 Transportation, Handling, and Storage:
- a. Documentation of Delivery:
 - a1. Document arrival of rolls of geomembrane.
 - a2. Document that each roll is labeled and that each label identifies the following information:
 - a2.1 Name of GM/GC Manufacturer.
 - a2.2 Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier's name, resin production plant, resin brand name type, and production date of the resin).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 Geomembrane thickness and type.
 - a2.7 Roll identification number.
 - a2.8 Roll dimensions (i.e., length and width) and weight.
 - a2.9 Panel number, which shall be referenced to the proposed HDPE geomembrane liner panel layout drawing prepared by the GM/GC Manufacturer.
 - a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
 - a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
 - b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.
 - b6. Report all damage to the Owner.
 - c. Handling:
 - c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.



- c2. Inspect the handling of materials by installing personnel to ensure that care is used.
- d. Storage:
 - d1. Inspect the storage facility.
 - d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.
 - d3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 305.3 Preconstruction Testing:
 - a. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the geomembrane materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing in accordance with Table 014362-6. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-6.
 - b. Test acceptance criteria shall be as specified in GW Specification Section 319020. If the results from any of the tests in Table 014362-6 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all geomembrane material from the resin batch corresponding to the failed test(s) for use in the project.
- 305.4 Inspections and Testing During Construction:
 - a. CQA activities during placement of the geomembrane component of the Ash Surge Basin's new composite liner system shall include visual observations and field testing to ensure that the geomembrane is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-6 and the following paragraphs.
 - b. Weather Conditions for Placement:
 - b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure that they are acceptable for geomembrane placement and seaming. The GW Specification describes acceptable weather conditions.
 - b2. If the weather becomes unacceptable for installation of the geomembrane liner, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.
 - c. Geomembrane Placement:
 - c1. Prior to placement of the geomembrane liner, the GCL component of the composite liner system in the area to be lined shall have been installed, seamed, and inspected and all necessary repairs made in accordance with GW Specification Section 319025.
 - c2. Observe and document that the GW Contractor's geomembrane placement plan is being followed. Note where the plan is not being followed and document the GW Contractor's reasons for not following the plan. As each panel is placed, visually inspect the geomembrane for tears, punctures, and thin spots. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the geomembrane for repair.

- c3. Document that the location of the seams meet the general requirements for seaming specified in GW Specification Section 319020.
- c4. At the time of placement, make measurements to confirm that required overlap of adjacent geomembrane sheets has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the geomembrane is being placed in a relaxed (nonstressed) state.
- c5. Document any liner damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the geomembrane for repair and on a drawing.
- c6. Document improper liner placement (e.g., if the GW Contractor's geomembrane placement plan is not followed) and, as a result, inadequate coverage with the available materials or an excess number of field seams.
- c7. Document inadequate sheet overlap resulting in poor quality seams.
- c8. Document nonwelded or cut panels.
- c9. Document repair of damage. Documentation shall include location, type, and method of repair.
- d. Geomembrane Seaming and Seam Repair:
 - d1. Trial Welds Prior to Beginning Seaming:
 - d1.1 Observe that trial welds are being made at the frequency specified in GW Specification Section 319020.
 - d1.2 Observe fabrication of test strips and note that test strips are fabricated correctly.
 - d1.3 Specify where samples are to be cut from the test strips and witness all destructive tests.
 - d1.4 Observe documentation of results of the destructive tests by the GW Contractor.
 - d1.5 Audit documentation of each trial weld received from the GW Contractor.
 - d2. Seaming and Seam Repair. Activities that shall be documented during field seaming operations include:
 - d2.1 Observe that the geomembrane is free from dirt, dust, and moisture.
 - d2.2 Observe that the seaming materials and seam welding equipment are as specified.
 - d2.3 Observe that a firm surface is available for seaming.
 - d2.4 Observe that geomembrane overlap and panel adjustment are correct prior to seaming.
 - d2.5 For extrusion welding, observe that the geomembrane is pre-beveled and the geomembrane is properly abraded and that the panels are temporarily bonded.
 - d2.6 Observe that grind marks are covered with extrudite.
 - d2.7 Observe weather conditions (e.g., temperature, precipitation, wind) to ensure that they are acceptable for seaming.

- d2.8 Record measurements of temperatures, pressures, and speeds of seaming to ensure that they are as specified. Gages and dials on seaming equipment shall be checked and readings recorded.
- d2.9 Observe that the geomembrane is not damaged by equipment or personnel during the seaming process.
- d2.10 Observe that no solvents or adhesives are used.
- e. Anchorage at Existing Penetrations and Concrete Structures:
 - e1. Where shown on the Design Drawings, CQA Geosynthetics Inspectors shall ensure that the seals around existing penetrations and the anchorage to existing concrete structures are of sufficient strength and are impermeable.
 - e2. Specific inspections that shall be made on all seals and anchors include:
 - e2.1 Observations and tests to ensure that the sealing systems (i.e., pipe boots) have been installed as specified (are leak free) and in the proper location(s).
 - e2.2 Observations to ensure that all objects that are placed adjacent to the geomembrane (i.e., batten bars) are smooth and free of objects or conditions that may damage the geomembrane.
 - e2.3 Observations to ensure that all seals and anchors are complete:
 - e2.3.1 Batten bars of the specified material, width, and thickness and prepunched at the specified spacing.
 - e2.3.2 Anchor bolts of the specified size and material.
 - e2.3.3 Anchor bolts spaced as specified.
 - e2.4 Observations to confirm that all geomembrane liner penetrations and connections are installed as specified. Liner penetrations shall be verified for appropriate clamp and caulking use, for appropriate material, for good seaming, and for good housekeeping practices. No sharp bends on concrete surfaces shall be allowed.
- f. Geomembrane Production Seam Testing:
 - f1. Non-Destructive Field Testing. Activities to be observed and documented include the following:
 - f1.1 Observe that 100 percent of the seam lengths are tested using non-destructive procedures.
 - f1.2 Observe that testing is performed as seaming progresses.
 - f1.3 Observe that the correct procedures are used for testing each type of seam.
 - f1.4 Observe all non-destructive test procedures.
 - f1.5 For air pressure testing, observe that the equipment, procedures, and air pressure meet specified requirements. Observe that all testing is properly documented.
 - f1.6 For vacuum box testing, observe that testing is being performed correctly.
 - f1.7 For inaccessible seams, observe that a procedure acceptable to the Owner is used to test the seams.

- f1.8 Observe that all leaks are marked, recorded as to location, and repaired.
- f1.9 Observe that repairs are made in accordance with approved techniques.
- f1.10 Observe that all repairs are re-tested and that no leakage is present.
- f1.11 Review leakage data for possible patterns. Make suggestions to the GW Contractor if data shows a consistent pattern of failure of a particular machine or crew.
- f1.12 Audit documentation of testing prepared by the GW Contractor to make sure that the location of leaks is identified on the drawings.
- f2. Destructive Testing:
 - f2.1 Destructive seam testing shall be performed at the frequencies specified in GW Specification Section 319020.
 - f2.2 The CQA Geosynthetics Inspector shall specify the location where each sample shall be taken and record data for each sample.
 - f2.3 The CQA Geosynthetics Inspector shall designate any additional test locations that may be necessary. These locations may be based on the suspicion of contamination by dirt or moisture, change in seaming materials, increase in failed nondestructive tests, and other causes that could result in unacceptable seams.
 - f2.4 Laboratory testing shall be performed in accordance with GW Specification Section 319020. Predetermined pass/fail values are specified in that section. Verbal laboratory test results shall be given to the Geosynthetics Contractor within 24 hours of receipt of the test samples. Written results shall follow within one week.
 - f2.5 Audit and document the results of laboratory testing on seam samples. Note any sample that does not pass and identify the location on the geomembrane liner for repair in the field and on the drawings.
- f3. Repair of Failed Seams:
 - f3.1 For field seams that fail, the seam can either be reconstructed between the failed and any previous passed seam location, or the installer can go on either side of the failed seam location (10-foot minimum), take another sample, and test it. If that sample passes, reconstruct the seam between the two locations. If it fails, the process shall be continued. In all cases, acceptable seams must be bounded by two passed test locations. The CQA Geosynthetics Inspector shall document the procedure used and results of tests.
 - f3.2 Document that repairs are made. Documentation shall include location, type, and method of repair.
- 306. CQA TESTING AND INSPECTION REQUIREMENTS FOR DRAINAGE GEOCOMPOSITE OF LEACHATE COLLECTION AND REMOVAL SYSTEM
 - 306.1 Initial Material Certification:
 - a. Prior to shipment of any drainage geocomposite materials, the CQA Contractor shall assemble, document the receipt of, and audit the GM/GC Manufacturer submittals listed below for conformance with the GW Specification.
 - a1. Copies of the raw material producers' certificates describing the origin and identification of the raw materials.



- a2. Copies of the raw material producers' QC certificates.
 - a3. Statement certifying that the manufactured drainage geocomposite is free of per- and polyfluoroalkyl substances (PFAS).
 - a4. Copies of the GM/GC Manufacturer's QC certificates on tests performed on the geonet core, the geotextile cap and carrier, and the finished drainage geocomposite as specified in Specification P-1802 Section 319020 and a summary of the test results.
 - a5. Certification that the properties of the manufactured drainage geocomposite material meets GW Specification requirements and are guaranteed by the GM/GC Manufacturer.
- 306.2 Transportation, Handling, and Storage:
- a. Documentation of Delivery:
 - a1. Document arrival of rolls of drainage geocomposite.
 - a2. Document that each roll is marked with the following information:
 - a2.1 Name of GM/GC Manufacturer.
 - a2.2 Product identification (e.g., brand name, product code).
 - a2.3 Order number.
 - a2.4 Date of manufacture.
 - a2.5 Manufacturing lot number.
 - a2.6 Drainage geocomposite thickness and type.
 - a2.7 Roll identification number.
 - a2.8 Roll dimensions (length and width) and weight.
 - a2.9 Panel number.
 - a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.
 - a4. Recommend rejection of rolls which do not have the required documentation and ensure that those rolls are removed from the site.
 - b. Inspection of Manufactured Rolls:
 - b1. Inspect all manufactured rolls upon delivery to the site.
 - b2. Ensure that packaging is secure and that no damage has occurred.
 - b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.
 - b4. If damage to just the packaging has occurred, document repair of the packaging.
 - b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.



- b6. Report all damage to the Owner.
- c. Handling:
 - c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.
 - c2. Inspect the handling of materials by installing personnel to ensure that care is used.
- d. Storage:
 - d1. Inspect the storage facility.
 - d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.
 - d3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 306.3 Preconstruction Testing:
 - a. Prior to material shipment to the site, the GM/GC Manufacturer shall submit to the CQA Contractor representative samples of the drainage geocomposite materials to be shipped to the site, along with a chain of custody and a certification that the samples submitted are from the drainage geocomposite materials to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing in accordance with Table 014362-7. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-7.
 - b. Test acceptance criteria shall be as specified in GW Specification Section 319020. If the results from any of the tests in Table 014362-7 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all drainage geocomposite materials for which the failed test(s) represent(s) for use in the project.
- 306.4 Inspections During Construction:
 - a. CQA activities during placement of the drainage geocomposite component of the Ash Surge Basin's new LCRS shall include visual observations and field testing to ensure that the drainage geocomposite is installed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-7 and the following paragraphs.
 - b. Weather Conditions for Placement:
 - b1. Observe and document the weather conditions (e.g., temperature, precipitation, and wind) to ensure they are acceptable for placement. The GW Specification describes correct weather conditions.
 - b2. If the weather becomes unacceptable for installation of the drainage geocomposite, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.
 - c. Drainage Geocomposite Placement:
 - c1. Prior to placement of the drainage geocomposite, the HDPE geomembrane component of the composite liner system in the area to be lined shall have been installed, seamed, and inspected and all necessary repairs made in accordance with GW Specification Section 319020.



- c2. Inspect all materials as they are unrolled to ensure that there are no flaws or damage.
 - c3. Observe and document that drainage geocomposite coverage is as specified on the Design Drawings, that joining of the geonet cores is as specified in GW Specification Section 319020, and that sewing of the geotextile caps is as specified in GW Specification Section 319020.
 - c4. Make measurements to ensure that the specified material overlap is achieved.
 - c5. Observe and document that all materials are free from wrinkles and folds.
 - c6. Observe and document that the material is not damaged during the installation process.
 - c7. Document any material damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the drainage geocomposite for repair and on a drawing.
 - c8. Document repair of damage. Documentation shall include location, type, and method of repair.
307. CQA TESTING AND INSPECTION REQUIREMENTS FOR COARSE AGGREGATE BEDDING, SAND FILTER LAYER, PROTECTIVE WARNING LAYER, RIPRAP BEDDING LAYER, AND RIPRAP MATERIALS
- 307.1 Initial Material Certification:
- a. Prior to shipment of any Coarse Aggregate Bedding, Sand Filter Layer, Protective Warning Layer, Riprap Bedding Layer, or riprap materials, the CQA Contractor shall assemble, document the receipt of, and audit the material suppliers' test results and certifications that the properties of the materials meet GW Specification requirements.
- 307.2 Inspections and Testing During Construction:
- a. CQA activities during the placement of Coarse Aggregate Bedding, Sand Filter Layer, Protective Warning Layer, Riprap Bedding Layer, and riprap materials shall include visual observations and laboratory and field testing to ensure that the materials are installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-2 and the following paragraphs.
 - b. Visual Observations of Material Placement:
 - b1. Upon delivery of the material to the site, inspect the material to ensure that it has not been contaminated during transportation and handling. Observe and document rejection of contaminated materials and replacement of suitable materials.
 - b2. Record the placement method(s) the GW Contractor is utilizing for installing the material.
 - b3. In instances where the GW Contractor is transporting material into the basin, then the CQA Contractor shall:
 - b3.1 Verify no equipment (wheeled or tracked) is traversing the Ash Surge Basin area when less than 10 inches of earthen material are above geosynthetic materials (i.e., drainage geocomposite, geomembrane liner, GCL).
 - b3.2 Document the receipt of and audit the GW Contractor's demonstration(s) that equipment entering the basin will not exert a ground pressure greater than 8 psi.

- b3.3 Verify equipment operating within the basin does not hard brake on the ramp, make sharp turns, nor make quick stops that could pinch or tear geosynthetic materials.
- b4. Observe placement procedures to provide proper thickness.
- b5. Observe placement procedures to prevent segregation and degradation of material.
- b6. Observe placement procedures to:
 - b6.1 Ensure pipes and underlying geosynthetic materials are not damaged during the installation process (Note: Side slope cover installation must be observed at all times to assure appropriate placement technique and equipment are used and to detect any damage to geosynthetic materials).
 - b6.2 Ensure that placement of the Coarse Aggregate Bedding material did not damage or displace the leachate collection pipe.
- c. With the use of the GW Contractor's surveyor, make thickness measurements not more than 50 feet on a grid pattern to ensure that the thickness and coverage of each material is in compliance with the Design Drawings.
- d. Audit surveys of each completed layer to ensure that specified slopes and elevations specified on the Design Drawings are obtained.
- e. Laboratory and Field Tests:
 - e1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-2.
- f. Test Acceptance Criteria:
 - f1. Acceptance criteria shall be as specified in GW Specification Section 319050.
- 308. CQA TESTING AND INSPECTION REQUIREMENTS FOR LEACHATE COLLECTION PIPING AND SIDESLOPE RISERS
- 308.1 Initial Material Certification:
 - a. Prior to shipment of any HDPE piping, the CQA Contractor shall assemble, document the receipt of, and audit the Pipe Manufacturer's submittals listed below for conformance with the GW Specification:
 - a1. Certification that the manufactured pipe meets the requirements of the GW Specification.
 - a2. Statement that no reclaimed polymer has been added to the resin.
 - a3. Copies of the Pipe Manufacturer's QA/QC certificates on tests performed during fabrication.
- 308.2 Transportation, Handling, and Storage:
 - a. Documentation of Delivery and Inspection of HDPE Pipe:
 - a1. Document the arrival of pipe.
 - a2. Check the Quality Control certificates and marking on each pipe to verify that the pipe received meets the GW Specification requirements.

- a3. Document that each length of pipe is marked with the following information:
 - a3.1 Name of Pipe Manufacturer.
 - a3.2 Pipe type (ASTM designation).
 - a3.3 Pipe size (diameter).
 - a3.4 Standard Dimension Ratio (SDR).
- a4. Document that all fittings are fabricated and manufactured by the same manufacturer.
- a5. Measure and document the spacing and diameter of perforations for perforated pipe and that perforations are predrilled prior to shipment.
- a6. Recommended rejection of pipe that does not have the required documentation; that is of the incorrect size, type, or strength; or that is incorrectly fabricated. Ensure that rejected pipes are removed from the site.
- b. Handling:
 - b1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.
 - b2. Inspect the handling of materials by installing personnel to ensure that care is used.
- c. Storage:
 - c1. Inspect the storage facility.
 - c2. Inspect the ground surface to ensure that it is dry, relatively level, smooth, and free of rocks, holes, and debris.
 - c3. Document unsafe or improper storage conditions, and report conditions to the Owner.
- 308.3 Preconstruction Testing:
 - a. Observe and document that the pipes are of the specified size and strength and are constructed of the specified material.
 - b. Observe and document that pipe perforations for perforated pipe are as specified.
 - c. Observe and document that the material is not damaged during the installation process and that underlying geosynthetic materials are not damaged.
- 308.4 Inspections and Testing During Construction:
 - a. Inspection activities that shall be performed during pipe placement and joining include:
 - a1. Location:
 - a1.1 Observations and measurements to ensure that the specified pipe sizes are placed at the specified locations.
 - a1.2 Observations to ensure that perforated pipe is placed correctly.
 - a1.3 Measurements to ensure that the horizontal and vertical position and slope are within tolerances required by the GW Specification.
 - a1.4 Document the as-built locations of all pipes.



a2. Pipe Joining:

a2.1 Observations to ensure that the pipe is joined by using the hot plate thermal butt fusion method as required by the GW Specification and that the equipment used for welding is as recommended by the Pipe Manufacturer.

a2.2 Observations to ensure that the joining method described in the GW Specification is followed.

a3. Joint Quality Control:

a3.1 Observations and documentation that the test joints required by the GW Specification are made.

a3.2 Observations and documentation that the quality of the test joints meet the GW Specification.

a4. Miscellaneous:

a4.1 Observations to ensure that cleanouts are installed as specified.

a4.2 Observations to ensure that the placement of the Coarse Aggregate Bedding material under, around, and over the pipe is as specified on the Design Drawings.

a4.3 Observations to ensure that the pipe network is not damaged during backfilling.

a5. Cleaning:

a5.1 Observe that all the pipes are cleaned by jet cleaning after installation is complete and document that all pipes are intact and not obstructed.

a5.2 Document the location of defective or clogged pipe.

a5.3 Document repair by the GW Contractor and re-cleaning.

a6. Testing:

a6.1 Observe and document that visual observations on pipe joints have been performed and the results of observations documented.

a6.2 Document the location of failed joints.

a6.3 Document the repair and retesting of failed joints by the GW Contractor and the results of testing.

309. CQA TESTING AND INSPECTION REQUIREMENTS FOR CREST ANCHOR TRENCH

309.1 Inspections and Testing During Construction:

a. CQA activities during excavation, formation, and backfilling of crest anchor trenches for the retrofitted Ash Surge Basin's geosynthetic materials shall include visual observations and field testing to ensure that, where specified on the Design Drawings, crest anchor trenches are constructed in accordance with the GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-5 and the following paragraphs.



b. Measurements:

b1. Perform measurements of the crest anchor trench to ensure that the trench width, depth, and location are as specified on the Design Drawings.

c. Observations:

c1. Observe that the trench corners are rounded as specified.

c2. Observe that good housekeeping practices are followed in the trenching operation by not allowing soil to fall back into the trench or down the slope and not allowing water to pond in the trench.

c3. Observe that the trench is backfilled as soon as possible after the geosynthetic materials being anchored are installed and compacted in a manner that does not damage the geosynthetic materials.

310. SAMPLING PATTERN

310.1 The CQA Officer shall establish a completely random sampling pattern for determining the choice of sampling points for field tests. Each block of work shall be subdivided into a sampling grid with at least 10 times as many grids as samples or tests to be taken or as directed by the Owner. The grid shall have a numeric identification system devised to distinguish each set of tests for a specific area from all other sets of tests. Each lift shall have a separate grid.

310.2 Sampling points shall be chosen by a random number generator or other acceptable method to obtain uniform coverage. Tests shall be numbered beginning with test number one (1) and no numbers shall be skipped. In areas where a test of any type fails to meet specification criteria and a retest is performed, the retest shall have the same test number as the original test except that an "R" shall follow the test designation.

311. VERIFICATION AND CALIBRATION

311.1 Verification of Selected Field Tests:

a. The following tests shall be verified at the following frequency:

<u>Test Requiring Verification</u>	<u>Frequency of Verification</u> <u>Test</u>
Nuclear In-Place Density and Nuclear In-Place Moisture Content, ASTM D6938	Note 1
"Quick" Moisture Content Test Using Microwave, (ASTM D4643) or Gas Stove, Frying Pan, or Infrared Oven, (ASTM D4959), etc.	One standard oven-dry moisture content (ASTM D2216) test per 20 quick tests.
Lift Thickness Measured Using a Shaft or Shovel	One lift thickness verified by measurement every two acre-lifts.

Notes:

1 – A standard block test as required by ASTM D6938 shall be performed at the start of each day on each Nuclear apparatus that will be used that day. At the start of earthwork construction, a series of five Nuclear tests and five sand cone or rubber balloon tests shall be performed in the borrow area, or area to be excavated, on a compacted test strip



to calibrate the Nuclear apparatus. During construction, one of the last Nuclear readings performed at the end of each day shall be verified using a sand cone (ASTM D1556) or rubber balloon (ASTM D2167) density and moisture content test for each apparatus used that day. The average wet density and moisture content for each apparatus shall be computed for every ten tests. If variations greater than those permitted by the ASTMs occur, corrections shall be applied to all future tests for the apparatus until the next set of 10 tests is performed.

311.2 Calibration:

- a. Procedures for calibration of field and laboratory testing equipment shall be submitted by the CQA Contractor prior to the start of testing. These procedures shall meet ASTM requirements.

312. CORRECTIVE ACTION PROCEDURES

312.1 Failure of Material Quality Tests:

- a. The GW Contractor and the Owner shall be notified immediately if gradation or Atterberg limits tests do not meet GW Specification acceptance criteria. Failure to meet acceptance criteria of one or more of these groups of tests may indicate problems with the quality of soil materials. The GW Contractor shall cease all construction activities until the source of the problem or "out-of-specification" materials are identified. Construction shall not begin again until materials and installation procedures meeting GW Specification acceptance criteria are identified for use.

312.2 Failure of Field Density or Moisture Content Tests:

- a. If the results of field density or moisture content tests fail to meet GW Specification acceptance criteria, those tests shall be re-run after recompaction. Judgment shall be used to select re-test locations suspected of having lower than specified density or moisture content. If the results of the re-test meet GW Specification requirements, the compaction can be considered acceptable. If the results of the re-tests show out-of-specification densities or moisture contents, the CQA Officer shall immediately inform the Owner of the extent of the defective area. The defective area shall be removed and reconstructed or recompacted by the GW Contractor.



TABLE 014362-1
CQA FOR STRUCTURAL FILL MATERIAL

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	In-Situ Moisture Content	Laboratory Moisture Content	ASTM D2216	One per 500 cubic yards, and for each moisture density curve sample.
2	Moisture Density Curve	Proctor	ASTM D1557	One per 500 cubic yards, and for all changes in material.
3	Soil Index Properties	Atterberg Limits	ASTM D4318	One per 500 cubic yards, and for each moisture density curve sample.
4	Soil Index Properties	Grain Size	ASTM D422	One per 500 cubic yards, and for each moisture density curve sample.
5	Soil Classification	Unified Soil Classification System	ASTM D2487	One per 500 cubic yards, and for each moisture density curve sample.
6	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938 ⁽¹⁾ , ASTM D2167, or ASTM D1556	Four per lift. One per 500 cubic yards.
7	Field Moisture Content	Nuclear Density Gauge or Direct Heat Method	ASTM D6938 ⁽¹⁾ or ASTM D4959	At each field density test location.
8	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per acre per lift.
9	Surface Lines and Grades	Surveying		One per 50-foot grid and at grade breaks (i.e., toe and top of slopes).

Notes:

(1) ASTM D6938 Procedure B (backscatter) shall be used to measure the as-compacted density of Structural Fill material.



TABLE 014362-2

CQA FOR COARSE AGGREGATE BEDDING, SAND FILTER LAYER, PROTECTIVE WARNING LAYER, RIPRAP BEDDING, AND RIPRAP MATERIALS

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
Coarse Aggregate Bedding, Protective Warning Layer, Road Surfacing, Riprap Bedding, and Riprap Materials				
1	Soil Index Properties	Grain Size	ITP 27	One per 500 cubic yards.
2	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per lift. One per 250 linear feet of road for material to be used as road surfacing.
3	Certification of Final Thickness and Grade	Surveying		One per 50-foot grid spacing.
Sand Filter Layer Material				
1	Hydraulic Conductivity	Hydraulic Conductivity	ASTM D2434	One per 500 cubic yards.
2	Soil Index Properties	Grain Size	ITP 27	One per 500 cubic yards.
3	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per lift. One per 250 linear feet of road for material to be used as road subgrade.
4	Certification of Final Thickness and Grade	Surveying		One per 50-foot grid spacing.



TABLE 014362-3
CQA FOR GEOSYNTHETIC CLAY LINER

No.	Characteristic to be Monitored	Test	
		Test Method Reference	Minimum Test Frequency
1	Swell Potential	ASTM D5890	One test prior to material delivery for each type of material, and one test per material per 20,000 SF
2	Fluid Loss Properties	ASTM D5891	
3	Moisture Content	ASTM D4643	
4	Nonwoven Cap and Nonwoven Carrier Mass / Area	ASTM D5261	
5	Bentonite Mass / Area	ASTM D5993	
6	Hydraulic Conductivity	ASTM 5084	
7	Index Flux	ASTM D5887	
8	Tensile Strength	ASTM D6768	
9	Peel Strength	ASTM D6496	
10	Hydrated Internal Shear Strength	ASTM D6243	



TABLE 014362-4
CQA FOR AREAS TO RECEIVE GEOSYNTHETIC MATERIALS

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Certification of Surface Elevation Prior to Geomembrane	Surveying		One per 50-foot grid and at grade breaks (toe and top of slopes).
2	Subgrade Firm and Unyielding	Observe and Document Proofroll		Continuous on Structural Fill surface.
3	Subgrade Free of Deleterious Conditions	Observe and document exposed subgrade is free from • Irregularities • Protrusions • Loose soil or soft spots • Abrupt changes in grade • Debris • Clods • Stones • Roots • Organic material • Moisture seeps, puddling, or ponding • Frozen material		Continuous



TABLE 014362-5
CQA FOR ANCHOR TRENCHES

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Trench Geometry	Measurement		2 locations per trench 1 location per 100 ft of trench
2	Trench Condition	Observe and Document • Trench free of sloughed material • Trench free from ponded water • Absence of loose material below geosynthetics		Continuous
3	Trench Backfill	Observe and document prompt backfill of trenches		Continuous
4	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938, ASTM D2167, or ASTM D1556	Two per lift One per 200 ft of trench per lift



TABLE 014362-6
CQA FOR HDPE GEOMEMBRANE

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Receipt of Delivery	Observe and document: • Name of GM/GC Manufacturer • Product identification • Date of manufacture of the geomembrane • Roll identification number • Geomembrane thickness and type • Physical dimensions (length, width) • Manufacturing lot number • Panel number and weight • Order number	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections, Blisters, Excessive Folding	Visual	Each Roll
3	Geomembrane Properties	Thickness	ASTM D5994	5 per roll of geomembrane delivered at locations evenly distributed throughout roll
		Density	ASTM D1505 / D792	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tensile properties (strength and elongation at yield and at break)	ASTM D6693	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tear resistance	ASTM D1004	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Puncture resistance	ASTM D4833	Per resin batch, but not less than once per 20,000 SF of geomembrane



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
		Carbon black content	ASTM D4218	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Carbon black dispersion	ASTM D5596	Per resin batch, but not less than once per 20,000 SF of geomembrane
4	Weather and Site Conditions at Time of HDPE Geomembrane Deployment and Seaming	Observe and document weather and site conditions		Continuous
5	Panel Deployment	Observe and document: • Relaxed deployment • Damage prevention • Wrinkles minimized • Temporary anchorage • Protected from damage • Proper overlap • Seam location	Visual	Continuous
6	Trial Welds	Observe and document Geosynthetics Contractor staff performing and testing trial welds		• Prior to each seaming period. • Every 4 hours of continuous seaming. • Whenever personnel or equipment are changed. • When climatic conditions result in wide changes in geomembrane temperature. • When requested by the CQA Geosynthetics Inspector(s) for any seaming crew or piece of welding equipment if problems are suspected.



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
7	Preparation for Seaming	Observe and document: • HDPE geomembrane is clean • Minimum wrinkles and fish mouths • Fish mouths cut as necessary to lay flat • Film surface for seaming	Visual	Continuous
8	Seaming	Observe and document: • Materials • Equipment • Staff • Acceptable procedures • Weather • Pressure • Speed • Damage • Absence of solvents	Visual	Continuous
9	Non-Destructive Seam Tests	Observe and document: • Equipment • Methods • Pressures • Leaks marked • Repairs made • Repairs retested	Double-Wedge Fusion Welds: ASTM D5820 and GRI GM6	100 percent of seam lengths shall be tested.
			Extrusion Welds: ASTM D5641	
			Inaccessible Seams: Electric Wire Testing	



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
10	Destructive Seam Samples and Testing	Observe and document - Removal of all destructive test samples - Repair of sampled areas - Testing of repairs Label all samples Ship all samples to CQA Contractor's testing laboratory	Shear strength and peel adhesion	- One test per every 500 linear feet of seam length if the seam is welded with a fusion weld. - One test per every 400 linear feet of seam length if the seam is welded with an extrusion weld. - One test for each seaming machine



TABLE 014362-7
CQA FOR DRAINAGE GEOCOMPOSITE

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Receipt of Delivery	Observe and document: • Name of GM/GC Manufacturer • Product identification • Roll identification number • Product thickness or composition • Manufacturing batch code or lot code • Date of manufacture • Order number • Roll dimensions (i.e., length, width, and total weight)	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections,	Visual	Each Roll
3	Drainage Geocomposite Properties	Flow rate per width	ASTM D4716	Once per 20,000 SF of drainage geocomposite
		Ply Adhesion	ASTM D7005	Once per 20,000 SF of drainage geocomposite
4	Weather and Site Conditions at Time of Deployment and Seaming	Observe and document weather and site conditions.		Continuous



No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
5	Panel Deployment	Observe and document: • No debris or rocks below geotextile or geonet • Anchorage • Cutting • Damage prevention • Proper overlap and seaming	Visual	Continuous
6	Seaming	Observe and document: • Seam orientation • Seaming method • Thread material • Stitching type • Stitch length • Sweep for broken needles	Visual	Continuous
7	Repair Areas	Identify areas to be patched Document patching method and location	Visual	Continuous

END OF SECTION 014362

**ATTACHMENT 7-1
LOCATION RESTRICTIONS COMPLIANCE
DEMONSTRATION**

PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTIONS
ASH SURGE BASIN
POWERTON GENERATING STATION
SEPTEMBER 2021

Pursuant to 35 Ill. Adm. Code Subpart C, Section 845.300, KPRG and Associates, Inc (KPRG) prepared this report to document compliance with location restrictions related to placement above the uppermost aquifer for the existing Ash Surge Basin (ASB) at the Powerton Generating Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Joshua Davenport in accordance with §845.300. Richard Gnat reviewed this report in accordance with KPRG's quality assurance/quality control procedures.

1. *Placement Location Restriction Determination*

The base of the ASB is approximately elevation 452 ft amsl and the upper limit groundwater elevation is 449.00 ft amsl. The ASB is not separated from the upper limit of the uppermost aquifer by a minimum of five (5) feet. The groundwater elevation data dated November 2015 to May 2021 that is associated with the ASB groundwater monitoring network and the elevation of the ASB liner were compared to determine if a hydraulic connection was present. This comparison demonstrated that an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the ASB and the uppermost aquifer due to normal fluctuations in groundwater elevations is not present.

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Joshua D. Davenport, P.E.

Illinois Professional Engineer No. 062.061945

License Expires: 11/30/2021

9/30/21



**PLACEMENT ABOVE THE UPPERMOST AQUIFER LOCATION RESTRICTIONS
ASH SURGE BASIN AND BYPASS BASIN
POWERTON STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.60, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to placement above the uppermost aquifer for the existing Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Placement Above the Uppermost Aquifer Restriction Determination*

The bases of Ash Surge Basin and Bypass Basin are separated from the upper limit of the uppermost aquifer by a minimum distance of five (5) feet (1.52 meters). Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.60.

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.





Jesse Varsho, P.E.
Illinois Professional Engineer No. 062.067766
License Expires: 11/30/19

**WETLANDS LOCATION RESTRICTIONS
ASH SURGE AND BYPASS BASINS
POWERTON STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.61, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to wetlands for the existing Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.61. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Wetlands Location Restriction Determination*

The Ash Surge Basin and the Bypass Basin are not located in mapped wetlands included in the National Wetlands Inventory – Version 2 presented by the U.S. Fish and Wildlife Service (USFW) [USFW, 2018]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.61(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



A handwritten signature in black ink, appearing to read "J. Varsho", written over a horizontal line.

Jesse Varsho, P.E.
Illinois Professional Engineer No. 062.067766
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Wetlands Location Restrictions
Ash Surge and Bypass Basins, Powerton Station
October 2018

3. *References*

USFS, 2018. “National Wetlands Inventory, Version 2,” <https://www.fws.gov/wetlands/data/Mapper.html>, updated 1 May 2018, accessed 28 August 2018.

**FAULT AREAS LOCATION RESTRICTIONS
ASH SURGE AND BYPASS BASINS
POWERTON STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.62, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to fault areas for the existing Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.62. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Fault Areas Location Restriction Determination*

The Ash Surge Basin and the Bypass Basin are not located within 200 feet (60 meters) of a mapped Holocene-aged fault, as mapped by the United States Geological Survey (USGS) Quaternary Fault Database [USGS, 2018]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.62(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Fault Areas Location Restrictions
Ash Surge and Bypass Basins, Powerton Station
October 2018

3. *References*

USGS, 2018. "Quaternary Fault and Fold Database,"
<https://earthquake.usgs.gov/hazards/qfaults/>, accessed 28 August 2018.

**SEISMIC IMPACT ZONES LOCATION RESTRICTIONS
ASH SURGE AND BYPASS BASINS
POWERTON STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.63, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to seismic impact areas for the existing Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.63. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Seismic Impact Zones Restriction Determination*

The Ash Surge Basin and the Bypass Basin are not located within a seismic impact zone as defined in §257.53 and as mapped by the United States Geological Survey (USGS) [USGS, 2014]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.63(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Seismic Impact Zones Location Restrictions
Ash Surge and Bypass Basins, Powerton Station
October 2018

3. *References*

USGS, 2014. “2014 U.S. Geological Survey National Seismic Hazard Maps, PGA 2% in 50 Years,” <https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014>, accessed 28 August 2018.

**UNSTABLE AREAS LOCATION RESTRICTIONS
ASH SURGE AND BYPASS BASINS
POWERTON STATION
OCTOBER 2018**

Pursuant to Code of Federal Regulations Title 40, Part 257, Subpart D (40 CFR), Section 257.64, Geosyntec Consultants (Geosyntec) prepared this report to document compliance with location restrictions related to unstable areas for the existing Ash Surge Basin and Bypass Basin (the Basins) at the Powerton Station (Site) in Pekin, Illinois.

The work presented in this report was performed under the direction of Mr. Jesse Varsho, P.G., P.E., of Geosyntec in accordance with §257.64. Ms. Jane Soule, P.E., reviewed this report in accordance with Geosyntec's senior review policy.

1. *Unstable Areas Restriction Determination*

The Ash Surge Basin and the Bypass Basin are not located in unstable areas [Geosyntec, 2016]. Therefore, the locations of the Basins are in compliance with the requirements outlined in §257.64(a).

2. *Limitations and Certification*

This report was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



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Unstable Areas Location Restrictions
Ash Surge and Bypass Basins, Powerton Station
October 2018

3. *References*

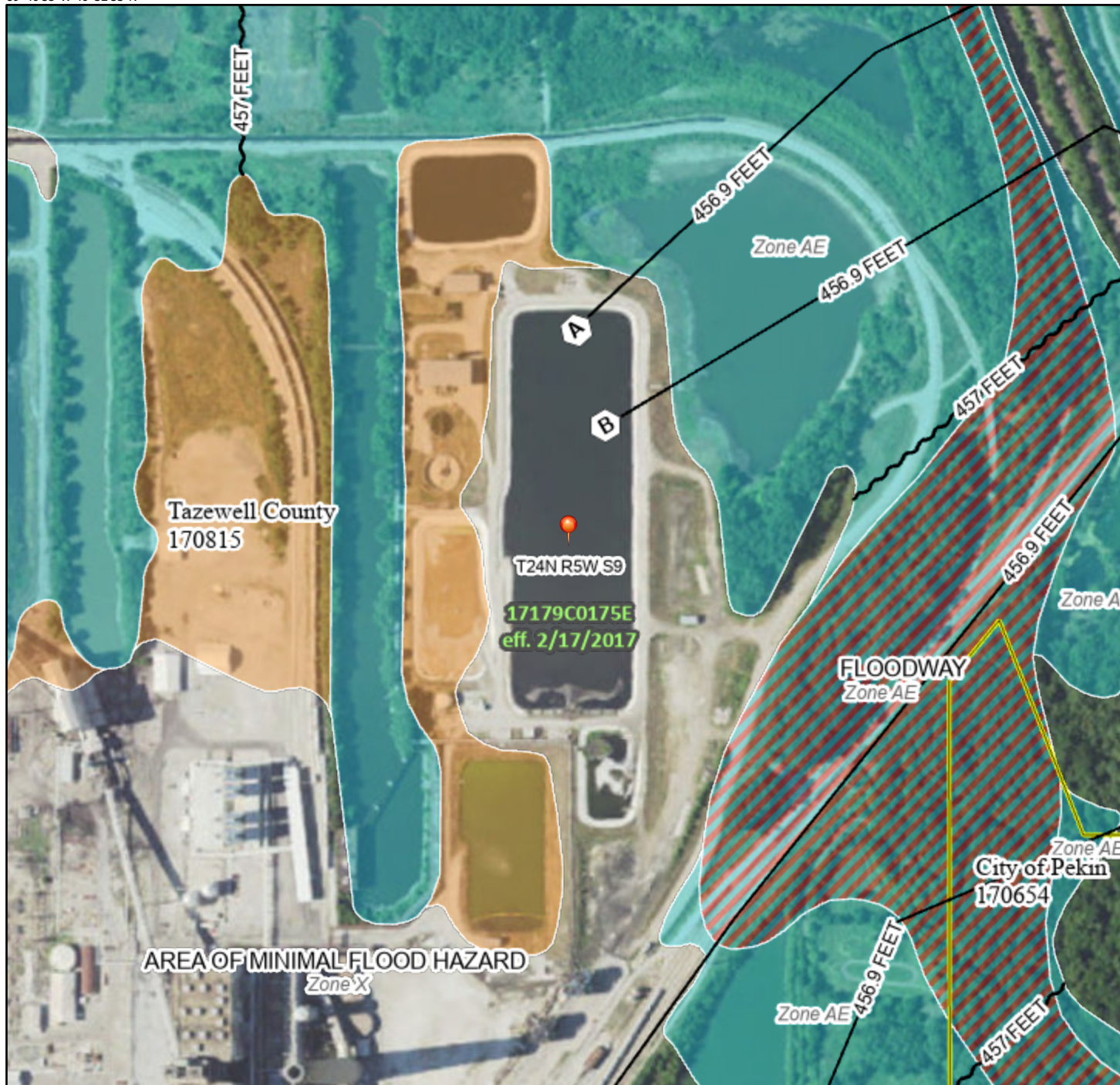
Geosyntec, 2016. Structural Stability and Factor of Safety Assessment, Ash Surge Basin and Bypass Basin, Powerton Station, October.

ATTACHMENT 7-2
FLOODPLAIN LOCATION DETERMINATION

National Flood Hazard Layer FIRMette



89°40'55"W 40°32'53"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		Coastal Transect
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
OTHER FEATURES		Hydrographic Feature
		Digital Data Available
MAP PANELS		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/23/2021 at 12:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

89°40'17"W 40°32'26"N

ATTACHMENT 7-3
LINER DESIGN CERTIFICATION



Midwest Generation, LLC

Powerton Generating Station

Alternative Composite Liner Design Certification for Retrofitted Ash Surge Basin

Revision 0

July 26, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(c)

Federal CCR Rule Reference: 40 CFR 257.72(c)

1.1 PURPOSE

The Ash Surge Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing coal combustion residual (CCR) surface impoundment that is being retrofitted with a new composite liner system and a new leachate collection and removal system (LCRS). As a CCR surface impoundment, the Ash Surge Basin is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which is codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and is referred to herein as the "Illinois CCR Rule." The Ash Surge Basin is also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), which is referred to herein as the "Federal CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.410(c) and 40 CFR 257.72(c), this document demonstrates and provides certification that the design of the new composite liner system for the retrofitted Ash Surge Basin complies with the requirements of 35 Ill. Adm. Code 845.410 and 40 CFR 257.72 for an alternative composite liner.

1.2 SCOPE & APPLICABLE CCR REGULATIONS

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the retrofitted Ash Surge Basin will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program. The Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval, and so this demonstration and certification has been prepared pursuant to both sets of regulations.

1.2.1 FEDERAL CCR RULE

The following excerpts from the Federal CCR Rule are applicable to the design of an alternative composite liner system for a retrofitted CCR surface impoundment:

- § 257.72(a): New CCR surface impoundments...must be designed, constructed, operated, and maintained with either a composite liner or an alternative composite liner that meets the requirements of § 257.70(b) or (c).
- § 257.70(c): If the owner or operator elects to install an alternative composite liner, all of the following requirements must be met:

- An alternative composite liner must consist of two components: the upper component consisting of, at a minimum, a 30-mil GM, and a lower component, that is not a geomembrane, with a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. GM components consisting of high density polyethylene (HDPE) must be at least 60-mil thick. If the lower component of the alternative liner is compacted soil, the GM must be installed in direct and uniform contact with the compacted soil.
- The hydraulic conductivity for the two feet of compacted soil used in comparison [to the alternative composite liner's lower component] shall be no greater than 1×10^{-7} cm/sec. The hydraulic conductivity of any alternative to the two feet of compacted soil must be determined using recognized and generally accepted methods. The liquid flow rate comparison must be made using Equation 1 of [40 CFR 257.70(c)], which is derived from Darcy's Law for gravity flow through porous media.

1.2.2 ILLINOIS CCR RULE

The following excerpts from the Illinois CCR Rule are applicable to the design of an alternative composite liner system for a retrofitted CCR surface impoundment:

- § 845.410(a): New CCR surface impoundments...must be designed, constructed, operated, and maintained with either a composite liner or an alternative composite liner that meets the requirements of Section 845.400(b) or (c).
- § 845.400(c)(1): An alternative composite liner must consist of two components: the upper component consisting of, at a minimum, a 30-mil geomembrane liner, and a lower component, that is not a geomembrane, with a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. The geomembrane liner components consisting of high-density polyethylene (HDPE) must be at least 60 mil. If the lower component of the alternative liner is compacted soil, the geomembrane liner must be installed in direct and uniform contact with the compacted soil.
- § 845.400(c)(2): The liquid flow rate through the lower component of the alternative composite liner must be no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec. The hydraulic conductivity for the two feet of compacted soil used in the comparison must be no greater than 1×10^{-7} cm/sec. The hydraulic conductivity of any alternative to the two feet of compacted soil must be determined using recognized and generally accepted methods.

- § 845.400(c)(3): The liquid flow rate comparison must be made using the following equation, which is derived from Darcy's Law for gravity flow through porous media.

$$Q/A = q = k ((h/t)+1)$$

where:

Q = flow rate (cubic centimeters/second)

A = surface area of the liner (squared centimeters)

q = flow rate per unit area (cubic centimeters / second / square centimeter)

k = hydraulic conductivity of the liner (centimeters / second)

h = hydraulic head above the liner (centimeters); and

t = thickness of the liner (centimeters)

2.0 DEMONSTRATION

The alternative composite liner design for the retrofitted Ash Surge Basin at the Powerton Generating Station is compliant with the referenced regulations as demonstrated in the following sections.

2.1 UPPER COMPONENT

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.400(c)(1)

Federal CCR Rule Reference: 40 CFR 257.70(c)(1)

The upper component of the alternative composite liner design for the retrofitted Ash Surge Basin consists of a 60-mil HDPE geomembrane. This complies with 35 Ill. Adm. Code 845.400(c)(1) and 40 CFR 257.70(c)(1).

2.2 LOWER COMPONENT

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.400(c)(2) & 845.400(c)(3)

Federal CCR Rule Reference: 40 CFR 257.70(c)(2)

The lower component of the alternative composite liner design for the retrofitted Ash Surge Basin consists of a geosynthetic clay liner (GCL). To demonstrate the specified GCL complies with 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3) and 40 CFR 257.70(c)(2), the maximum liquid flow rate allowed by the project construction specifications is compared to the liquid flow rate through two feet of soil with a hydraulic conductivity of 1×10^{-7} cm/sec. Table 1 presents this flow rate comparison. As shown in the table, the maximum allowable hydraulic conductivity specified for the GCL is 1×10^{-9} cm/sec. The GCL's hydraulic conductivity will be determined by ASTM D5887, which is a recognized and generally accepted method for determining the hydraulic conductivity of a GCL.

Per Table 1, the design liquid flow rate through the GCL specified for the lower component of the alternative composite liner for the retrofitted Ash Surge Basin is less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec. This complies with 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3) and 40 CFR 257.70(c)(2).

Table 1 – Liquid Flow Rate Comparison Between Compacted Soil Liner & GCL for Retrofitted Ash Surge Basin

Parameter	Symbol	Compacted Soil Liner	GCL
Crest Elevation	EL_{crest}	467 feet	
Minimum Elevation of Composite Liner System	EL_{floor}	450.50 feet	
Hydraulic Head on Liner (Omitting Geomembrane Thickness)	$h = EL_{crest} - EL_{floor}$	16.50 feet	
Thickness of Liner Lower Component	t	2 feet	7 mm = 0.023 feet
Hydraulic Gradient Through Liner	$i = h / t$	8.25	717.39
Maximum Hydraulic Conductivity of Liner	k	1.0×10^{-7} cm/sec	1.0×10^{-9} cm/sec
Liquid Flow Rate Through Liner (per Unit Area)	$q = k \times (i + 1)$	9.25×10^{-7} cm ³ /sec/cm ²	7.18×10^{-7} cm ³ /sec/cm ²

3.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(c)

Federal CCR Rule Reference: 40 CFR 257.72(c)

I hereby certify that:

- Per the preceding demonstration and pursuant to 35 Ill. Adm. Code 845.400(c)(2) and 845.400(c)(3) and 40 CFR 257.70(c)(2), the design liquid flow rate through the lower component of the alternative composite liner for the retrofitted Ash Surge Basin is no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1×10^{-7} cm/sec.
- The design of the alternative composite liner for the retrofitted Ash Surge Basin complies with the requirements of 35 Ill. Adm. Code 845.410 and 40 CFR 257.72.
- This pre-construction composite liner design certification was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 26, 2023

Seal:



Th. Dehlin
7/26/2023
Exp. 11/30/2023

4.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed April 15, 2022.
2. U.S. Environmental Protection Agency. "Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments." 40 CFR Part 257 Subpart D. <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D>. Accessed April 15, 2022.

**ATTACHMENT 7-4
LEACHATE COLLECTION SYSTEM DESIGN
CERTIFICATION**



Midwest Generation, LLC

Powerton Generating Station

Leachate Collection System Design Certification for Retrofitted Ash Surge Basin

Revision 0

July 26, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(b)

1.1 PURPOSE

The Ash Surge Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing coal combustion residual (CCR) surface impoundment that is being retrofitted with a new composite liner system and a new leachate collection and removal system (LCRS). As a CCR surface impoundment, the Ash Surge Basin is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which is codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and is referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.420(b), this document demonstrates and provides certification that the design of the new leachate collection and removal system for the retrofitted Ash Surge Basin complies with the requirements of 35 Ill. Adm. Code 845.420.

1.2 APPLICABLE ILLINOIS CCR RULE REGULATIONS

The following excerpts from the Illinois CCR Rule are applicable to the design of an LCRS for a retrofitted CCR surface impoundment:

- § 845.420: A new CCR surface impoundment must be designed, constructed, operated and maintained with a leachate collection and removal system. The leachate collection and removal system must be designed, constructed, operated, and maintained to collect and remove leachate from the leachate collection system of the CCR surface impoundment during its active life and post-closure care period.
- § 845.420(a): The leachate collection and removal system must:
 - 1) Be placed above the liner required by Section 845.410;
 - 2) Have placed above it a filter layer that has a hydraulic conductivity of at least 1×10^{-5} cm/sec;
 - 3) Have a bottom slope of three percent or more towards the collections pipes;
 - 4) Be constructed of:
 - A) Granular drainage materials with a hydraulic conductivity of 1×10^{-1} cm/sec or more and a thickness of 24 inches or more above the crown of the collection pipe; or
 - B) Synthetic drainage materials with a transmissivity of 6×10^{-4} m²/sec or more;
 - 5) Be constructed of materials that are chemically resistant to CCR and any non-CCR waste managed in the CCR surface impoundment and the leachate expected to be

- generated, and of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying waste and any waste cover materials and equipment used at the CCR surface impoundment;
- 6) Be designed, constructed, and operated with collection pipes at the base of the granular material to prevent clogging with fines during the active life and post-closure care period;
 - 7) Have collection pipes
 - A) Designed such that leachate is collected at a sump and is pumped or flows out of the CCR surface impoundment;
 - B) With slopes that allow flow from all points within the CCR surface impoundment to the sump or drain outlet; and
 - C) Large enough to conduct periodic cleaning;
 - 8) Have a protective layer or other means of deflecting the force of CCR pumped into the CCR surface impoundment;
 - 9) Be designed and operated to minimize clogging during the active life and post-closure care period; and
 - 10) At a minimum, the leachate collection and removal system must be operated to remove free liquids from the CCR surface impoundment at the time of closure during post closure care.

2.0 DEMONSTRATION

The LCRS design for the retrofitted Ash Surge Basin at the Powerton Generating Station is compliant with the referenced regulations as demonstrated in the following sections.

2.1 LOCATION ABOVE NEW COMPOSITE LINER SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(1)

The LCRS will be placed above the retrofitted Ash Surge Basin's new composite liner system – a 60-mil high-density polyethylene (HDPE) geomembrane over a geosynthetic clay liner (GCL) – as required by 35 Ill. Adm. Code 845.420(a)(1).

2.2 FILTER LAYER

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(2)

A sand filter layer having a hydraulic conductivity of at least 1×10^{-5} cm/sec will be placed above the LCRS as required by 35 Ill. Adm. Code 845.420(a)(2). This filter layer will consist of sand, except north of the weir wall where riprap will be installed near the basin's existing drain outlet.

2.3 BOTTOM SLOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(3)

Natural soil fill material will be placed along the floor of the Ash Surge Basin to establish three percent slopes down towards a leachate collection pipe located in the middle of the basin. The LCRS will also be installed along the inside faces of the Ash Surge Basin's existing dikes, which have interior sideslopes of approximately 3-horizontal:1-vertical, or 33 percent. This complies with 35 Ill. Adm. Code 845.420(a)(3).

2.4 DRAINAGE MATERIAL

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(4)

The LCRS will be constructed of a drainage geocomposite with a transmissivity of at least 6×10^{-4} m²/sec. The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core. This complies with 35 Ill. Adm. Code 845.420(a)(4).

2.5 CHEMICAL RESISTANCE, STRENGTH, & THICKNESS

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(5)

The HDPE components (collection pipe, drainage geocomposite) and natural soil components (protective warning layer, sand filter layer, and coarse aggregate bedding layer) of the LCRS are chemically resistant to the CCR and non-CCR waste that will be managed in the retrofitted Ash Surge Basin. The LCRS components have also been designed to have sufficient strength and thickness to prevent collapse under the pressures exerted by the overlying waste, a potential final cover system for the waste, and Station equipment used to perform routine maintenance at the CCR surface impoundment. This complies with 35 Ill. Adm. Code 845.420(a)(5).

2.6 CLOGGING PREVENTION FOR COLLECTION PIPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(6)

The perforated leachate collection pipe will be surrounded by coarse aggregate bedding material. The perforations in the leachate collection pipe and the gradation of the coarse aggregate bedding material are designed to prevent fines from clogging the pipe during the active life and post-closure care period of the retrofitted Ash Surge Basin. This complies with 35 Ill. Adm. Code 845.420(a)(6).

2.7 COLLECTION PIPE DESIGN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(7)

A 6-in.-diameter, perforated leachate collection pipe will be installed in a north-south spanning trench in the middle of the retrofitted Ash Surge Basin to collect leachate from the drainage geocomposite component of the LCRS. The leachate collection pipe will be sloped towards the basin's existing drain outlet, a 48-inch-diameter reinforced concrete pipe, to convey leachate out of the basin. The slopes of the retrofitted Ash Surge Basin's LCRS will ensure flow from all points within the retrofitted Ash Surge Basin is directed to the leachate collection pipe and ultimately conveyed to the existing drain outlet. A wye branch in the leachate collection pipe will also be installed and lead to a non-perforated riser pipe in the northeastern quadrant of the basin, where a wheeled, submersible pump will be installed. The Station will use this pump to dewater the Ash Surge Basin during periodic cleanings, at the time of closure, and as needed during the post-closure care period. Finally, the 6-in. diameter of the leachate collection pipe is large enough to conduct periodic cleaning. This complies with 35 Ill. Adm. Code 845.420(a)(7).

2.8 PROTECTIVE LAYER

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(8)

Along the retrofitted Ash Surge Basin's floor, a protective warning layer consisting of 6 inches of densely graded aggregate will be installed over the sand filter layer to deflect the force of CCR flowing into the CCR surface impoundment. This layer will also provide a working surface for operators removing CCR from the basin during routine cleanings and will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's sideslopes, the protective warning layer will consist of riprap on a gravel bedding layer to protect the sand filter layer from erosion. North of the weir wall, near the basin's existing drain outlet, the protective warning layer will consist of riprap. This complies with 35 Ill. Adm. Code 845.420(a)(8).

2.9 CLOGGING PREVENTION FOR DRAINAGE GEOCOMPOSITE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(9)

The upper non-woven geotextile component of the drainage geocomposite will prevent CCR and non-CCR sediments from intruding into, clogging, and impeding the flow of leachate through the HDPE geonet core during the active life and post-closure care period of the retrofitted Ash Surge Basin. Moreover, the sand filter layer installed above the LCRS will also preclude CCR and non-CCR sediments from clogging the LCRS. This complies with 35 Ill. Adm. Code 845.420(a)(9).

2.10 OPERATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)(10)

At a minimum, the LCRS will be operated to remove free liquids from the retrofitted Ash Surge Basin when the basin is closed and during the basin's post-closure care period.

3.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(b)

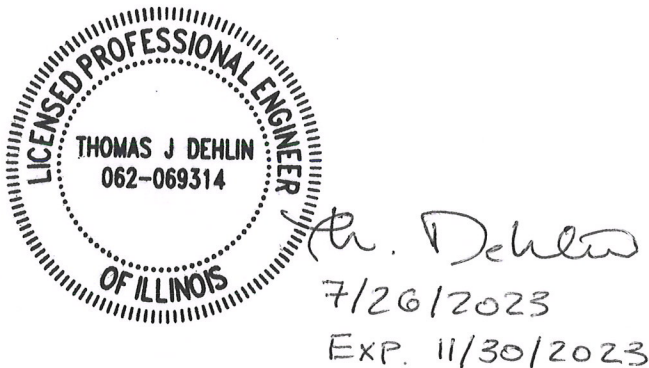
I hereby certify that:

- The design of the leachate collection system for the retrofitted Ash Surge Basin complies with the requirements of 35 Ill. Adm. Code 845.420.
- This pre-construction leachate collection system design certification was prepared by me or under my direct supervision, and
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 26, 2023

Seal:



4.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed March 1, 2023.

ATTACHMENT 7-5
CCR FUGITIVE DUST CONTROL PLAN

CCR COMPLIANCE FUGITIVE DUST CONTROL PLAN

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

PREPARED BY:

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

October 19, 2021

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Appendix B – Example Assessment Record

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1.0 INTRODUCTION

On April 15, 2021, the Illinois Environmental Protection Agency adopted a new Part 845 of its waste disposal regulations creating statewide standards for the disposal of coal combustion residuals (CCR) in surface impoundments, created by the generation of electricity by coal-fired power plants. Part 845 specifically requires that “the owner or operator of a CCR surface impoundment, or any lateral expansion of a CCR surface impoundment, must adopt measures that will effectively minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR surface impoundments, roads, and other CCR management and material handling activities”. As a result, each regulated facility must develop a CCR fugitive dust control plan that complies with 35 Ill. Adm. Code 845.500(b).

This site specific Fugitive Dust Control Plan (Plan) has been developed to comply with the requirements specified in Section 845.500. In general, the Plan identifies the potential CCR fugitive dust sources and describes the control measures that will be implemented to minimize CCR fugitive dust emissions. The Plan also includes a procedure for the periodic assessment of the Plan’s effectiveness, documentation of any Plan amendments deemed necessary to assure continued compliance, a record of any citizen complaints received pertaining to CCR fugitive dust emissions, and an outline of the required reporting and recordkeeping requirements in 35 Ill. Adm. Code 845.500.

2.0 SITE INFORMATION

2.1 Owner/Operator and Address:

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

2.2 Owner Representative/Responsible Person Contact Information:

Mr. Dale Green
Plant Manager
309-346-2165

2.3 Location and Description of Facility Operations

The 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 which occupies approximately 1,440 acres and provides cooling water to the facility.

The general vicinity is a primarily mixed industrial and agricultural area with limited commercial and residential developments.

3.0 POTENTIAL FUGITIVE DUST SOURCES

Potential fugitive dust sources associated with the bottom ash and slag and fly ash systems have been identified at the facility; however, some of these are regulated by the facility's operating permit and are adequately addressed within the required fugitive dust operating program. The potential CCR fugitive dust sources generally include exterior ash distribution systems, temporary ash storage locations, ash bulk loading/unloading operations and ash truck transportation routes. Fugitive dust could potentially be generated from these sources as a result of equipment malfunctions, wind erosion, housekeeping issues and/or the nature of the operation. Specifically, these identified sources were further evaluated to determine the probability of CCR fugitive dust being generated and to determine the level of emission controls that are warranted to mitigate fugitive dust emissions. The findings of the evaluation are individually discussed in the following sections.

3.1 Bottom Ash and Slag Distribution System

Collected bottom ash and slag in the boilers is transported as a liquid mixture through an enclosed piping system to the dewatering bins. Some of this piping is located inside a building; however, a portion is situated above ground and in the outside environment. Although not an anticipated occurrence, a breach in the exterior piping could result in the accidental release of bottom ash and slag and potential fugitive dust emissions if the material were to accumulate and dry out.

3.2 Dewatering Bins

The dewatering bins are designed to remove water from the bottom ash and slag. Bottom ash and slag that is relatively wet is drop loaded through the bins into open top trucks for removal off-site for beneficial reuse purposes. The water removed from the dewatering bins is pumped to the Ash Surge Basin and the Ash Bypass Basin where settling occurs prior to discharge of the water from the facility. As of right now, the Metals Cleaning Basin has no water. The loading operation has the potential for fugitive dust emissions if bottom ash and slag is not properly loaded and is allowed to accumulate and dry out on the ground surface beneath the dewatering bins.

3.3 Ash Surge Basin, Bypass Basin, and Metal Cleaning Basin

Extracted water from the dewatering bins is pumped through enclosed pipes to the Ash Surge Basin or the Ash Bypass Basin. Occasionally, CCR material is placed in the Metal Cleaning Basin. After settling occurs, water from the Ash Surge Basin, Ash Bypass Basin, and the Metal Cleaning Basin is ultimately discharged

through a final settling basin and then through a regulated NPDES outfall. These basins are normally filled with water; however, dredging occasionally may be required to remove the settled material from each basin. When this requirement occurs, the basins are dewatered and the dredged material is allowed to dry within each basin. When the material is suitable for transport, it is loaded into open top trucks, covered if necessary, and sent off site to a mine reclamation site. Potential fugitive dust emissions could occur if dry bottom ash and slag residual is exposed or loaded during excessive windy and dry weather conditions.

3.4 Former Ash Basin

This basin was formerly used for the routine disposal of bottom ash and slag; however, this procedure ceased in the 1970s. The bottom ash and slag is completely submerged within the basin. Water level fluctuations in the basin are attributable to precipitation and other weather-related conditions. In rare emergency operational situations, overflow from the Ash Surge Basin to the Former Ash Basin could occur by gravity through the spillway. This discharge is not expected to contain significant quantities of CCR and is allowed through the existing NPDES permit. It is noted that a new railroad spur was constructed through the middle of the Former Ash Basin.

3.5 Concrete Storage Pad

This partially below-grade concrete structure is used for the temporary storage of residual bottom ash and slag generated at the dewatering bins and as a result of other routine ash-related maintenance activities. The staged bottom ash and slag is allowed to partially dry within the structure until it is suitable for off-site removal. The material is placed in temporary storage, loaded into open top trucks, covered and sent off site to a mine reclamation site. Dry material that is exposed during excessively windy and dry weather conditions has the potential for becoming fugitive dust emissions.

3.6 Fly Ash Equipment

Collected fly ash in the precipitator hoppers is initially transported in a closed vacuum piping system to a cyclone and bag filter where it is mechanically separated from the air stream within an enclosed building. Fly ash is then sent within an enclosed building to the fly ash silos. At the silos, the fly ash is drop loaded into trucks through a telescopic pipe contained within a drop chute. The loading of fly ash occurs within a partially enclosed structure. After the trucks containing fly ash have been loaded and the truck's rear gate is water sprayed to remove dust, they proceed to a nearby platform to allow the truck driver to secure

the truck and to broom sweep or water spray any residual fly ash remaining on the truck. This entire process is covered by the fugitive dust operating program for the facility.

3.7 Ash Transport Roadways

Both gravel covered and asphalt paved roads within the facility are used by trucks hauling bottom ash, slag, and fly ash to the mine reclamation site as well as by other vehicles entering and exiting the facility. Fugitive CCR dust emissions could occur during transit if CCR material is not properly cleaned from the trucks or if there is a release of CCR material from the vehicle due to a malfunction or accident.

These potential fugitive dust sources are identified on the Site Diagram included in Appendix A.

4.0 DESCRIPTION OF CONTROL MEASURES

4.1 Purpose

The purpose of developing appropriate control measures is to minimize and reduce the emissions of CCR fugitive dust from the identified potential emission sources. The control measures and work practices implemented at the facility are described in the following sections.

4.2 Bottom Ash and Slag Distribution System

Bottom ash and slag is in a liquid mixture within a closed system until the point of discharge at the dewatering bins. A significant portion of the piping system is contained within a building, which eliminates dust emissions to the outside environment. An assessment of the exterior distribution system will be performed on a quarterly basis to verify the integrity of the system or when a breach in the system is detected. If a leak is noted, resulting in the release of bottom ash and slag, the affected area will be restored to original conditions and repair of the pipe will be performed as soon as feasible. The CCR will be sent off site to a mine reclamation site.

4.3 Dewatering Bins

The bottom ash and slag is drop loaded from the dewatering bins in a wet state and into trucks positioned beneath the bins. The bottom ash and slag has sufficient moisture to preclude this material from becoming airborne during loading. An assessment of the dewatering bin loading operation will be performed on a quarterly basis to verify if there has been an equipment malfunction resulting in an accumulation of released material. Should there be a malfunction in the dewatering equipment that results in a spill of the material, repair of any malfunctioning equipment and clean up and transfer of the material to the concrete storage pit will be performed as soon as feasible.

4.4 Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin

During normal operations, the Ash Surge Basin and Ash Bypass Basin are filled with water thereby suppressing any potential fugitive dust emissions. The Metal Cleaning Basin has recently been emptied and cleaned thereby suppressing any potential fugitive dust emissions. Infrequently, the basins will need to be dewatered and the sediment removed for proper off-site disposition. While the bottom ash and slag residue is drying, there is the potential for this material to

become airborne especially during excessively dry and windy conditions. Loading of this material under these adverse conditions also has the potential for generating fugitive dust. Dewatered basins will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag, the height of the staged material will be minimized and the material piles will be either sprayed with water or covered. Loading activities also will be limited during such occasions.

4.5 Former Ash Basin

The Former Ash Basin was used for the disposal of bottom ash and slag in the past; however, this procedure is no longer occurring. The previously deposited material is completely submerged within the basin with the typical water level at approximately 10-15 feet below grade, thereby, making the bottom ash and slag not readily susceptible to wind erosion and generation of potential fugitive dust emissions.

4.6 Concrete Storage Pad

The concrete pad only periodically contains bottom ash and slag and other CCR-related materials generated from routine plant maintenance activities. Typically these materials are in a wet state but are allowed to partially dry to facilitate removal. When sufficiently dry, the material is promptly removed off site. The concrete pad will be assessed on a quarterly basis or more frequently during excessively dry and windy conditions. To minimize fugitive dust emissions from exposed dry bottom ash and slag and other CCR-related materials, the height of the staged material will be minimized and the material piles will be either sprayed with water or covered.

4.7 Fly Ash Equipment

Fly ash from the mechanical separators is sent to the silos within an enclosed structure. The fly ash is drop loaded into an opening within the tarp covering the truck trailer through a telescopic pipe contained within a drop chute. This loading mechanism minimizes the potential for fly ash to become airborne during the loading process. The loading of trucks also occurs within a partial enclosure. At the completion of loading but prior to leaving the enclosure, the rear of each truck trailer is sprayed with water. The truck is then broom swept or water sprayed at the truck stand to remove any accumulated fly ash. Accumulated CCR is promptly transferred to the concrete storage pad.

This process is covered by the facility's fugitive dust operating program. Under the program, the facility must maintain control measures, including enclosures, covers and dust collection devices. Additionally, the facility is required to conduct weekly inspections of the process to confirm compliance. A record of the inspections is maintained at the facility.

4.8 Ash Transport Roadways

Truck drivers are instructed on the proper procedure for cleaning trucks and a vehicle speed limit is enforced at the facility. Ash material that may not have been adequately removed from the trucks has the potential to become airborne and ultimately be deposited on haul roads. To minimize fugitive dust emissions, these roads will be assessed on a quarterly basis and any observed accumulated ash material will be promptly cleaned up and collected for off-site removal.

5.0 PLAN ASSESSMENTS/AMENDMENTS

To assure that the work practices being implemented adequately control the dust from the identified potential fugitive dust emission sources at the facility, routine assessments and record keeping are performed. These procedures include the following:

5.1 Fugitive CCR Dust Assessments

Pursuant to 845.500(b)(3), assessments of the potential fugitive dust emission sources identified within this Plan will be conducted to assess the effectiveness of this Plan. The assessment will include observation of ash removal from basins, temporary storage and transport activities at the facility to confirm the adequacy of the control measures. The assessments will be conducted on a quarterly basis by an individual designated by the contact identified in Section 2.2 of this Plan. Observations made during each assessment are recorded on a form similar to the one included in Appendix B, however, the station may create their own form.

If the results of the assessment determine that ash-related equipment has malfunctioned or the integrity of the equipment has been compromised, the necessary repairs or replacement will be performed as soon as feasible. If the assessment finds that this Plan does not effectively minimize the CCR from becoming airborne, this Plan will be amended to include additional control measures.

5.2 Plan Amendments

This Fugitive Dust Plan will be reviewed whenever there is a change in conditions that would substantially affect the written Plan currently in place. A record of the reviews and any modifications or amendments made to the Plan currently in place will be kept on a form similar to the one included in Appendix C, however, the station may create their own form. The amended Plan will be reviewed by a Registered Professional Engineer and, if deemed acceptable, will be recertified.

5.3 Citizen Complaints

Any written or verbal complaints received from a citizen involving alleged CCR fugitive dust emission events at the facility will be recorded by an individual designated by the contact identified in Section 2.2 of this Plan. The complaints will be recorded on a form similar to the one included in Appendix D, however, the station may create their own form. Upon receipt of the complaint, an investigation of the alleged source of the fugitive dust emissions will be

performed and the results of that investigation recorded on the form. If the fugitive dust emission event is confirmed, any necessary repairs or changes in operation required to mitigate the fugitive dust emissions will be implemented as soon as practicable. Quarterly reports will be submitted to the IEPA no later than 14 days from the end of the quarter of all complaints received during that quarter, including the information required by 845.500(b)(2)(A).

6.0 CCR FUGITIVE DUST PLAN REPORTING/RECORDKEEPING REQUIREMENTS

This section outlines the Plan reports that must be prepared, submitted, and records that must be maintained to meet the requirements specified in 35 Ill. Adm. Code Section 845.500. These requirements include the following:

- Place the Plan in the facility's operating record and publicly accessible internet site. If the Plan is amended, replace the initial Plan with the amended Plan. Only the most recent amended Plan will be maintained in the facility's operating record and internet site.
- Prepare an annual CCR Fugitive Dust Control Report and submit to the IEPA as part of the annual consolidated report required by 845.550. The annual report will include:
 - A description of the actions taken to control CCR fugitive dust,
 - A record of all citizen complaints, and
 - A summary of any corrective measures taken.
 - Placement of this report in the operating record and publicly accessible internet site.
- Provide notification to the IEPA and, if applicable, the Tribal authority when the Plan and reports are placed in the facility's operating record and publicly accessible internet site.
- Submit quarterly reports to IEPA within 14 days from the end of the quarter of all complaints received in that quarter. The quarterly reports will include:
 - The date of the complaint,
 - The date of the incident,
 - The name and contact information of the complainant, and
 - All actions taken to assess and resolve the complaint.

7.0 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned Registered Professional Engineer is familiar with the requirements of 845.500 and has visited and examined the facility or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this CCR Fugitive Dust Control Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of 845.500, and that this Plan is adequate for the facility. This certification was prepared as required by 845.500(b)(7).

Engineer: Joshua D. Davenport

Signature: _____

Date: 10/19/21

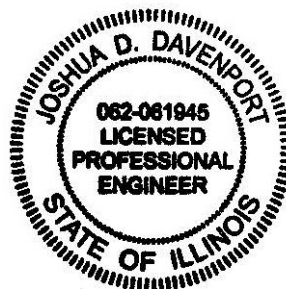
Company: KPRG and Associates, Inc.

Registration State: Wisconsin

Registration Number: 062.061945

License Expiration Date: November 30, 2021

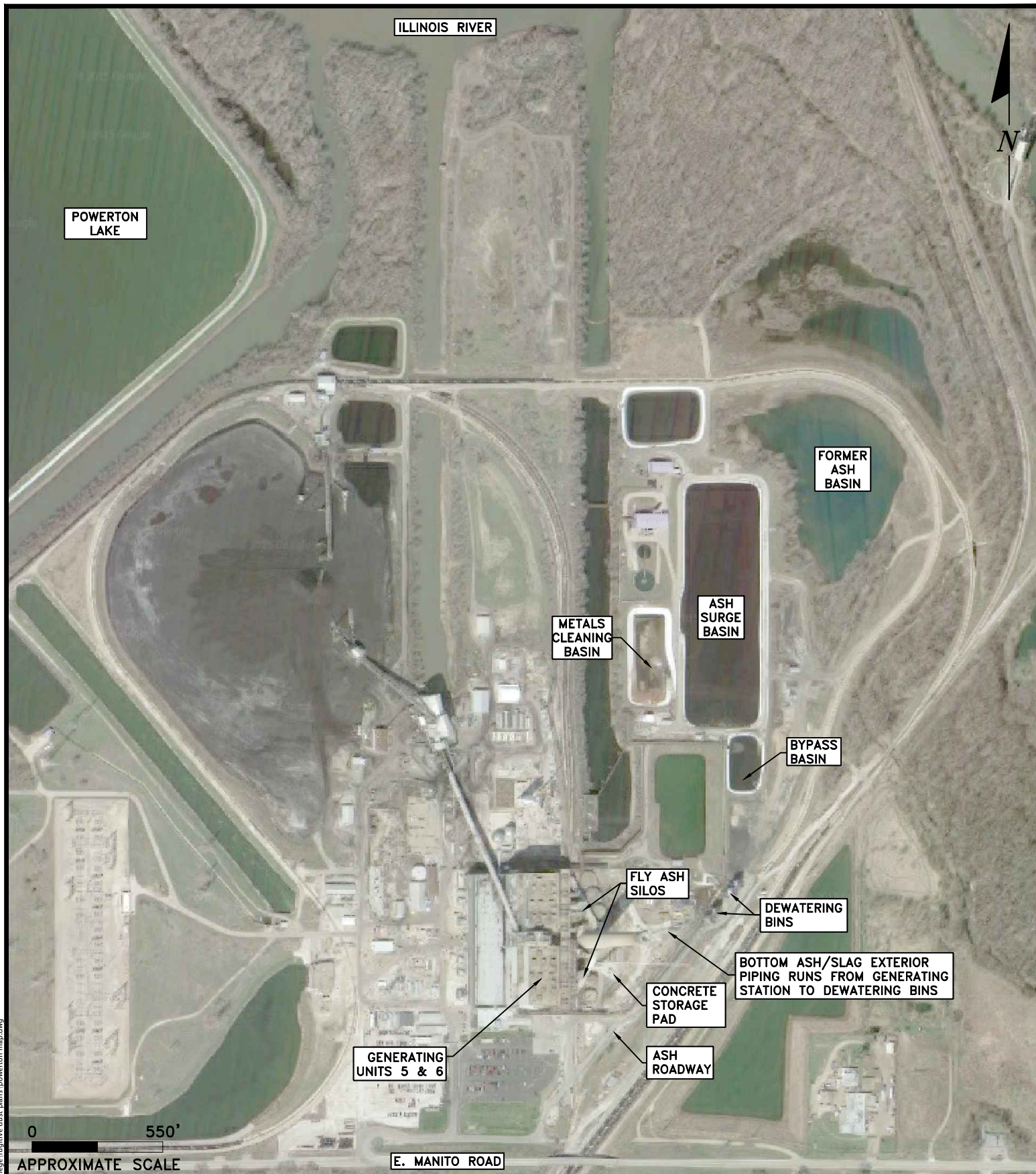
Professional Engineer Stamp:



APPENDIX A

SITE DIAGRAM

POTENTIAL FUGITIVE DUST SOURCES



ENVIRONMENTAL CONSULTATION & REMEDIATION

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 28 Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

SITE DIAGRAM/FUGITIVE DUST SOURCES

POWERTON GENERATING STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: October 15, 2021

KPRG Project No. 15315

APPENDIX A

APPENDIX B

EXAMPLE ASSESSMENT RECORD

APPENDIX B

POWERTON STATION

EXAMPLE ASSESSMENT RECORD

Date	Inspector	Unit Inspected (See Key Below)	Maintenance/Cleanup Required (yes/no)	Response Action Performed (completion date)	Inspector Signature

Unit Key:

1 - Exterior Bottom Ash/Slag Piping

2 - Dewatering Bins

3 - Concrete Storage Pad

4 - Ash Roadways

5 - Ash Surge Basin

6 - Bypass Basin

APPENDIX C

EXAMPLE PLAN REVIEW AND AMENDMENT RECORD

POWERTON STATION

EXAMPLE CCR PLAN REVIEW/AMENDMENT RECORD

[illegible]

APPENDIX D

EXAMPLE CITIZEN COMPLAINT LOG

EXAMPLE CITIZEN COMPLAINT LOG

[illegible]

ATTACHMENT 8-1
WRITTEN RETROFIT PLAN

MWVG

Midwest Generation, LLC

Powerton Generating Station

Ash Surge Basin Retrofit Plan

Revision 0

March 24, 2023

Issue Purpose: Use

Project No.: 12661-152

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)

1.1 PURPOSE

Midwest Generation, LLC (MWG) plans to retrofit the Ash Surge Basin at the Powerton Generating Station ("Powerton" or "Station") in Pekin, Illinois with a new composite liner system and a new leachate collection and removal system. The Ash Surge Basin is an existing coal combustion residual (CCR) surface impoundment that the Station uses as a settling pond for bottom ash transport water discharged from the Station's dewatering bins (which initially treat the Station's CCR sluice water) and for other process waste streams related to electric power-generating operations. The basin is currently lined with a 60-mil high-density polyethylene (HDPE) geomembrane liner, has a surface area of approximately 8.4 acres, and has a storage capacity of approximately 162,000 cubic yards.

As a CCR surface impoundment, the Ash Surge Basin is regulated by both the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which are codified in Title 35, Part 845 to the Illinois Administrative Code (35 Ill. Adm. Code 845), and the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," which are codified in 40 CFR Part 257 Subpart D. These state and federal CCR regulations are referred to herein as the Illinois CCR Rule and the Federal CCR Rule, respectively. Pursuant to 35 Ill. Adm. Code 845.770(c) and 40 CFR 257.102(k)(2), this document provides MWG's written retrofit plan for the Ash Surge Basin.

1.2 SCOPE

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the Ash Surge Basin will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program. The Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval, and so this written retrofit plan has been prepared pursuant to both sets of regulations.

2.0 RETROFIT PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(A)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(i)(A)

MWG plans to retrofit the Ash Surge Basin by executing the following sequential steps:

1. Removing the CCR from the basin and transporting the material to a beneficial-use facility or a permitted disposal facility in accordance with current and historic Station maintenance procedures for the Ash Surge Basin;
2. Obtaining a construction permit from the Illinois EPA for retrofitting the Ash Surge Basin;
3. Removing the gravel warning and sand cushion layers over the existing geomembrane liner from the basin and transporting these materials to a permitted disposal facility;
4. Decontaminating the basin's existing geomembrane liner for re-use as a supplemental liner in the retrofitted basin, including submittal of visual inspection documentation and analytical testing results to demonstrate the existing liner is not contaminated with CCR constituents in accordance with 35 Ill. Adm. Code 845.770(a)(4);
5. Decontaminating the basin's appurtenant structures (e.g., inlet troughs and aprons, outlet structures, piping);
6. Placing structural fill within the basin floor to establish the slopes for the new leachate collection and removal system and to support the new composite liner (see Section 2.1);
7. Installing an alternative composite liner system in accordance with 35 Ill. Adm. Code 845.410 and 40 CFR 257.72 (see Section 2.2);
8. Installing a leachate collection and removal system in accordance with 35 Ill. Adm. Code 845.420 (see Section 2.3);
9. Submitting to the Illinois EPA:
 - a. A retrofit completion report (see Section 8.0), and
 - b. A certification from a qualified professional engineer licensed in the State of Illinois that the Ash Surge Basin has been retrofitted in accordance with the activities outlined in this retrofit plan (or subsequent amendment of this retrofit plan), the requirements stipulated in 35 Ill. Adm. Code Part 845, and the requirements of 40 CFR 257.102(k).

2.1 STRUCTURAL FILL

Pursuant to 35 Ill. Adm. Code 845.420(a)(3), the retrofitted Ash Surge Basin will have a new leachate collection and removal system that slopes towards a collection pipe at a minimum slope of three percent. Because the existing basin floor is approximately flat, MWG plans to place, compact, and grade structural fill along the basin floor to establish the lines and grades for the new leachate collection and removal system. The structural fill will be placed over the Ash Surge Basin's existing HDPE geomembrane liner, which MWG plans to leave in-place as a supplemental liner under the basin's new composite liner. All earthwork activities

associated with placing, compacting, and grading structural fill along the basin floor will be done in a manner to prevent tearing, ripping, or otherwise damaging the Ash Surge Basin's existing HDPE geomembrane liner.

2.2 COMPOSITE LINER SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.410(a) & 845.400(c)

Federal CCR Rule Reference: 40 CFR 257.72(a) & 257.70(c)

MWG plans to retrofit the Ash Surge Basin with an alternative composite liner system that meets the requirements of 35 Ill. Adm. Code 845.400(c) and 40 CFR 257.70(c). The composite liner will consist of a 60-mil HDPE geomembrane over a geosynthetic clay liner (GCL). Pursuant to 35 Ill. Adm. Code 845.400(c)(2) and 40 CFR 257.70(c)(1), the GCL component will have a hydraulic conductivity of no more than 1×10^{-9} cm/sec to ensure that the liquid flow rate through the GCL is less than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec.

2.3 LEACHATE COLLECTION & REMOVAL SYSTEM

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.420(a)

In addition to installing a new composite liner in the basin, MWG plans to install a new leachate collection and removal system (LCRS) in the Ash Surge Basin pursuant to 35 Ill. Adm. Code 845.420. This LCRS will be placed over the new composite liner and will be constructed of drainage geocomposite with a transmissivity of at least 6×10^{-4} m²/sec in accordance with 35 Ill. Adm. Code 845.420(a)(4). The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat-laminated to each side of the geonet core, and will be sloped towards a perforated collection pipe installed in a trench along the middle of the basin. As discussed in Section 2.1, the structural fill placed along the basin floor will ensure the drainage geocomposite slopes towards the collection pipe at a slope of at least three percent pursuant to 35 Ill. Adm. Code 845.420(a)(3). This collection pipe will then convey leachate to the existing discharge pipe at the northern end of the retrofitted Ash Surge Basin to ultimately be discharged out of the basin. This drainage geocomposite and collection pipe system will ensure leachate flows from all points within the basin to the sump, will be constructed in such a way as to prevent clogging of the LCRS during the active life and post-closure care period of the basin, and will be large enough to conduct periodic cleaning. The upper non-woven geotextile component of the drainage geocomposite will also prevent CCR and non-CCR sediments from intruding into, clogging, and impeding the flow of leachate through the HDPE geonet core.

In addition to the upper non-woven geotextile component of the drainage geocomposite, a sand filter layer will be installed above the retrofitted Ash Surge Basin's LCRS to prevent CCR and non-CCR sediments from clogging the LCRS. This sand filter layer will have a hydraulic conductivity of at least 1×10^{-5} cm/sec pursuant to 35 Ill. Adm. Code 845.420(a)(2). Meanwhile, the upper non-woven geotextile component of the drainage

geocomposite will preclude the intrusion of sand particles from the filter layer into the HDPE geonet core's apertures, which would otherwise impede the flow of leachate through the geonet.

Finally, in accordance with 35 Ill. Adm. Code 845.420(a)(8), a protective warning layer will be installed over the sand filter layer to provide a means of deflecting the force of CCR flowing into the retrofitted Ash Surge Basin. Along the floor of the retrofitted Ash Surge Basin, this uppermost layer will be comprised of coarse aggregate materials to provide a working surface for operators removing CCR from the basin; it will also serve as a means of warning these operators that they have reached the basin floor and to stop excavating. Along the basin's side slopes, the protective warning layer will consist of riprap on a gravel bedding layer to protect the sand filter layer from erosion.

3.0 CCR REMOVAL & DECONTAMINATION PROCEDURES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(B)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(i)(B)

After temporarily ceasing all flows into the impoundment, MWG will remove the ash stored above the granular protective layers covering the Ash Surge Basin's existing geomembrane liner in accordance with the Station's usual cleaning and maintenance practices. After the ash stored in the Ash Surge Basin has been removed, the retrofit work described in Section 2.0 will be performed in accordance with this retrofit plan (or subsequent amendment of this retrofit plan) and the construction permit issued by the Illinois EPA.

After receiving a retrofit construction permit from the Illinois EPA, MWG will first remove the granular protective layers covering the Ash Surge Basin's existing geomembrane liner: a 6-inch-thick gravel warning layer and a 12-inch-thick sand cushion layer. MWG will also remove an 18-inch-thick layer gravel warning layer above the basin's existing geomembrane liner between the basin's concrete weir wall and discharge pipe. These materials will be loaded onto trucks and transported to a permitted disposal facility. Because these materials are likely to contain CCR materials, the trucks transporting the material off-site will carry manifests pursuant to 35 Ill. Adm. Code 845.740(c)(1)(A) and as specified in 35 Ill. Adm. Code 809. In addition, a CCR transportation plan will be prepared in accordance with 35 Ill. Adm. Code 845.740(c)(1)(B) which will include:

- Identification of the transportation method selected;
- The frequency, time of day, and routes of CCR transportation;
- Any measures to minimize noise, traffic, and safety concerns caused by the transportation of the CCR;
- Measures to limit fugitive dust from any transportation of CCR;
- Installation and use of a vehicle washing station;
- A means of covering the CCR for any mode of CCR transportation;

- A requirement that the CCR is transported by a permitted special waste hauler under 35 Ill. Adm. Code 809.201.

On-site fugitive dust control measures will also be implemented as necessary to minimize airborne CCR particulates while CCR and CCR-impacted materials are being removed and handled. Pursuant to 35 Ill. Adm. Code 845.740(c)(2)(A), these dust control measures will include a water spray, commercial dust suppressant, or a combination of these.

Prior to the removal of the granular protective layers covering the Ash Surge Basin's existing geomembrane liner, signage will be posted at the Station's entrance warning of the hazards of CCR dust inhalation in accordance with 35 Ill. Adm. Code 845.740(c)(3)(A). Pursuant to 35 Ill. Adm. Code 845.740(c)(3)(B), a written notice will be issued to each of the local governments through which the CCR-impacted material will be transported. This written notice will include an explanation of the hazards of CCR dust inhalation, the aforementioned CCR transportation plan, and a tentative transportation schedule.

After the granular protective layers in the basin have been removed, MWG will begin decontaminating the Ash Surge Basin's existing geomembrane liner to be re-used as a supplemental liner under the new composite liner. The basin's inlet troughs and aprons, outlet structures, associated piping, *etc.* will also be decontaminated. At a minimum, decontamination procedures will include pressure washing of the geomembrane liner and pond appurtenances in a systematic manner to remove all boiler wash water sediments. Following decontamination, the existing geomembrane liner will be visually inspected, and an electrical leak location survey will be conducted to ensure the liner is competent. Analytical tests will also be conducted in accordance with the construction permit issued by the Illinois EPA at the time of the retrofit work to demonstrate that the liner is not contaminated with CCR constituents. The results from the visual inspection and analytical tests will be submitted to the Illinois EPA for approval of re-using the existing geomembrane liner as a supplemental liner under the new composite liner in the retrofitted Ash Surge Basin.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR TO BE REMOVED

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(C)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(i)(C)

For the purposes of this retrofit plan, the maximum amount of CCR that will be removed during the retrofit of the Ash Surge Basin is conservatively based on the estimated maximum capacity of the basin: 162,000 cubic yards.

5.0 ESTIMATED LARGEST AREA TO BE RETROFITTED

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(D)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(i)(D)

The estimated largest area of the Ash Surge Basin to be retrofitted is anticipated to be the basin's full surface area: 8.4 acres.

6.0 RETROFIT SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(1)(E)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(i)(E)

MWG expects to complete the retrofit work for the Ash Surge Basin in 2025. Table 1 lists the major milestones necessary for retrofitting the Ash Surge Basin and the expected duration for completing each milestone.

Table 1 – Planning Level Schedule for Retrofitting the Ash Surge Basin

Activity	Estimated Duration
Prepare Retrofit Construction Design Documents	2 Months
Obtain Retrofit Construction Permit from Illinois EPA	18 Months
Hire Contractor to Complete Retrofit Activities in Accordance with Illinois EPA Permit	4 Months
Remove Protective Granular Layers Above Existing Liner	1 Month
Decontaminate Existing Liner and Basin Appurtenances (Including Laboratory Testing)	3 Months
Obtain Approval from Illinois EPA to Re-Use Existing Liner as Supplemental Liner	6 Weeks
Install Composite Liner System	6 Weeks
Install Leachate Collection and Removal System (Including Filter and Protective Layers)	6 Weeks
Submit Retrofit Completion Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Retrofit Completion Report and Certification from Illinois EPA	6 Weeks
Complete and Certify Retrofit of the Ash Surge Basin	--

7.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(3)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(iii)

This retrofit plan will be amended in accordance with 35 Ill. Adm. Code 845.770(c)(3) and 40 CFR 257.102(k)(2)(iii) if a change in the operation of the Ash Surge Basin would substantially affect this retrofit plan or if an unanticipated event necessitates a revision to this retrofit plan. Any and all amendments to this retrofit plan will be certified by a qualified professional engineer licensed in the State of Illinois in accordance with 35 Ill. Adm. Code 845.770(c)(4) and 40 CFR 257.102(k)(2)(iv).

8.0 COMPLETION OF RETROFIT ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(g)

Federal CCR Rule Reference: 40 CFR 257.102(k)(4)

Upon completion of all retrofit activities required by 35 Ill. Adm. Code Part 845 and 40 CFR 257.102(k) and approved by the Illinois EPA in a construction permit, a retrofit completion report and certification will be submitted to the Illinois EPA. The retrofit completion report will include (1) the engineering and hydrogeology reports containing monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time, date, and location information of the liner system and leachate collection system; (3) other photographs relied upon for documentation of construction activities; (4) a written summary of the retrofit requirements and completed activities as stated in the construction permit and 35 Ill. Adm. Code 845; and (5) any other information relied upon by the qualified professional engineer for the certification. Pursuant to 35 Ill. Adm. Code 845.770(g)(2) and 40 CFR 257.102(k)(4), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that the Ash Surge Basin has been retrofitted in accordance with this retrofit plan (or subsequent amendment of this retrofit plan), the requirements of 35 Ill. Adm. Code Part 845, and the requirements of 40 CFR 257.102(k). Finally, within 30 days of the Illinois EPA approving the retrofit completion report and certification, a notification of completion of retrofit activities will be prepared in accordance with 35 Ill. Adm. Code 845.770(h).

9.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.770(c)(4)

Federal CCR Rule Reference: 40 CFR 257.102(k)(2)(iv)

I certify that:

- This written retrofit plan for the Ash Surge Basin was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.770 and with the requirements for 40 CFR 257.102(k).
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: March 24, 2023

Seal:



th. Dehlin Thomas Dehlin
2023.03.24
10:01:50-05'00'

ATTACHMENT 8-2
PRELIMINARY WRITTEN CLOSURE PLAN

MWVG

Midwest Generation, LLC
Powerton Generating Station

Preliminary Written Closure Plan for Ash Surge Basin

Revision 1

October 29, 2021

Issue Purpose: Use

Project No.: 12661-122

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)

Federal CCR Rule Reference: 40 CFR 257.102(b)

1.1 PURPOSE

The Ash Surge Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is an existing coal combustion residual (CCR) surface impoundment that is regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." The Ash Surge Basin is also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), also referred to herein as the "Federal CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.720(a) and 40 CFR 257.102(b), this document provides the preliminary written closure plan for the Ash Surge Basin at Powerton. In accordance with both sets of regulations, this document describes the steps necessary to close the CCR unit at any point during its active life. MWG intends to first retrofit the Ash Surge Basin with a composite liner and a leachate collection and removal system (LCRS) in accordance with 35 Ill. Adm. Code 845.770(a) and 40 CFR 257.102(k) and then use the basin to manage CCR wastestreams and several non-CCR wastestreams from the Station. After Powerton ceases coal-fired power generating operations, the Station will initiate closure of the CCR surface impoundment. Therefore, this preliminary written closure plan describes the steps necessary to close the Ash Surge Basin after it has been retrofitted. In accordance with 40 CFR 257.102(k)(2)(ii)(A), MWG will prepare a corresponding retrofit plan for the Ash Surge Basin no later than 60 days prior to submitting a retrofit construction permit application to the Illinois EPA.

MWG intends to close the retrofitted Ash Surge Basin by removing CCR and CCR-mixed materials remaining in the basin at the time of closure and decontaminating affected areas pursuant to 35 Ill. Adm. Code 845.740(a) and 40 CFR 257.102(c). This plan describes the steps necessary to close the Ash Surge Basin in this manner.

1.2 SCOPE

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the retrofitted Ash Surge Basin will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program. The Illinois EPA has yet to publish a timeline for submitting its proposed CCR

permit program to the U.S. EPA for approval, and so this preliminary written closure plan has been prepared pursuant to both sets of regulations.

2.0 CLOSURE PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(A) & 845.740(a)

Federal CCR Rule References: 40 CFR 257.102(b)(1)(i) & 257.102(c)

MWG plans to close the retrofitted Ash Surge Basin by removing CCR and CCR-mixed materials remaining in the basin at the time of closure and decontaminating affected areas pursuant to 35 Ill. Adm. Code 845.740(a) and 40 CFR 257.102(c). The Ash Surge Basin closure will be executed according to the following sequential steps:

1. Obtaining a construction permit from the Illinois EPA for closing the retrofitted basin;
2. Ceasing all CCR and non-CCR inflows to the basin;
3. Drawing down free surface water in the basin by evaporation and by draining water into the existing outlet structure at the north end of the basin;
4. Once the water elevation is below the invert elevation of the basin's outlet structure, promoting additional drainage and dewatering by:
 - a. Excavating sumps and trenches within the ash material,
 - b. Using portable pumps as necessary to remove additional water by pumping water into the basin's outlet structure, and/or
 - c. Utilizing earthmoving equipment to pile the ash within the basin to promote drainage;
5. Removing the CCR from the retrofitted basin, loading the material onto trucks, and transporting the material to a beneficial-use facility or a permitted disposal facility;
6. Removing the retrofitted basin's LCRS, the filter layer installed over the LCRS, and any soil and geosynthetic materials installed over the filter layer and transporting the materials to a permitted disposal facility;
7. Removing the retrofitted basin's composite liner system;
8. Removing the original geomembrane liner (which MWG plans to use as a supplemental liner for the retrofitted basin pursuant to 35 Ill. Adm. Code 845.770(a)(4));
9. Inspecting the basin subgrade to verify it is not contaminated with CCR constituents;
10. Removing the retrofitted basin's appurtenant structures (e.g., inlet troughs, outlet structures, piping);
11. Sampling the groundwater at the basin site to verify the groundwater monitoring concentrations do not exceed the groundwater protection standards established for constituents in accordance with the operating permit issued by the Illinois EPA for the basin; and
12. Certifying (via a qualified professional engineer licensed in the State of Illinois) that the CCR has been removed from the basin and the CCR surface impoundment has been decontaminated in

accordance with the closure plan in effect at the time of closure and in accordance with the corresponding construction permit issued by the Illinois EPA.

3.0 CCR REMOVAL & DECONTAMINATION PROCEDURES

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(B) & 845.740(a)

Federal CCR Rule References: 40 CFR 257.102(b)(1)(ii) & 257.102(c)

The preliminary closure plan for the retrofitted Ash Surge Basin is to follow the sequential steps outlined in Section 2.0.

Upon receipt of the construction permit from the Illinois EPA for closing the retrofitted Ash Surge Basin and after permanent cessation of all flows into the impoundment, MWG will first draw down the free surface water remaining in the CCR surface impoundment and dewater the CCR stored therein. Initially, free water remaining in the retrofitted basin will be drawn down by allowing the water to drain to the outlet structure at the northern end of the basin. Once the water level falls below the outlet structure's invert elevation, additional drainage and dewatering may be facilitated by:

- Excavating sumps and trenches within the ash,
- Using portable pumps to pump water into the basin's outlet structure, and/or
- Utilizing earthmoving equipment to pile the CCR within the retrofitted basin to promote drainage.

Once the CCR within the impoundment is sufficiently dewatered to handle, construction equipment will then be used to load CCR materials onto trucks and transported to a beneficial-use facility or a permitted disposal facility. Trucks transporting the CCR materials off-site will carry manifests pursuant to 35 Ill. Adm. Code 845.740(c)(1)(A) and as specified in 35 Ill. Adm. Code 809. In addition, a CCR transportation plan will be prepared in accordance with 35 Ill. Adm. Code 845.740(c)(1)(B) which will include:

- Identification of the transportation method selected;
- The frequency, time of day, and routes of CCR transportation;
- Any measures to minimize noise, traffic, and safety concerns caused by the transportation of the CCR;
- Measures to limit fugitive dust from any transportation of CCR;
- Installation and use of a vehicle washing station;
- A means of covering the CCR for any mode of CCR transportation;
- A requirement that the CCR is transported by a permitted special waste hauler under 35 Ill. Adm. Code 809.201.

On-site fugitive dust control measures will also be implemented as necessary to minimize airborne CCR particulates while CCR materials are being handled. Pursuant to 35 Ill. Adm. Code 845.740(c)(2)(A), these dust control measures will include a water spray, commercial dust suppressant, or a combination of these.

Prior to the removal of CCR materials from the retrofitted Ash Surge Basin, signage will be posted at the Station's entrance warning of the hazards of CCR dust inhalation in accordance with 35 Ill. Adm. Code 845.740(c)(3)(A). Pursuant to 35 Ill. Adm. Code 845.740(c)(3)(B), a written notice will be issued to each of the local governments through which the CCR materials will be transported. This written notice will include an explanation of the hazards of CCR dust inhalation, the aforementioned CCR transportation plan, and a tentative transportation schedule.

The containment systems installed within the retrofitted Ash Surge Basin (*i.e.*, LCRS, composite liner, filter layer over the LCRS, *etc.*) will be removed from the impoundment. The original geomembrane liner and appurtenant structures (*i.e.*, inlet trough, outlet structure, piping, *etc.*) will also be removed. Materials removed from the impoundment site will be loaded onto trucks and transported to permitted disposal facilities in accordance with the aforementioned CCR transportation plan developed for the closure work. Finally, the basin subgrade will be visually inspected to verify that the area is not contaminated with CCR constituents.

In accordance with 35 Ill. Adm. Code 845.740(e) and 40 CFR 257.102(c), CCR removal and decontamination will be complete when constituent concentrations throughout the retrofitted Ash Surge Basin and areas that may have been affected by releases from the basin have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standards established under 35 Ill. Adm. Code 845.600. After CCR removal and decontamination of the retrofitted Ash Surge Basin has been completed, MWG will submit a report documenting the completion of CCR removal and decontamination of the unit, which will include a certification from a qualified professional engineer licensed in the State of Illinois that CCR removal and decontamination was completed in accordance with 35 Ill. Adm. Code 845.740.

In accordance with 35 Ill. Adm. Code 845.740(b), MWG will continue groundwater monitoring in accordance with Subpart F of the Illinois CCR Rule ("Groundwater Monitoring and Corrective Action") for three years after the completion of CCR removal and decontamination. After groundwater monitoring has been completed, MWG will submit a report documenting the completion of groundwater monitoring, which will include a certification from a qualified professional engineer licensed in the State of Illinois that groundwater monitoring was completed in accordance with 35 Ill. Adm. Code 845.740.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(D)

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(iv)

Detailed records of the maximum inventory of CCR ever stored in the Ash Surge Basin are not available. For the purposes of this preliminary written closure plan, the maximum inventory of CCR ever on-site over the active life of the Ash Surge Basin is conservatively based on the estimated maximum capacity of the basin prior to retrofit: 162,000 cubic yards.

5.0 CLOSURE SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(F)

Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(vi)

Closure activities for the retrofitted Ash Surge Basin are expected to be completed by 2030. Table 1 lists the major milestones necessary for closing the basin and the expected duration for completing each milestone.

Table 1 – Planning Level Schedule for Closing the Retrofitted Ash Surge Basin

Activity	Estimated Duration
Prepare Closure Construction Design Documents	6 Months
Obtain Closure Construction Permit from Illinois EPA	13 Months
Hire Contractor to Complete Closure Activities in Accordance with Illinois EPA Permit	4 Months
Cease All Flows into Retrofitted Ash Surge Basin	--
Draw Down Water & Dewater Impounded Ash	14 Months
Remove Impounded Ash	4 Months
Remove Basin Containment Systems and Appurtenant Structures	6 Months
Submit Completion of CCR Removal and Decontamination Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Completion of CCR Removal and Decontamination Report from Illinois EPA	3 Months
Complete and Certify Closure of the Retrofitted Ash Surge Basin	--

6.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(3)

Federal CCR Rule Reference: 40 CFR 257.102(b)(3)

This closure plan will be amended in accordance with 35 Ill. Adm. Code 845.720(a)(3) and 40 CFR 257.102(b)(3) if a change in the operation of the Ash Surge Basin would substantially affect this closure plan or if an unanticipated event necessitates a revision to this closure plan. Any and all amendments to this closure plan will be certified by a qualified professional engineer registered in the State of Illinois in accordance with 35 Ill. Adm. Code 845.720(a)(4) and 40 CFR 257.102(b)(4).

7.0 COMPLETION OF CLOSURE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.760

Federal CCR Rule Reference: 40 CFR 257.102(f)

Upon completion of all CCR removal and decontamination activities required by 35 Ill. Adm. Code Part 845 and 40 CFR 257.102(c) and approved by the Illinois EPA in a construction permit, a closure report and a closure certification for the retrofitted Ash Surge Basin will be submitted to the Illinois EPA in accordance with 35 Ill. Adm. Code 845.760(e). The closure report will include (1) the engineering and hydrogeology reports containing any monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time, date, and location information relied upon for documentation of construction activities; (3) a written summary of the closure requirements and completed activities as stated in the closure plan in effect and 35 Ill. Adm. Code Part 845; and (4) any other information relied upon by the qualified professional engineer for the certification. Pursuant to 35 Ill. Adm. Code 845.760(e)(2) and 40 CFR 257.102(f)(3), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that the retrofitted Ash Surge Basin has been closed in accordance with the closure plan in effect at the time of the closure work, the requirements of 35 Ill. Adm. Code Part 845, and the requirements of 40 CFR 257.102. Finally, within 30 days of the Illinois EPA approving the closure report and closure certification, a notification of completion of closure will be prepared in accordance with 35 Ill. Adm. Code 845.760(f).

8.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(4)

Federal CCR Rule Reference: 40 CFR 257.102(b)(4)

I certify that:

- This preliminary written closure plan for the Ash Surge Basin was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code Part 845 and with the requirements of 40 CFR 257.102.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: October 29, 2021

Seal:



Th. Dehlin
10/29/2021
Exp. 11/30/2021

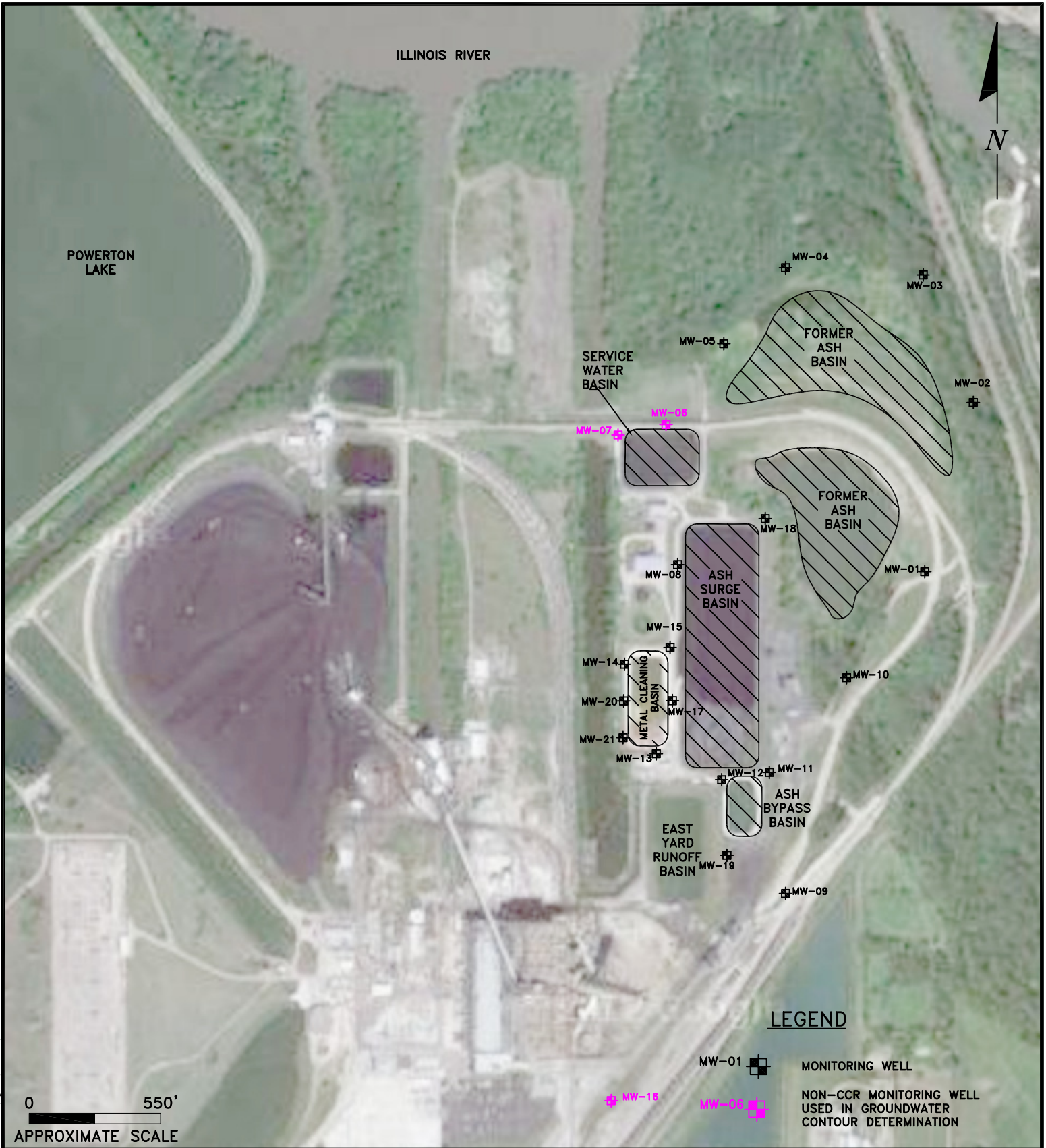
9.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed October 19, 2021.
2. U.S. Environmental Protection Agency. "Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments." 40 CFR Part 257 Subpart D. <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D>. Accessed October 19, 2021.

ATTACHMENT 9-0

GROUNDWATER MONITORING FIGURES & TABLES

FIGURE	TITLE
FIGURE 9-1	MONITORING WELL MAP
FIGURE 9-2	CROSS SECTION A-A'
FIGURE 9-3	CROSS SECTION A'-A''
FIGURE 9-4	CROSS SECTION B-B'
FIGURE 9-5	CROSS SECTION B'-B''
FIGURE 9-6	CROSS SECTION C-C'
FIGURE 9-7	CROSS SECTION D-D'
FIGURE 9-8	ASH BYPASS BASIN AND ASH SURGE BASIN HYDROGRAPH
FIGURE 9-9	<i>NOT USED</i>
FIGURE 9-10	GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 08/2020
FIGURE 9-11	GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 08/2020
FIGURE 9-12	GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 12/2020
FIGURE 9-13	GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 12/2020
FIGURE 9-14	GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 02/2021
FIGURE 9-15	GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 02/2021
FIGURE 9-16	GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 05/2021
FIGURE 9-17	GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 05/2021
FIGURE 9-18	GROUNDWATER MANAGEMENT ZONE FOR CCR SURFACE IMPOUNDMENTS
FIGURE 9-19	2500' RADIUS POTABLE WELL MAP



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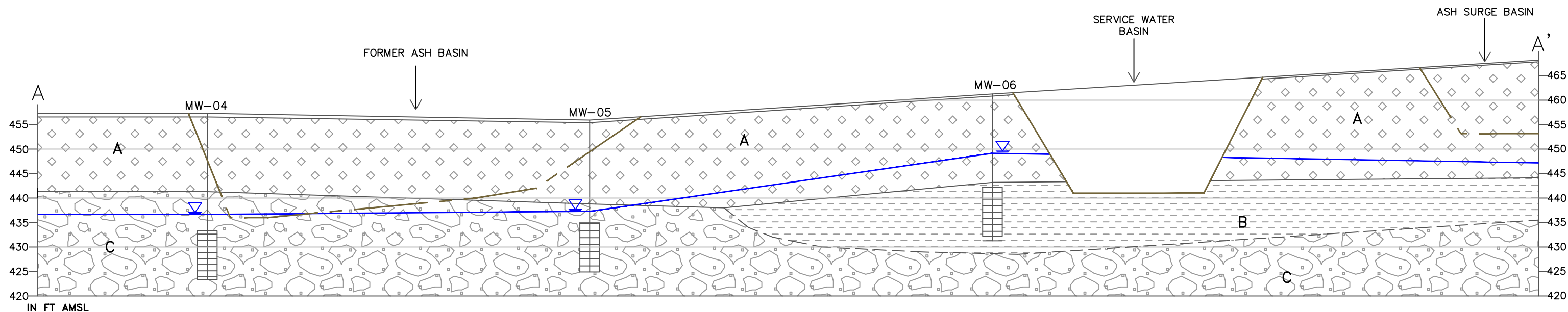
MONITORING WELL MAP

POWERTON STATION
PEKIN, ILLINOIS

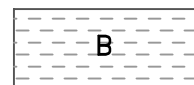
Scale: 1" = 550' Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-1



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.



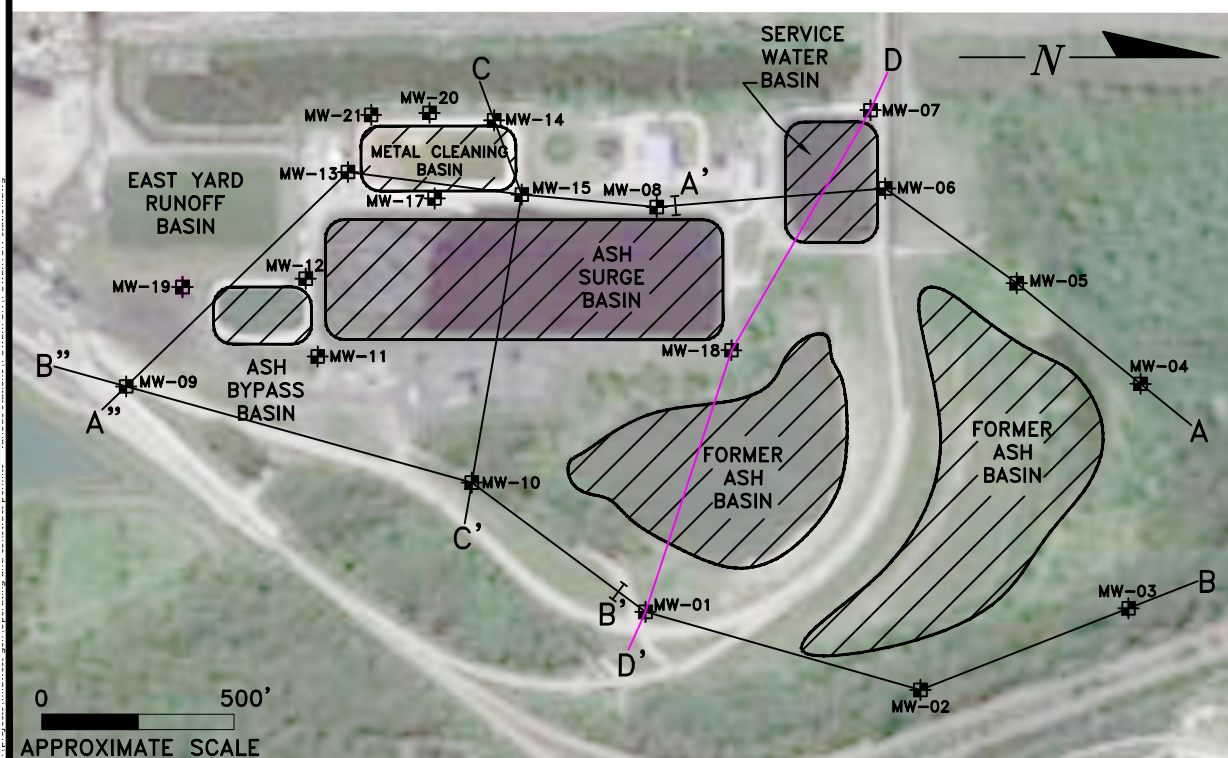
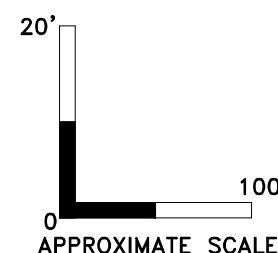
WATER LEVEL (5/21)



PROJECTED POND OUTLINE

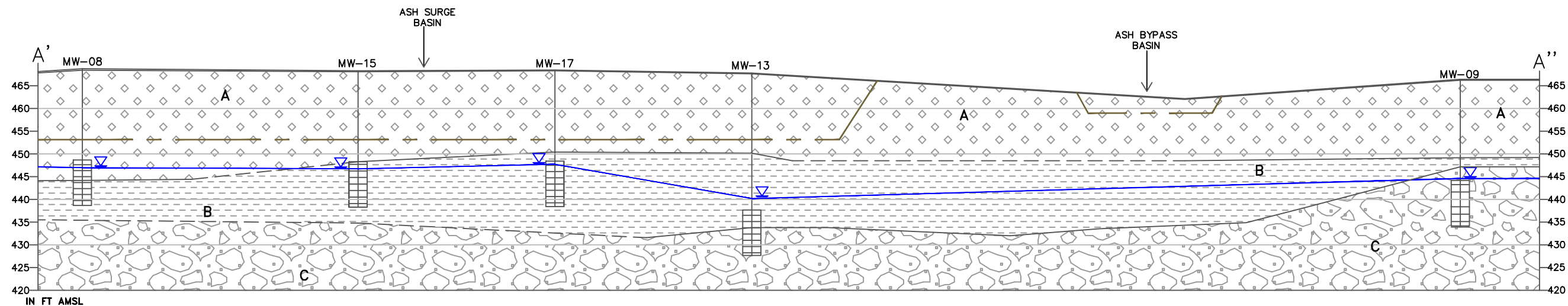


POND OUTLINE

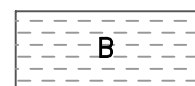


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CROSS SECTION A-A'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 4, 2021
KPRG Project No. 19520.1	FIGURE 9-2



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).



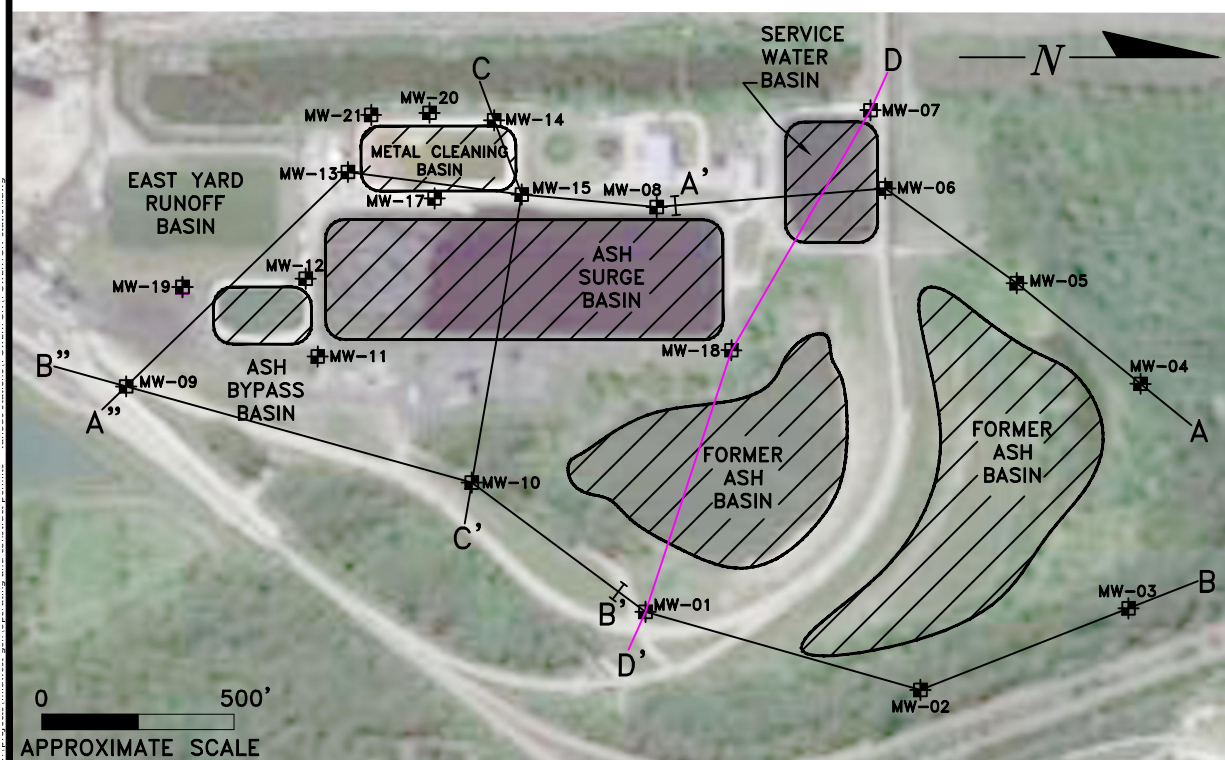
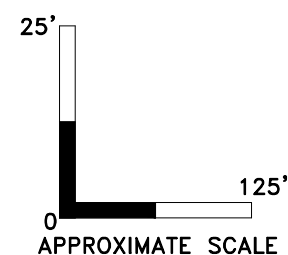
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



WATER LEVEL (5/21)



PROJECTED POND OUTLINE



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CROSS SECTION A'-A''

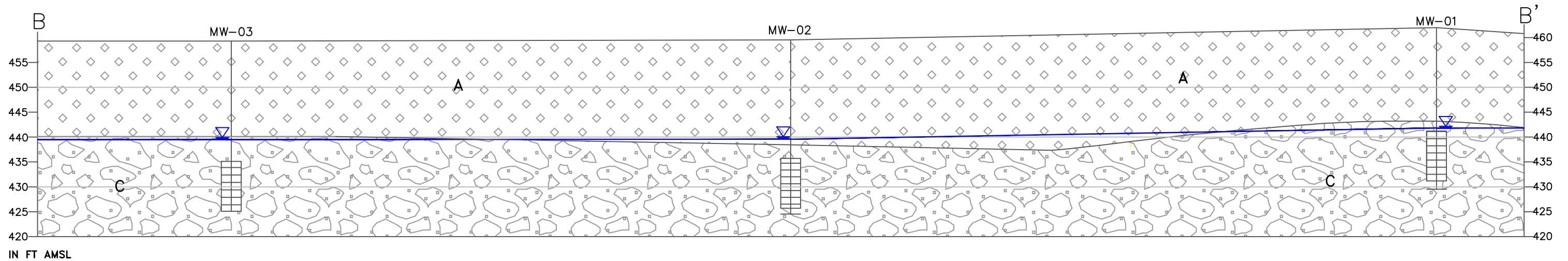
POWERTON STATION
PEKIN, ILLINOIS

SEE SCALE

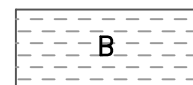
Date: October 4, 2021

KPRG Project No. 19520.1

FIGURE 9-3



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.



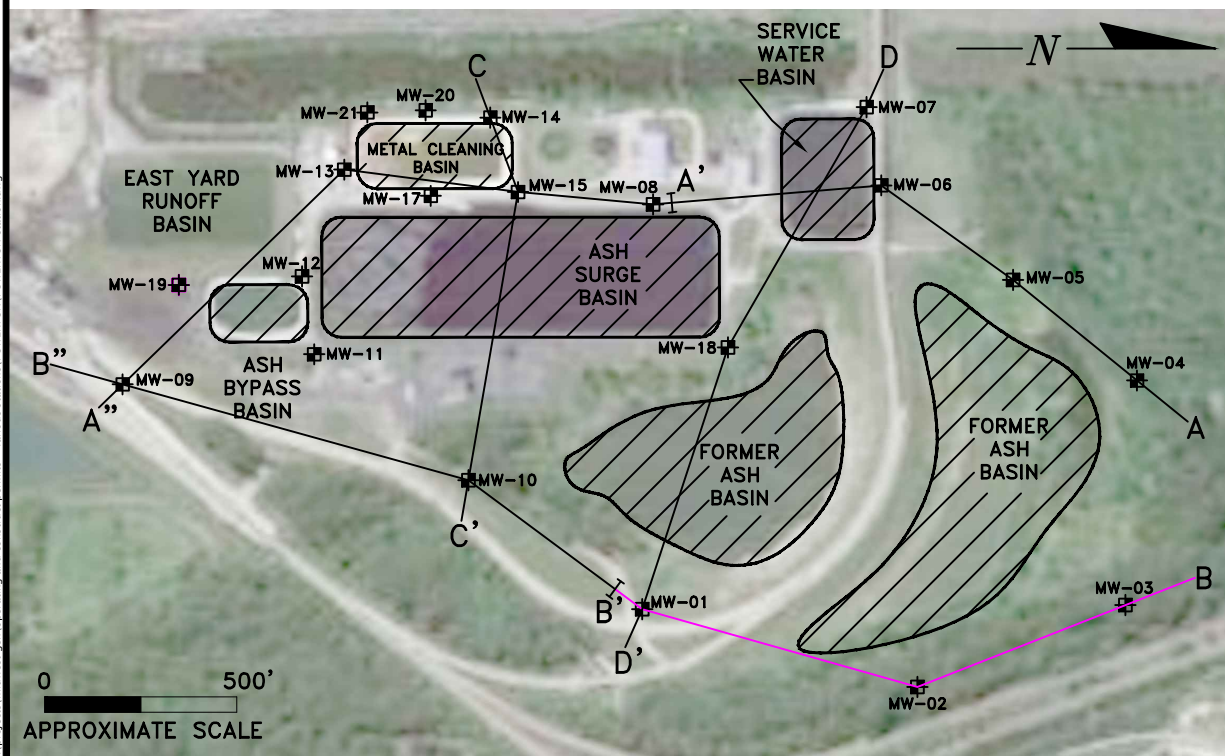
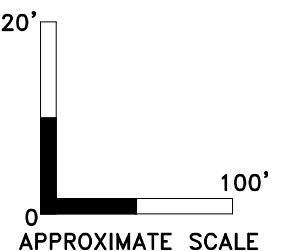
CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).



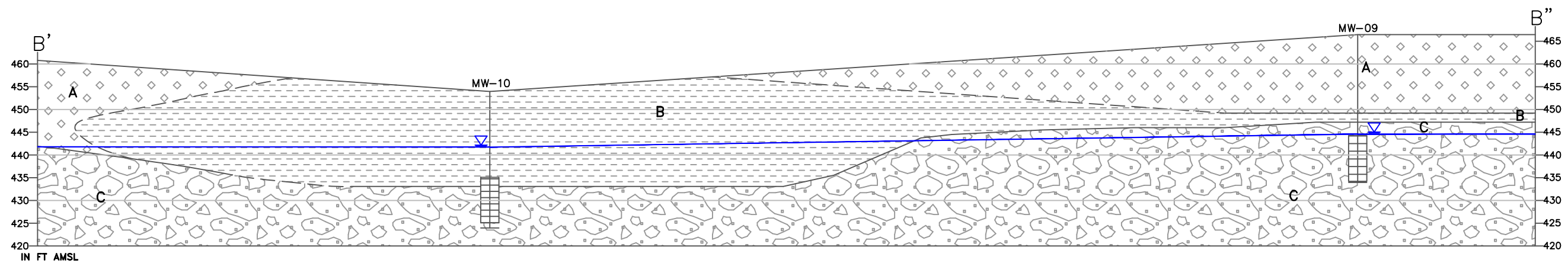
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



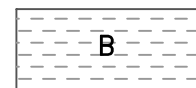
WATER LEVEL (5/21)



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



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.



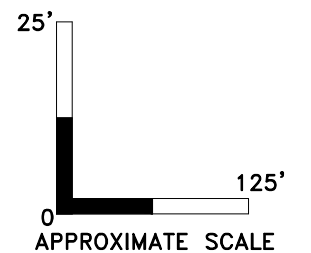
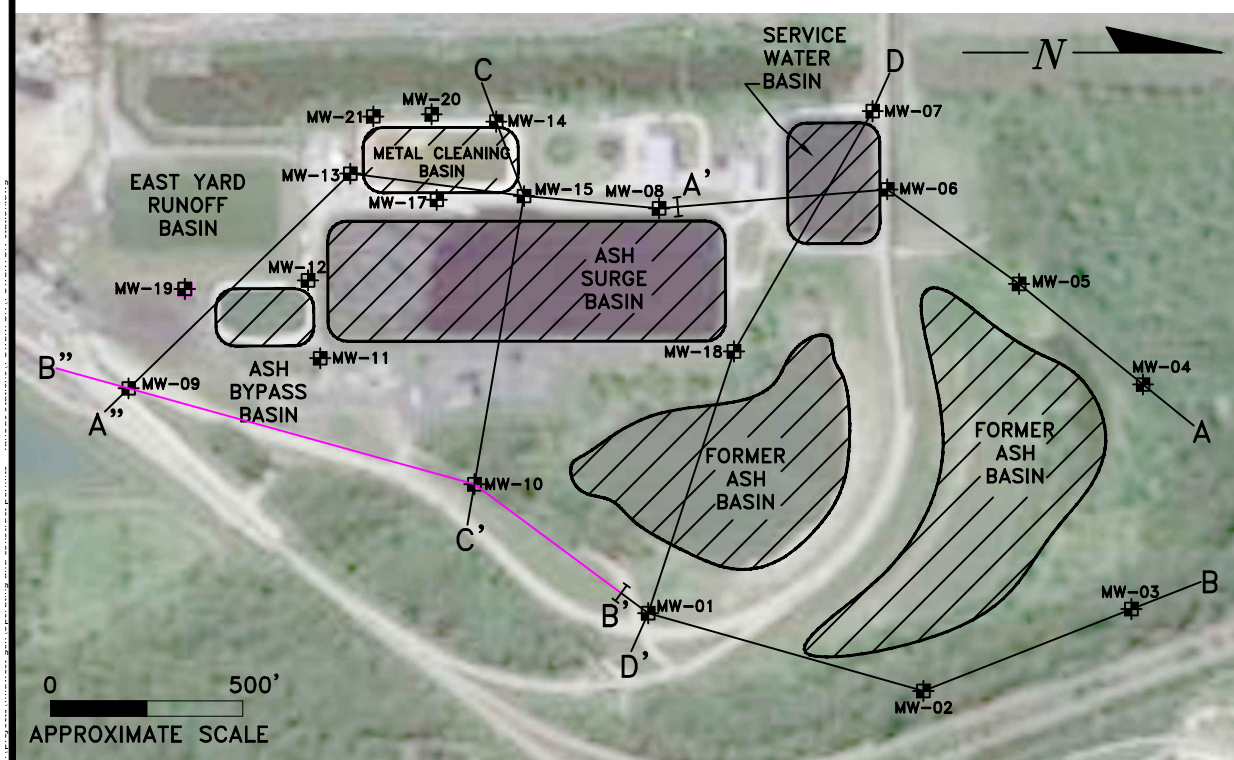
CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).



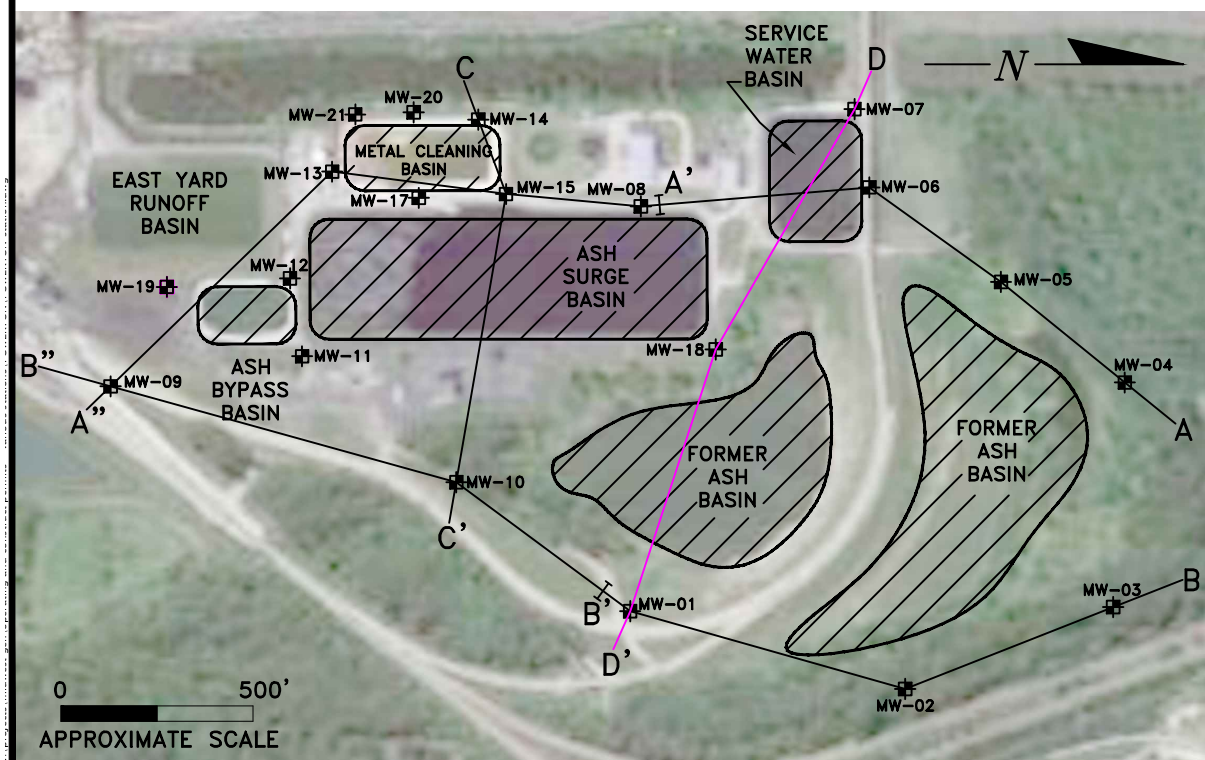
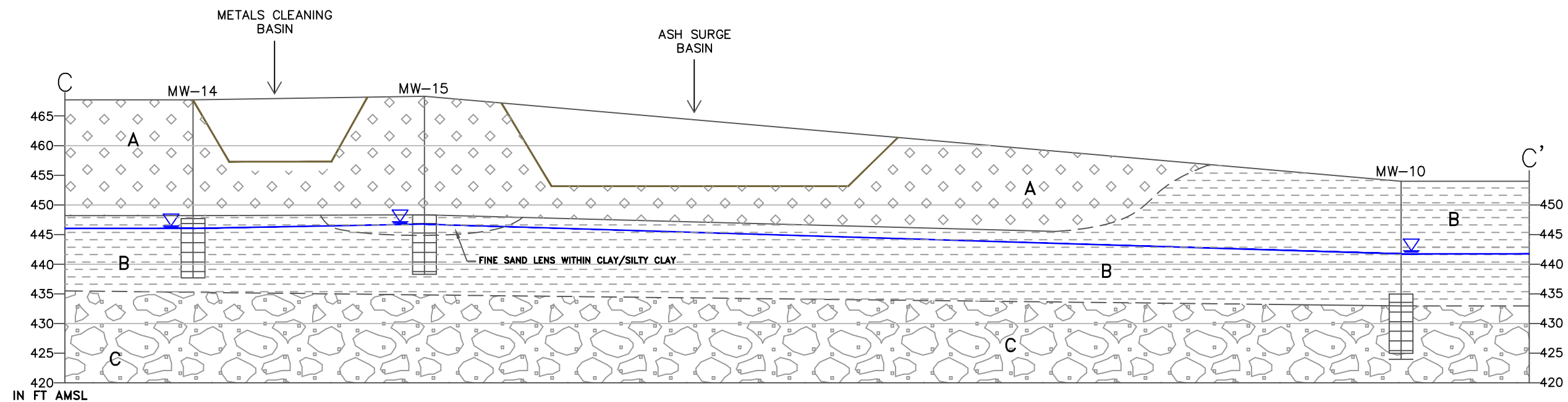
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



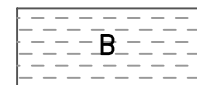
WATER LEVEL (5/21)



ENVIRONMENTAL CONSULTATION & REMEDIATION		CROSS SECTION B'-B''	
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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593		KPRG Project No. 19520.1	FIGURE 9-5



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).



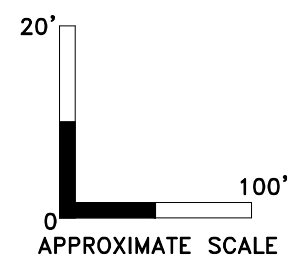
C SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.



WATER LEVEL (5/21)



POND OUTLINE



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CROSS SECTION C-C'

POWERTON STATION
PEKIN, ILLINOIS

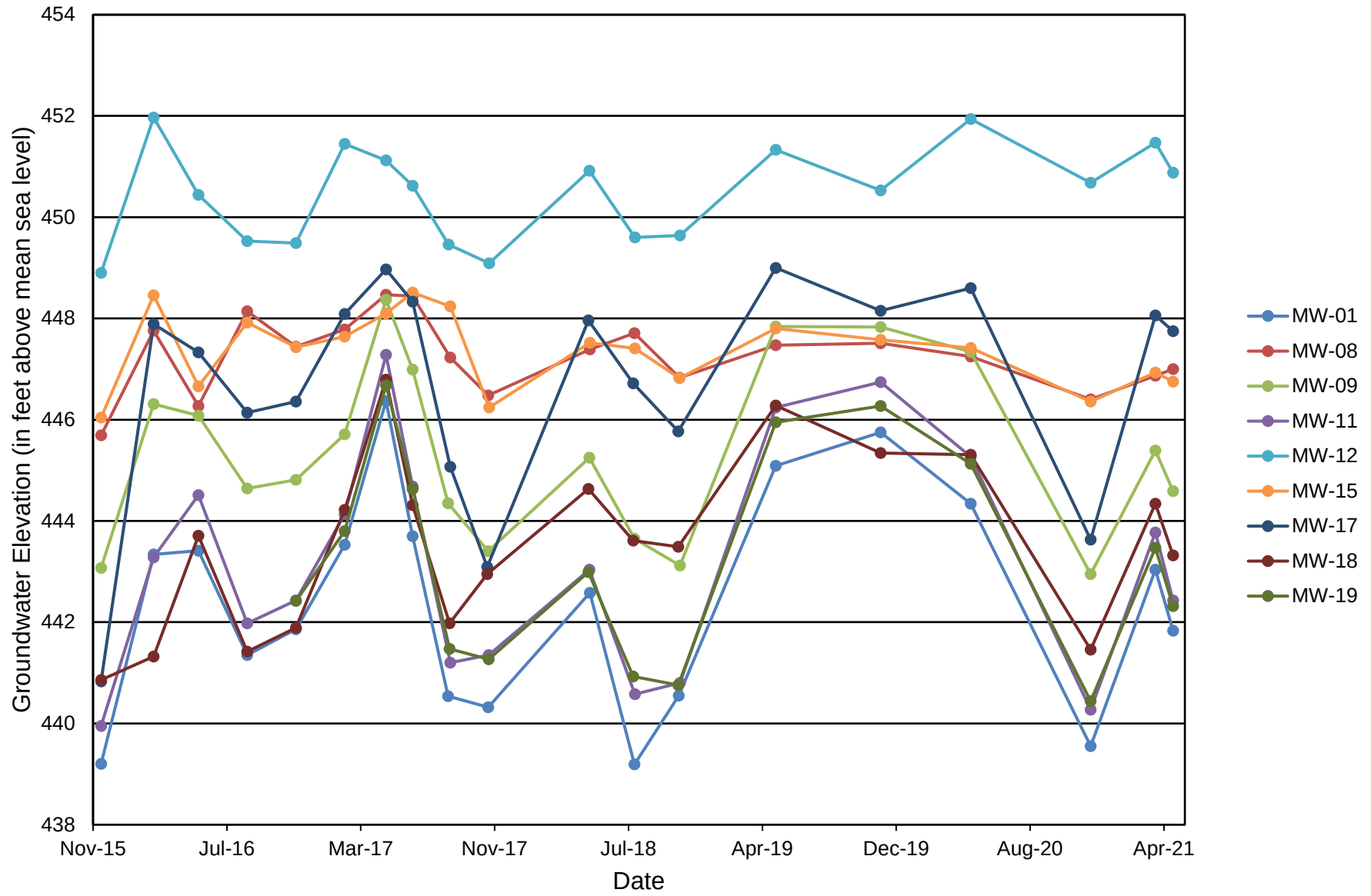
SEE SCALE

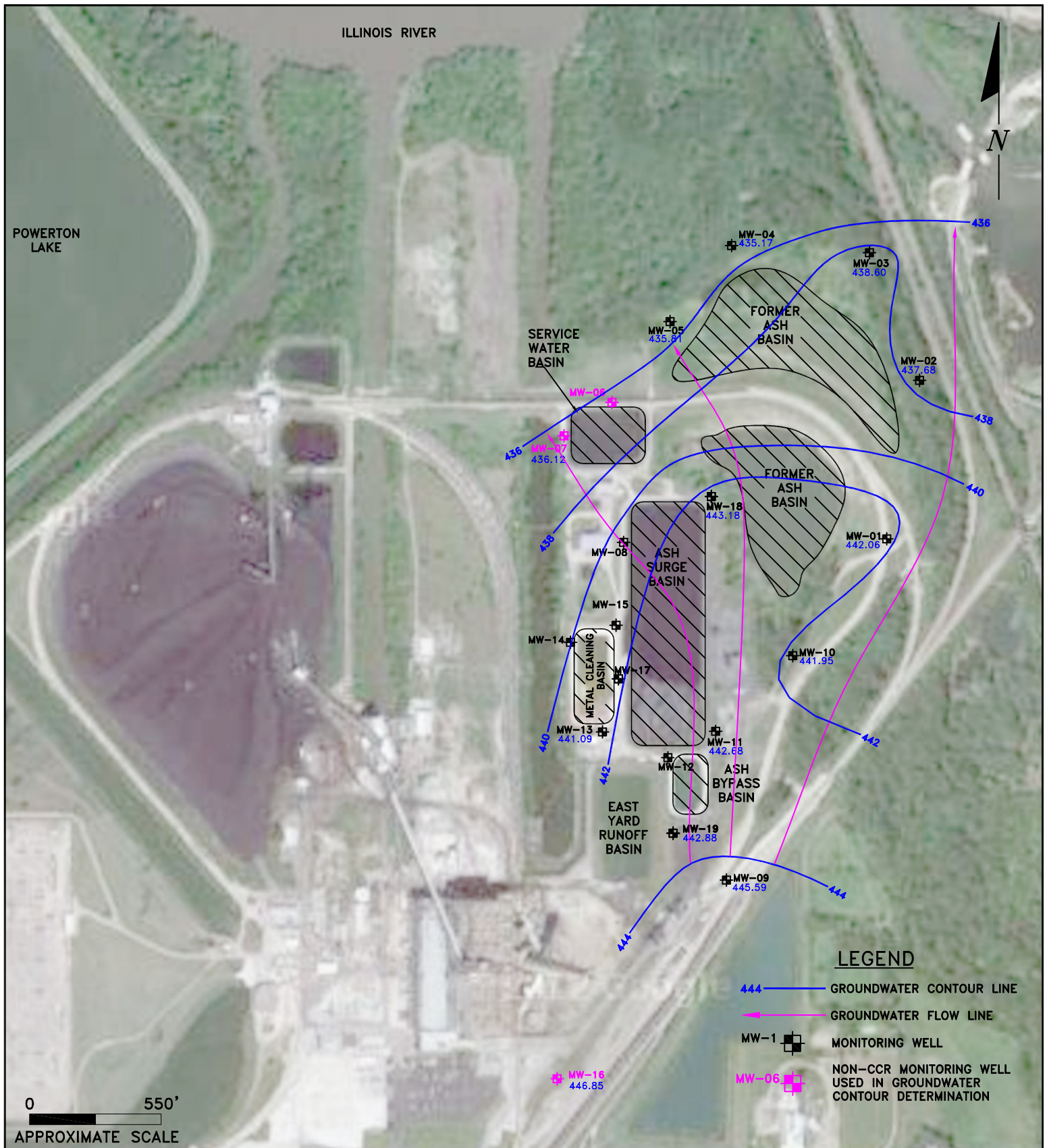
Date: October 4, 2021

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FIGURE 9-6

Midwest Generation Powerton Station, Pekin, IL.
Figure 9-8. Ash Bypass Basin and Ash Surge Basin Hydrograph





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GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 08/2020

POWERTON STATION
PEKIN, ILLINOIS

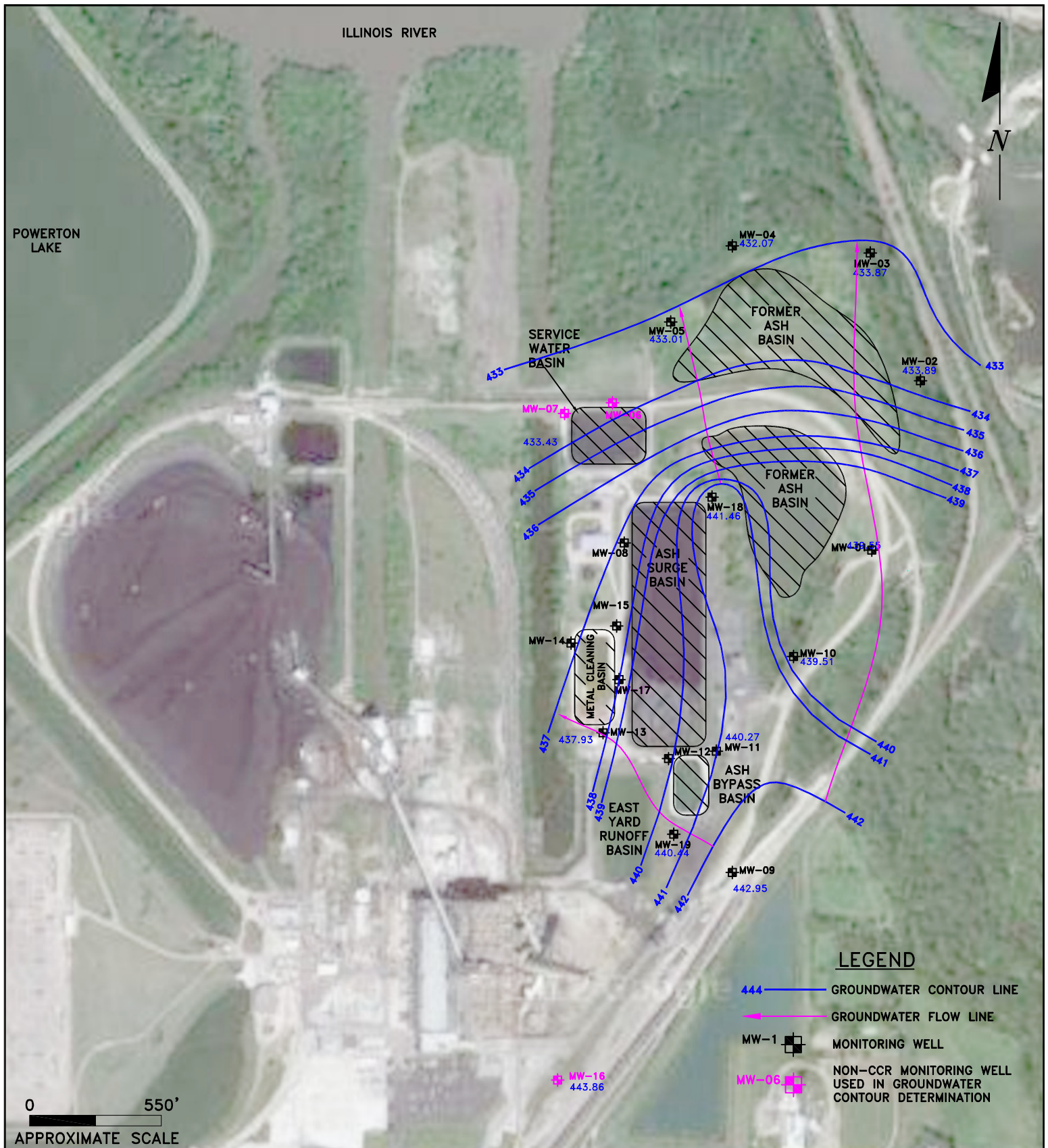
Scale: 1" = 550'

Date: August 31, 2021

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FIGURE 9-10

FIGURE 9-11



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GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 12/2020

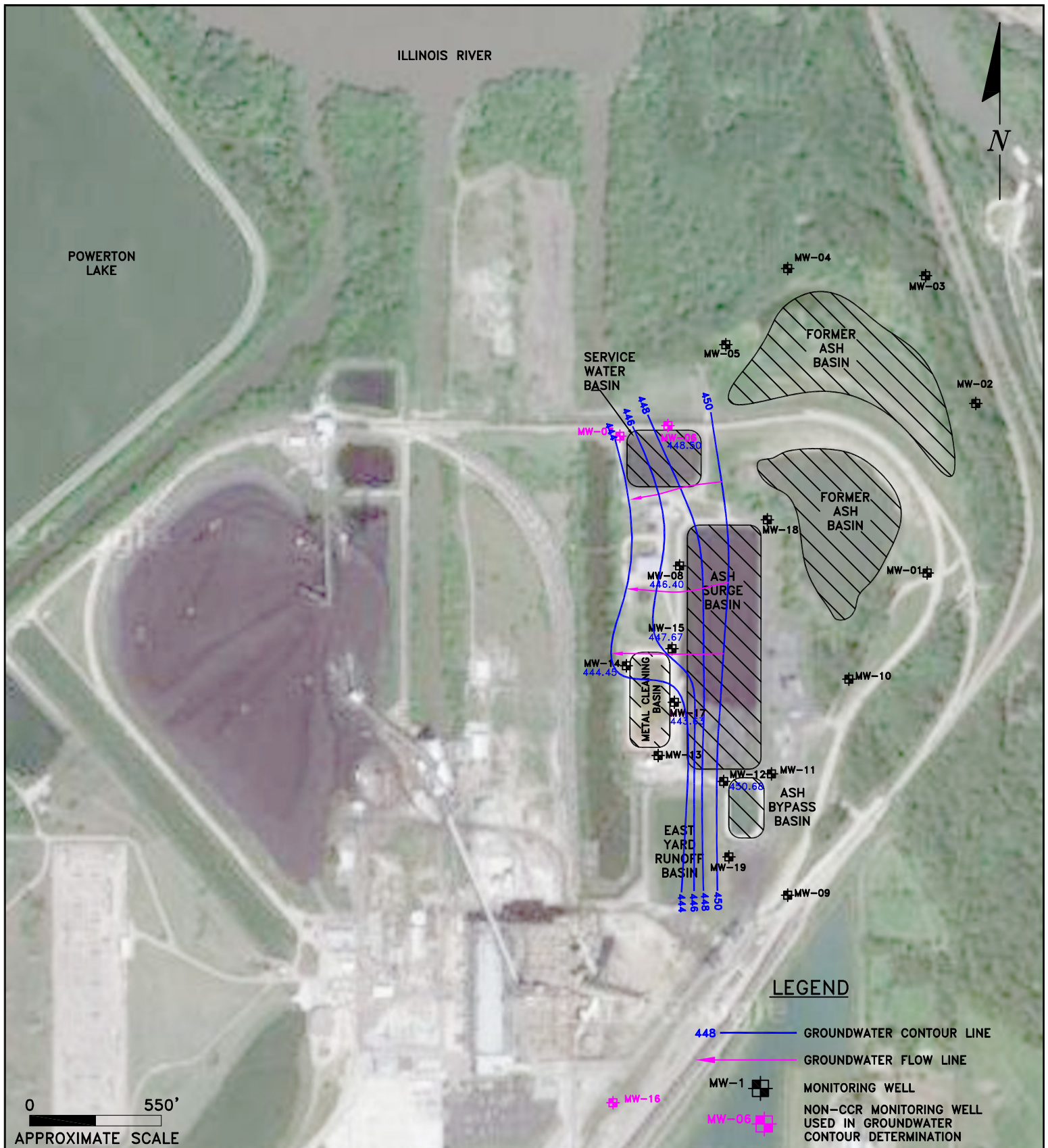
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-12



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

GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 12/2020

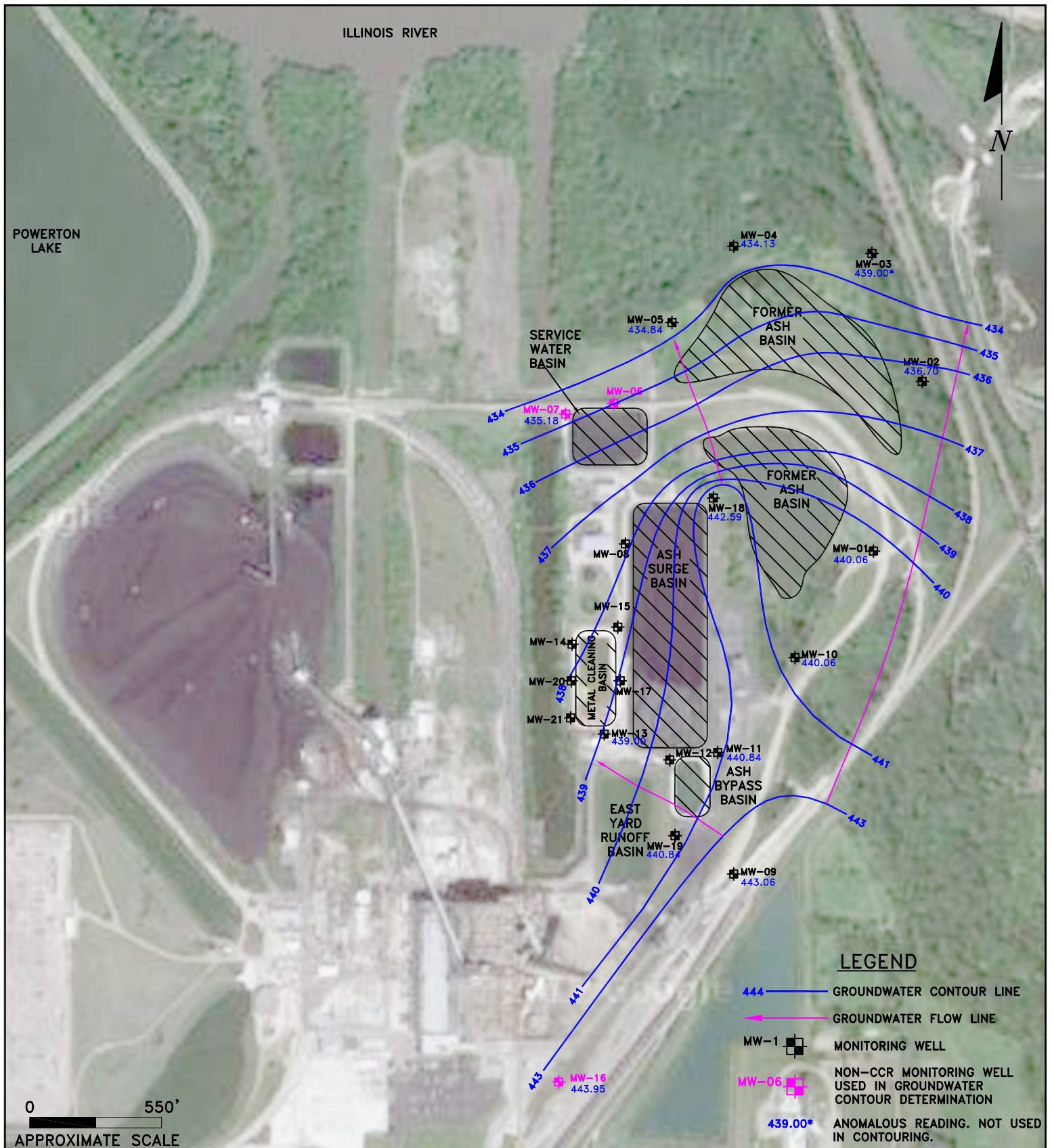
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-13



ENVIRONMENTAL CONSULTATION & REMEDIATION

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GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 02/2021

POWERTON STATION
PEKIN, ILLINOIS

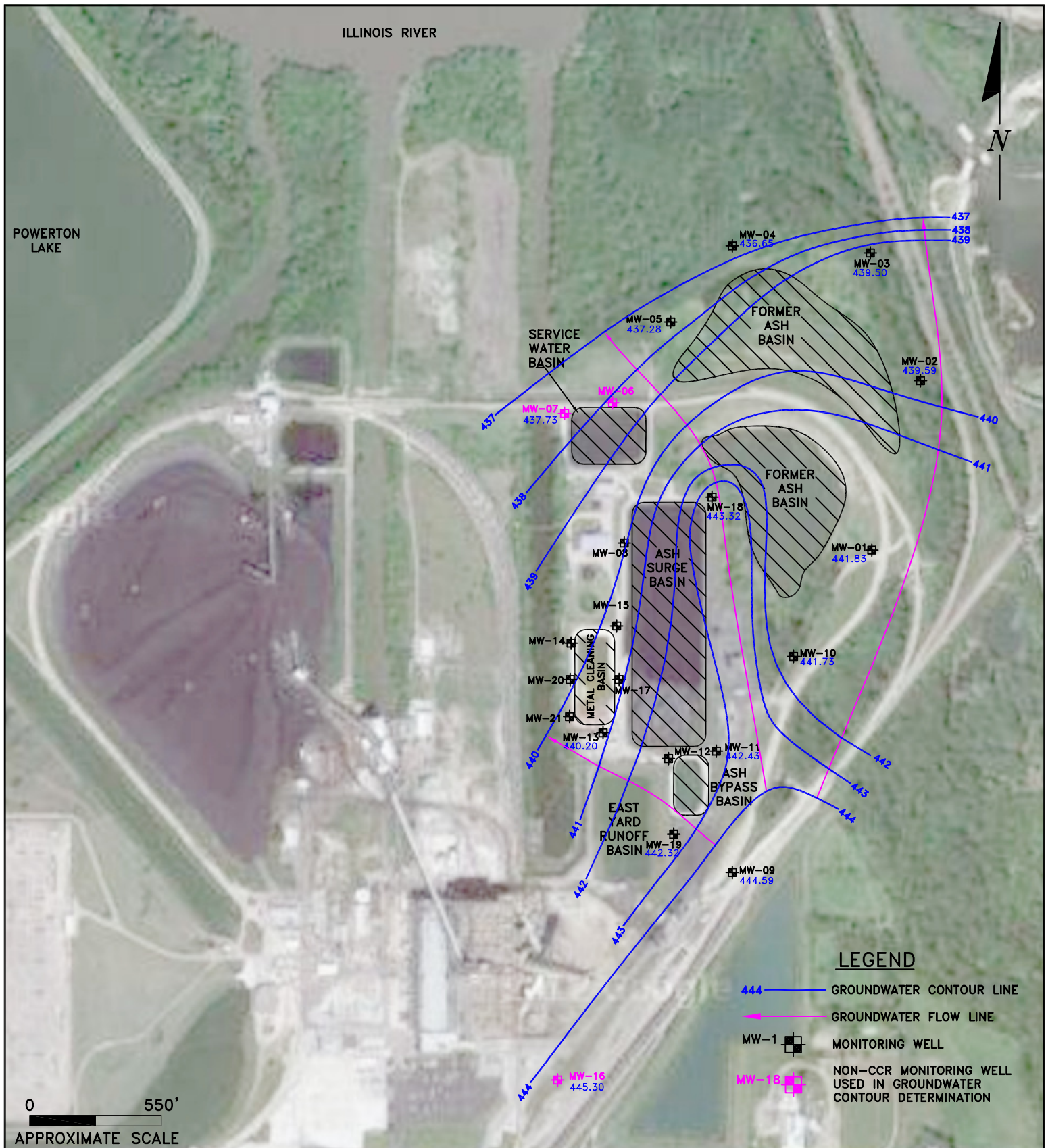
Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-14

FIGURE 9-15



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

GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 05/2021

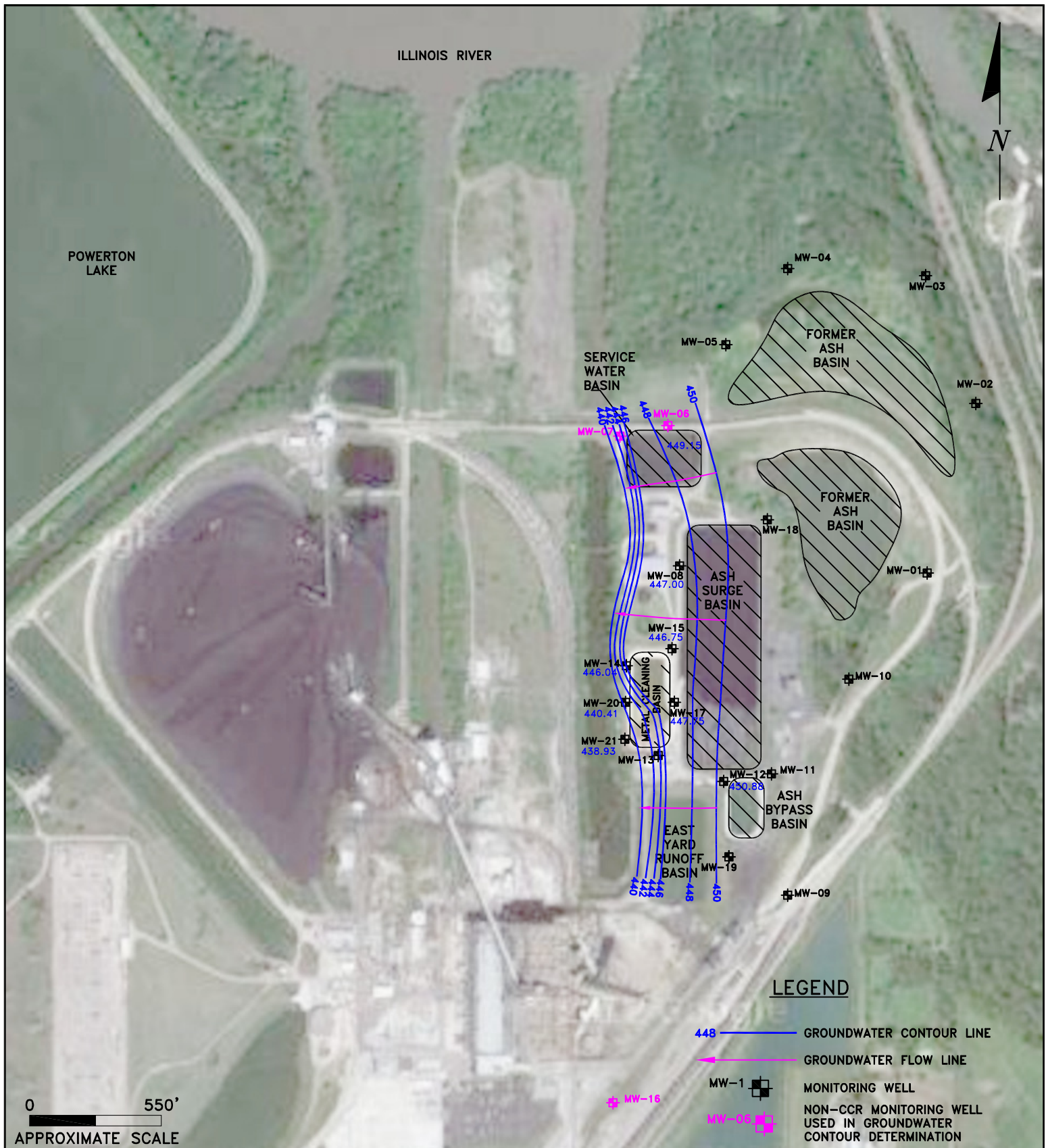
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-16



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

GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 05/2021

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-17



ENVIRONMENTAL CONSULTATION & REMEDIATION

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GROUNDWATER MANAGEMENT ZONE FOR CCR SURFACE IMPOUNDMENTS

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: September 17, 2021

KPRG Project No. 19520.1

Figure 9-18



ENVIRONMENTAL CONSULTATION & REMEDIATION

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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 9-19

ATTACHMENT 9-0

GROUNDWATER MONITORING FIGURES & TABLES

TABLE	TITLE
TABLE 9-1	SUMMARY OF LOCAL PRECIPITATION DATA
TABLE 9-2	ASH BYPASS BASIN AND ASH SURGE BASIN GROUNDWATER ELEVATIONS
TABLE 9-3	<i>NOT USED</i>
TABLE 9-4	HYDRAULIC GRADIENT, DIRECTION AND SEEPAGE VELOCITY
TABLE 9-5	GROUNDWATER ANALYTICAL RESULTS
TABLE 9-6	<i>NOT USED</i>
TABLE 9-7	ASH BYPASS BASIN AND ASH SURGE BASIN TURBIDITY MEASUREMENT DATA
TABLE 9-8	<i>NOT USED</i>
TABLE 9-9	SUMMARY OF SAMPLE BOTTLES, PRESERVATION HOLDING TIME, AND ANALYTICAL METHODS

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. Ash Bypass Basin and Ash Surge 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
	4/29/2019	465.24	20.15	445.09
	11/11/2019	465.24	19.49	445.75
	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
MW-08	5/10/2021	465.24	23.41	441.83
	11/16/2015	471.75	26.06	445.69
	2/22/2016	471.75	23.99	447.76
	5/16/2016	471.75	25.48	446.27
	8/15/2016	471.75	23.61	448.14
	11/14/2016	471.75	24.31	447.44
	2/13/2017	471.75	23.97	447.78
	5/1/2017	471.75	23.28	448.47
	6/20/2017	471.75	23.31	448.44
	8/29/2017	471.75	24.52	447.23
	11/8/2017	471.75	25.27	446.48
	5/17/2018	471.75	24.36	447.39
	8/8/2018	471.75	24.04	447.71
	10/31/2018	471.75	24.92	446.83
	4/29/2019	471.75	24.28	447.47
	11/11/2019	471.75	24.24	447.51
	4/27/2020	471.75	24.50	447.25
	12/7/2020	471.75	25.35	446.40
MW-09	4/7/2021	471.75	24.88	446.87
	5/10/2021	471.75	24.75	447.00
	11/16/2015	469.14	26.07	443.07
	2/22/2016	469.14	22.83	446.31
	5/16/2016	469.14	23.06	446.08
	8/15/2016	469.14	24.50	444.64
	11/14/2016	469.14	24.33	444.81
	2/13/2017	469.14	23.43	445.71
	5/1/2017	469.14	20.77	448.37
	6/20/2017	469.14	22.15	446.99
	8/25/2017	469.14	24.79	444.35
	11/8/2017	469.14	25.74	443.40
	5/16/2018	469.14	23.89	445.25
	8/8/2018	469.14	25.49	443.65
	11/1/2018	469.14	26.02	443.12
	4/29/2019	469.14	21.30	447.84
	11/11/2019	469.14	21.31	447.83
	4/27/2020	469.14	21.80	447.34
	12/7/2020	469.14	26.19	442.95
	4/7/2021	469.14	23.75	445.39
	5/10/2021	469.14	24.55	444.59

Table 9-2. Ash Bypass Basin and Ash Surge 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-11	11/16/2015	471.62	31.67	439.95
	2/22/2016	471.62	28.34	443.28
	5/16/2016	471.62	27.11	444.51
	8/15/2016	471.62	29.64	441.98
	11/14/2016	471.62	29.19	442.43
	2/13/2017	471.62	27.49	444.13
	5/1/2017	471.62	24.34	447.28
	6/20/2017	471.62	26.94	444.68
	8/29/2017	471.62	30.42	441.20
	11/9/2017	471.62	30.27	441.35
	5/16/2018	471.62	28.58	443.04
	8/9/2018	471.62	31.04	440.58
	11/1/2018	471.62	30.82	440.80
	4/29/2019	471.62	25.38	446.24
	11/11/2019	471.62	24.88	446.74
	4/27/2020	471.62	26.35	445.27
	12/7/2020	471.62	31.35	440.27
	4/7/2021	471.62	27.85	443.77
	5/10/2021	471.62	29.19	442.43
MW-12	11/16/2015	473.38	24.48	448.90
	2/22/2016	473.38	21.41	451.97
	5/16/2016	473.38	22.94	450.44
	8/15/2016	473.38	23.85	449.53
	11/14/2016	473.38	23.89	449.49
	2/13/2017	473.38	21.93	451.45
	5/1/2017	473.38	22.26	451.12
	6/20/2017	473.38	22.76	450.62
	8/26/2017	473.38	23.92	449.46
	11/10/2017	473.38	24.29	449.09
	5/16/2018	473.38	22.46	450.92
	8/9/2018	473.38	23.78	449.60
	11/1/2018	473.38	23.74	449.64
	4/29/2019	473.38	22.05	451.33
	11/11/2019	473.38	22.85	450.53
	4/27/2020	473.38	21.44	451.94
	12/7/2020	473.38	22.70	450.68
	4/7/2021	473.38	21.91	451.47
	5/10/2021	473.38	22.50	450.88
MW-15	11/16/2015	471.37	25.33	446.04
	2/22/2016	471.37	22.91	448.46
	5/16/2016	471.37	24.71	446.66
	8/15/2016	471.37	23.45	447.92
	11/14/2016	471.37	23.94	447.43
	2/13/2017	471.37	23.73	447.64
	5/1/2017	471.37	23.27	448.10
	6/20/2017	471.37	22.86	448.51
	8/29/2017	471.37	23.13	448.24
	11/10/2017	471.37	25.13	446.24
	5/17/2018	471.37	23.85	447.52
	8/9/2018	471.37	23.96	447.41
	10/31/2018	471.37	24.55	446.82
	4/29/2019	471.37	23.57	447.80
	11/11/2019	471.37	23.79	447.58
	4/27/2020	471.37	23.95	447.42
	12/7/2020	471.37	25.01	446.36
	4/7/2021	471.37	24.44	446.93
	5/10/2021	471.37	24.62	446.75

Table 9-2. Ash Bypass Basin and Ash Surge 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-17	11/16/2015	467.75	26.92	440.83
	2/22/2016	467.75	19.86	447.89
	5/16/2016	467.75	20.42	447.33
	8/15/2016	467.75	21.61	446.14
	11/14/2016	467.75	21.39	446.36
	2/13/2017	467.75	19.66	448.09
	5/1/2017	467.75	18.78	448.97
	6/20/2017	467.75	19.42	448.33
	8/29/2017	467.75	22.68	445.07
	11/6/2017	467.75	24.66	443.09
	5/14/2018	467.75	19.79	447.96
	8/6/2018	467.75	21.03	446.72
	10/29/2018	467.75	21.98	445.77
	4/29/2019	467.75	18.75	449.00
	11/11/2019	467.75	19.60	448.15
	4/27/2020	467.75	19.15	448.60
	12/7/2020	467.75	24.12	443.63
MW-18	4/7/2021	467.75	19.69	448.06
	5/10/2021	467.75	20.00	447.75
	11/16/2015	469.28	28.42	440.86
	2/22/2016	469.28	27.96	441.32
	5/16/2016	469.28	25.57	443.71
	8/15/2016	469.28	27.86	441.42
	11/14/2016	469.28	27.39	441.89
	2/13/2017	469.28	25.06	444.22
	5/1/2017	469.28	22.49	446.79
	6/20/2017	469.28	24.97	444.31
	8/28/2017	469.28	27.30	441.98
	11/6/2017	469.28	26.33	442.95
	5/14/2018	469.28	24.65	444.63
	8/6/2018	469.28	25.67	443.61
	10/29/2018	469.28	25.79	443.49
	4/29/2019	469.28	23.00	446.28
	11/11/2019	469.28	23.94	445.34
MW-19	4/27/2020	469.28	23.97	445.31
	12/7/2020	469.28	27.82	441.46
	4/7/2021	469.28	24.94	444.34
	5/10/2021	469.28	25.96	443.32
	11/14/2016	465.07	22.65	442.42
	2/13/2017	465.07	21.27	443.80
	5/1/2017	465.07	18.39	446.68
	6/20/2017	465.07	20.44	444.63
	8/28/2017	465.07	23.60	441.47
	11/9/2017	465.07	23.80	441.27
	5/14/2018	465.07	22.08	442.99
	8/6/2018	465.07	24.14	440.93
	10/29/2018	465.07	24.31	440.76
	4/29/2019	465.07	19.12	445.95
	11/11/2019	465.07	18.80	446.27
	4/27/2020	465.07	19.94	445.13
	12/7/2020	465.07	24.63	440.44
	4/7/2021	465.07	21.60	443.47
	5/10/2021	465.07	22.75	442.32

MSL - Mean Sea Level
TOC - Top of Casing

Table 9-4. 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 - Northwest	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 - Northwest	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 - Northwest	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 - Northwest	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 - Northwest	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 9-5. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Ash By-Pass Basin Ash Surge 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 (S) 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	< 0.010	< 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	0.04	< 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	6.7	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	6.8	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	7.2	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
	11/13/2019	0.52	95	47	0.18	7.51	41	390	NA	NA	0.029	NA	0.00085	NA	0.016	0.034	0.012	< 0.0002	0.0079	0.884	< 0.0025	< 0.002
	12/26/2019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0021	0.0041	NA	NA	NA	NA	NA	NA
	4/28/2020	0.33	110	46	0.19	7.17	41	470	NA	< 0.001	0.051	NA	< 0.0005	NA	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.628	< 0.0025	< 0.002
	12/7/2020	0.6	100	54	0.25	7.22	55	490	NA	< 0.001	0.058	NA	< 0.0005	NA	< 0.001	0.00055	<^ 0.01	< 0.0002	0.0051	0.724	< 0.0025	< 0.002
	5/11/2021	0.23	84	53	0.2	7.52	38	450	< 0.003	< 0.001	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.01	< 0.523	< 0.0025	< 0.002
MW-09 (S) up-gradient	11/18/2015	2.0	63	H 31	H 0.19	7.15	H 110	H 440	< 0.003	< 0.001	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	H < 0.0002	0.043	< 0.655	< 0.0025	< 0.002
	2/25/2016	2.3	77	36	0.19	7.34	120	500	< 0.003	0.0042	0.036	< 0.001	< 0.0005	< 0.005	0.0011	< 0.0005	< 0.01	< 0.0002	0.053	< 0.361	< 0.0025	< 0.002
	5/19/2016	2.0	73	38	0.17	7.30	100	520	< 0.003	< 0.001	0.029	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.042	< 0.394	0.0032	< 0.002
	8/17/2016	2.7	74	39	0.15	7.32	120	750	< 0.003	< 0.001	0.031	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.036	< 0.498	< 0.0025	< 0.002
	11/17/2016	4.5	85	38	0.13	7.37	110	630	< 0.003	0.0038	0.039	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.036	0.646	0.0025	< 0.002
	2/15/2017	4.1	84	38	0.13	6.94	160	620	< 0.003	0.0032	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.035	< 0.377	0.0062	< 0.002
	5/3/2017	3.5	85	38	0.17	7.48	170	680	< 0.003	0.0012	0.034	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.034	< 0.445	0.011	< 0.002
	6/21/2017	3.3	82	38	0.14	7.63	180	760	< 0.003	< 0.001	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.033	< 0.380	0.0072	< 0.002
	8/25/2017	3.8	85	36	0.14	7.30	150	630	< 0.003	< 0.001	0.044	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.028	< 0.160	0.0043	< 0.002
	11/8/2017	4	89	37	0.13	6.92	190	650	< 0.003	0.0012	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.026	< 0.344	< 0.0025	< 0.002
	5/16/2018	4.1	89	36	0.15	7.83	180	550	< 0.003	< 0.001	0.038	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	0.00029	0.031	< 0.424	0.006	< 0.002
	8/8/2018	4.3	86	39	0.14	7.31	180	690	< 0.003	< 0.001	0.037	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.032	0.44	0.0078	< 0.002
	5/1/2019	4.6	79	37	0.17	7.11	170	640	< 0.003	< 0.001	0.038	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.031	< 0.66	0.0036	< 0.002
	11/14/2019	2.5	85	36	0.18	7.49	82	500	NA	0.0056	0.057	NA	< 0.0005	NA	0.0032	0.00076	< 0.010	< 0.0002	0.026	< 0.457	< 0.0025	< 0.002
	4/29/2020	2	71	34	0.2	7.19	140	510	NA	0.0012	0.031	NA	< 0.0005	NA	< 0.001	< 0.0005	< 0.010	< 0.0002	0.028	< 0.698	< 0.0025	< 0.002
	12/8/2020	2.6	65	34	0.22	7.29	63	400	NA	0.0013	0.042	NA	< 0.0005	NA	< 0.001	< 0.0005	< 0.010	< 0.0002	0.025	< 0.479	< 0.0025	< 0.002
	5/13/2021	2	74	33	0.2	7.33	120	410	< 0.003	< 0.001	0.035	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.025	< 0.612	< 0.0025	< 0.002
	MW-19^A (S) up-gradient	11/18/2016	3.8	89	38	0.13	7.34	120	670	< 0.003	< 0.001	0.084	< 0.001	< 0.0005	< 0.005	0.001	0.00068	< 0.01	< 0.0002	0.035	< 0.476	0.0043
2/15/2017		4.7	88	37	0.13	7.50	180	630	< 0.003	< 0.001	0.088	< 0.001	< 0.0005	< 0.005	< 0.001	0.00061	< 0.01	< 0.0002	0.046	< 0.482	0.0063	< 0.002
5/5/2017		3.3	88	38	0.14	7.51	160	640	< 0.003	< 0.001	0.076	< 0.001	< 0.0005	< 0.005	0.0013	0.0012	< 0.01	< 0.0002	0.035	0.923	0.0068	< 0.002
6/21/2017		2.3	110	35	0.12	7.30	170	690	< 0.003	< 0.001	0.089	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.024	< 0.334	0.0028	< 0.002
8/28/2																						

Table 9-5. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Ash By-Pass Basin Ash Surge 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-11 (S) down-gradient	11/18/2015	1.7	110	H 54	H 0.55	7.06	H 160	H 670	< 0.003	0.017	0.18	^ < 0.001	< 0.0005	< 0.005	0.002	< 0.0005	< 0.01	H < 0.0002	0.0120	0.788	< 0.0025	< 0.002
	2/26/2016	1.5	140	120	0.55	7.25	220	850	< 0.003	0.023	0.23	< 0.001	< 0.0005	< 0.005	0.0023	< 0.0005	< 0.01	< 0.0002	0.013	0.562	< 0.0025	< 0.002
	5/20/2016	1.6	140	120	0.56	7.10	210	920	< 0.003	0.027	0.26	< 0.001	< 0.0005	< 0.005	0.0024	0.00076	< 0.01	< 0.0002	0.014	0.524	< 0.0025	< 0.002
	8/17/2016	1.0	130	93	0.67	7.08	180	910	< 0.003	F1 0.29	1.4	< 0.001	< 0.0005	< 0.005	0.0034	0.001	< 0.010	< 0.0002	0.011	1.130	< 0.0025	< 0.002
	11/17/2016	1.2	140	130	0.44	7.21	240	1100	< 0.003	0.071	0.44	< 0.001	< 0.0005	< 0.005	0.0037	0.0013	< 0.01	< 0.0002	0.0088	0.734	< 0.0025	< 0.002
	2/16/2017	1.6	140	110	0.40	6.62	260	910	< 0.003	0.04	0.3	< 0.001	< 0.0005	< 0.005	0.003	0.00094	< 0.01	< 0.0002	0.013	0.341	< 0.0025	< 0.002
	5/3/2017	1.3	160	160	0.42	7.36	440	1300	< 0.003	0.039	0.26	< 0.001	< 0.0005	< 0.005	0.0035	0.00093	< 0.01	< 0.0002	0.015	0.662	< 0.0025	< 0.002
	6/22/2017	1.2	140	120	0.60	7.21	260	1000	< 0.003	0.07	0.36	< 0.001	< 0.0005	< 0.005	0.0025	< 0.0005	< 0.01	< 0.0002	0.014	< 0.418	< 0.0025	< 0.002
	8/29/2017	2.2	130	83	0.52	7.23	310	1100	< 0.003	0.017	0.21	< 0.001	< 0.0005	< 0.005	0.0026	< 0.0005	< 0.01	< 0.0002	0.016	< 0.313	< 0.0025	< 0.002
	11/9/2017	1.5	140	100	0.59	6.96	230	970	< 0.003	0.092	0.54	< 0.001	< 0.0005	< 0.005	0.0034	< 0.0005	< 0.01	< 0.0002	0.014	1.24	< 0.0025	< 0.002
	5/16/2018	2.0	140	88	0.61	7.89	270	1000	< 0.003	0.089	0.47	< 0.001	< 0.0005	< 0.005	0.0041	< 0.0005	< 0.01	< 0.0002	0.014	1.12	< 0.0025	< 0.002
	8/9/2018	1.4	160	120	0.65	7.24	220	1000	< 0.003	0.68	3.0	<^ 0.0010	0.0008	< 0.005	0.0053	0.0012	< 0.01	< 0.0002	0.013	1.48	< 0.0025	< 0.002
	5/1/2019	2.3	110	60	0.62	7.08	200	730	< 0.003	0.11	0.6	< 0.001	< 0.0005	< 0.005	0.0026	0.0011	< 0.01	< 0.0002	0.014	1.59	< 0.0025	< 0.002
	11/14/2019	1.8	120	83	0.55	7.43	150	890	NA	0.14	0.72	NA	< 0.0005	NA	0.0041	0.0021	< 0.01	< 0.0002	0.02	2.64	< 0.0025	< 0.002
	4/29/2020	1.2	100	110	0.62	7.08	320	950	NA	0.019	0.21	NA	< 0.0005	NA	0.0019	< 0.0005	< 0.01	< 0.0002	0.024	0.47	< 0.0025	< 0.002
	12/8/2020	0.7	86	94	0.67	7.26	200	650	NA	0.027	0.26	NA	< 0.0005	NA	0.0021	< 0.0005	< 0.01	< 0.0002	0.03	< 0.523	< 0.0025	< 0.002
	5/11/2021	1.0	99	130	0.72	7.26	230	820	< 0.003	0.024	0.25	< 0.001	< 0.0005	< 0.005	0.0019	< 0.0005	0.012	< 0.0002	0.032	1.59	< 0.0025	< 0.002
MW-12 (CL) down-gradient	11/19/2015	0.94	160	H 220	H 0.57	7.12	H 650	H 1400	< 0.003	0.10	0.180	^ < 0.001	0.00068	< 0.005	< 0.001	0.00063	0.023	H < 0.0002	0.0280	< 0.685	< 0.0025	< 0.002
	2/26/2016	0.42	130	200	0.40	7.96	530	1200	< 0.003	0.077	0.130	< 0.001	0.0016	< 0.005	< 0.001	0.0014	0.014	< 0.0002	0.0150	1.11	< 0.0025	< 0.002
	5/20/2016	0.65	150	200	0.49	7.28	550	1400	< 0.003	0.065	0.16	F1 < 0.001	0.00077	< 0.005	< 0.001	0.0016	0.013	< 0.0002	0.028	0.576	< 0.0025	< 0.002
	8/18/2016	0.69	170	200	0.49	7.06	620	1600	< 0.003	0.33	0.88	0.0013	0.007	< 0.005	0.001	0.0011	0.015	< 0.0002	0.011	3.68	< 0.0025	< 0.002
	11/18/2016	0.83	140	180	0.46	7.34	340	1300	< 0.003	0.23	0.67	< 0.001	0.0028	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	< 0.01	1.86	< 0.0025	< 0.002
	2/16/2017	0.48	140	190	0.37	7.54	630	1300	< 0.003	0.29	0.26	< 0.001	0.0057	< 0.005	0.0013	0.0042	0.010	< 0.0002	0.015	1.15	< 0.0025	< 0.002
	5/3/2017	0.49	120	190	0.37	7.47	500	1200	< 0.003	0.10	0.17	< 0.001	0.0022	< 0.005	< 0.001	0.0038	0.011	< 0.0002	0.017	0.518	< 0.0025	< 0.002
	6/22/2017	0.50	130	190	0.48	7.36	580	1400	< 0.003	0.025	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	0.00096	< 0.010	< 0.0002	0.028	0.376	< 0.0025	< 0.002
	8/29/2017	0.78	140	180	0.52	7.34	520	1400	< 0.003	0.02	0.095	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.024	0.529	< 0.0025	< 0.002
	11/10/2017	0.94	130	170	0.48	7.38	370	1200	< 0.003	0.50	0.45	< 0.001	0.0015	< 0.005	< 0.001	0.00097	0.018	< 0.0002	0.023	1.67	< 0.0025	< 0.002
	5/16/2018	0.46	100	180	0.47	8.12	720	1500	< 0.003	0.09	0.1	< 0.001	0.00052	< 0.005	< 0.001	0.00067	0.012	< 0.0002	0.021	0.741	< 0.0025	< 0.002
	8/9/2018	0.61	120	190	0.44	7.42	480	1300	< 0.003	0.12	0.15	<^ 0.001	0.00084	< 0.005	< 0.001	0.00072	< 0.010	< 0.0002	0.026	0.735	< 0.0025	< 0.002
	5/1/2019	0.4	100	170	0.38	7.68	330	1000	< 0.003	0.04	0.13	< 0.001	0.00054	< 0.005	< 0.001	0.0012	0.014	< 0.0002	0.011	0.666	< 0.0025	< 0.002
	11/14/2019	0.74	120	160	0.45	7.61	280	1100	NA	0.026	0.072	NA	< 0.0005	NA	< 0.001	< 0.0005	0.014	< 0.0002	0.027	0.568	< 0.0025	< 0.002
	4/29/2020	0.34	71	150	0.34	7.96	360	980	NA	0.003	0.034	NA	< 0.0005	NA	< 0.001	< 0.0005	0.012	< 0.0002	0.015	0.578	< 0.0025	< 0.002
	12/8/2020	0.61	92	160	0.56	7.36	320	990	NA	0.025	0.069	NA	< 0.0005	NA	< 0.001	< 0.0005	0.012	< 0.0002	0.027	< 0.476	< 0.0025	< 0.002
	5/13/2021	0.4	89	140	0.23	7.39	350	990	< 0.003	0.0025	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.016	0.563	< 0.0025	< 0.002
MW-15 (CL) down-gradient	11/18/2015	1.5	270	H 210	H 0.53	6.55	H 1400	H 2400	< 0.003	0.03	0.096	^ < 0.001	0.00061	< 0.005	< 0.001	< 0.0005	0.042	H < 0.0002	0.023	< 0.599	0.0065	< 0.002
	2/25/2016	2.0	240	110	0.61	6.84	640	1700	< 0.003	0.025	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.041	< 0.0002	0.			

Table 9-7 Ash Bypass Basin and Ash Surge 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
	5/11/2021	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-09	2/24/2021	16.90
	4/9/2021	5.73
	5/13/2021	0.49
	6/2/2021	2.37
	6/29/2021	4.53
	7/19/2021	6.12
	8/25/2021	16.65
	9/30/2021	3.20
MW-19	2/22/2021	0.56
	4/9/2021	4.25
	5/10/2021	1.80
	6/2/2021	5.77
	6/29/2021	8.79
	7/19/2021	7.30
	8/26/2021	30.91
	9/30/2021	2.92
MW-08	2/23/2021	47.30
	4/9/2021	23.05
	5/11/2021	8.93
	6/3/2021	11.11
	6/29/2021	5.48
	7/19/2021	6.86
	8/25/2021	6.80
	9/30/2021	5.01
MW-11	2/25/2021	35.10
	4/9/2021	41.53
	5/13/2021	14.70
	6/3/2021	14.92
	6/29/2021	40.48
	7/19/2021	25.73
	8/25/2021	55.39
	9/30/2021	4.06
MW-12	2/25/2021	26.50
	4/9/2021	66.11
	5/13/2021	5.17
	6/3/2021	106.47
	6/29/2021	21.40
	7/19/2021	22.70
	8/25/2021	12.62
	9/30/2021	18.66
MW-15	2/24/2021	64.90
	4/9/2021	16.80
	5/12/2021	16.45
	6/3/2021	7.85
	6/29/2021	6.58
	7/20/2021	5.82
	8/23/2021	4.28
	10/1/2021	13.13
MW-17	2/24/2021	42.00
	4/8/2021	17.10
	5/12/2021	10.90
	6/3/2021	38.15
	6/28/2021	29.15
	7/20/2021	16.38
	8/23/2021	26.51
	10/1/2021	21.26
MW-18	2/22/2021	3.40
	4/9/2021	4.62
	5/10/2021	2.28
	6/3/2021	2.38
	6/29/2021	3.96
	7/19/2021	5.19
	8/26/2021	7.96
	9/30/2021	37.94

Table 9-9. 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

HNO₃ - Nitric Acid

NS- No Standard

ATTACHMENT 9-1
LOCAL WELL STRATIGRAPHY INFORMATION

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
MONITORING WELL BORING LOGS

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-1-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET 1 OF 2

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 Unconfined Compressive Strength (TSF) * 10 20 30 40 50					NOTES & TEST RESULTS
						1	2	3	4	5	
461.7	0.0		Brown coarse to fine sand, dry	FILL							qu=NT Bentonite seal 3.0'-18.0'. Stickup protective cover installed. qu=NT qu=NT qu=NT qu=NT qu=NT Sand pack 18.0'-30.0' qu=NT
				SS-1 1.0-2.5 14"R	3 4 4						
				SS-2 3.5-5.0 12"R	3 3 5						
				SS-3 6.0-7.5 12"R	2 6 8						
				SS-4 8.5-10.0 10"R	2 5 8						
				SS-5 11.0-12.5 8"R	5 9 10						
				SS-6 13.5-15.0 12"R	3 6 6						
				SS-7 16.0-17.5 16"R	4 6 7						
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						

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

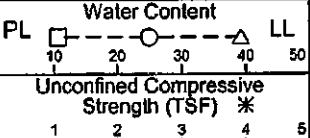
PROJECT & NO.

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	PL  LL					NOTES & TEST RESULTS
						1	2	3	4	5	
441.7	20.0										Set screen (slot 0.010") 20.5'-30.5' qu=NT
				SS-9 21.0-22.5 15"R	4 5 5						
439.7	22.0										
				SS-10 23.5-25.0 18"R	4 4 4						
			Coarse to fine gravel, some coarse sand, medium dense, saturated GP	SS-11 26.0-27.5 18"R	4 4 6						qu=NT
433.7	28.0										
				SS-12 28.5-30.0 18"R	4 5 6						
				SS-13 31.0-32.5 18"R	4 6 7						
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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
						1	2	3	4	5	
459.2	0.0		Dark brown topsoil, silty clay, dry								
			FILL								
457.7	1.5		Light brown coarse to fine sand, loose, dry	SS-1 1.0-2.5 10"R	4 4 4						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.)

▽ 24.0

▽

▽

PATRICK ENGINEERING INC.

BORING NUMBER

B-MW-2-Po

SHEET 2 OF 2

CLIENT

Midwest Generation

PROJECT & NO.

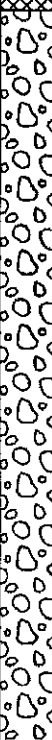
21053.070

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					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF) *					LL	
						10	20	30	40	50			
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	
435.2	24.0												Set screen (slot 0.010") 23.5'-33.5'
					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.

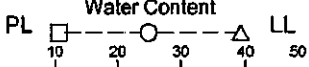
21053.070

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 					NOTES & TEST RESULTS	
						Unconfined Compressive Strength (TSF) *						
						1	2	3	4	5		
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									qu=NT
			FILL	SS-1 1.0-2.5 16"R	2 1 2							
				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
				SS-4 8.5-10.0 18"R	2 3 2							qu=NT
				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
				SS-8 18.5-20.0 16"R	3 4 3							qu=NT
440.1	19.0			Brown coarse sand, trace fine gravel, well graded, very loose, wet								

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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
						1	2	3	4	5	
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										
			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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
						10	20	30	40	50		
						1	2	3	4	5		
457.3	0.0		Brown silty clay, roots, topsoil									
456.5	0.8		FILL									
			Light brown sand, medium to fine brown silty clay, fine gravel, dry	SS-1 1.0-2.5 10"R	6 3 4							
			FILL									
				SS-2 3.5-5.0 8"R	3 4 4							
				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	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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
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 8 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
				SS-13 31.0-32.5 10"R	4 4 8						qu=NT
423.3	34.0		Coarse to fine gravel, trace silt								
			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.

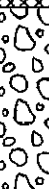
21053.070

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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						10	20	30	40	50	
						1	2	3	4	5	
455.8	0.0		Dark brown silty clay, black coal cinders, topsoil								Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT
			FILL	SS-1 1.0-2.5 12"R	2 2 3						
			Dry								
				SS-2 3.5-5.0 14"R	6 8 10						
			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						
				SS-4 8.5-10.0 18"R	1 2 2						
				SS-5 11.0-12.5 18"R	2 2 3						
			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								Sand pack 19.0'-31.0'
			GP								
				SS-8 18.5-20.0 18"R	4 8 7						
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.

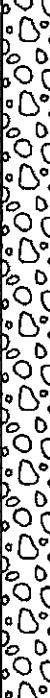
21053.070

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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					
						10	20	30	40	50		
435.8 435.3	20.0 20.5		Coarse to fine gravel, trace coarse to fine sand, poorly graded, medium dense, saturated	GP							qu=NT Set screen (slot 0.010") 21.0'-31.0'	
				SS-9 21.0-22.5 0"R	4 6 6							
				SS-10 23.5-25.0 10"R	4 6 6							
			Loose	SS-11 26.0-27.5 10"R	3 4 4							
				SS-12 28.5-30.0 10"R	4 5 6							
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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
						1	2	3	4	5	
461.2	0.0		Gravel, clay, coal cinders	FILL							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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							qu=0.25**tsf
				SS-5 11.0-12.5 17"R	WOH 1 1						
447.2	14.0		Black coal cinders, loose, wet	FILL							qu=0.25**tsf
				SS-6 13.5-15.0 16"R	WOH 3 3						
444.2	17.0										
				SS-7 16.0-17.5 14"R	2 3 3						
443.2	18.0		Olive gray and gray organic silt, trace clay, trace peat, low plasticity, wet	OL							Sand pack 18.0'-28.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'
				SS-8 18.5-20.0	2 2 1						

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

▽

▽

1

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	PL Water Content 1020304050 LL Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS	
						1	2	3	4	5		
459.6	0.0		Sand, gravel, black cinders, dry FILL								Bentonite seal 3.0'-32.0'. Stickup protective cover installed.	
				SS-1 1.0-2.5								
				SS-2 3.5-5.0								
				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 Trace fine sand, organic silt, moist	SS-7 16.0-17.5 18"R	2 1 2						qu=0.5**tsf	
					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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF)			LL		
						10	20	30	40	50		
						1	2	3	4	5		
439.6	20.0		Dark gray organic clay, mottled black, medium stiff, dry	OH							qu=1.0**tsf	
			SS-9 21.0-22.5 18"R	3 2 4								
			SS-10 23.5-25.0 18"R	2 3 4								
433.6	26.0		Gray organic silt, trace shells, fibers, very soft, moist	OL	2 2 2						qu=0.25**tsf	
			Dry	SS-12 28.5-30.0 18"R	2 3 3							
428.6	31.0		Dark gray organic clay, trace fine gravel, moist	OH	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	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							
			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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
468.7	0.0		Fine gravel, sand, silt, clay, black cinders, dry	FILL							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							
458.7	10.0		Black cinders	FILL							Sand pack 18.0'-30.0'
				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						
449.2	19.5			SS-8 18.5-20.0 18"R	7 11 11						

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.

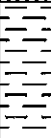
21053.070

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					NOTES & TEST RESULTS		
						PL	LL						
						10	20	30	40	50			
						Unconfined Compressive Strength (TSF) *							
						1	2	3	4	5			
448.7	20.0		Black clnders								Set screen (slot 0.010") 20.0'-30.0'		
447.7	21.0		Saturated	FILL	SS-9	5							
					21.0-22.5	5							
					18"R	3							
					SS-10	1							
				23.5-25.0	1								
444.2	24.5		Dark gray organic clay, soft, moist	OH	18"R	2					qu=0.75**tsf		
							SS-11	1					
							26.0-27.5	2					
				18"R	2						qu=1.0**tsf		
441.2	27.5		Dark gray organic silt, medium stiff to soft, low plasticity, moist	OL									
							SS-12	2					
					28.5-30.0	4					qu=1.25**tsf		
					18"R	4							
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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF)					LL
						10	20	30	40	50		
						1	2	3	4	5		
466.2	0.0		Black cinders, fine gravel, crushed rock, dry FILL								Bentonite seal 3.0'-20.0'. Stickup protective cover installed.	
			SS-1 1.0-2.5									
			SS-2 3.5-5.0									
			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								qu=NT	
			SS-5 11.0-12.5 14"R	6 12 15								
			SS-6 13.5-15.0 18"R	5 6 7								
			SS-7 16.0-17.5 18"R	6 9 10								
449.2	17.0		Moist								qu=NT	
			Brown clayey silt, trace fine sand, moist CL									
447.2	19.0										qu=NT	
			Light brown fine to medium sand, loose, well graded	SS-8 18.5-20.0 18"R	3 6 11							

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	Water Content					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF)			LL			
						10	20	30	40	50			
						1	2	3	4	5			
446.2	20.0		SW Medium dense Trace fine gravel								Sand pack 20.0'-32.0' Set screen (slot 0.010") 22.0'-32.0'		
444.6	21.6			SS-9 21.0-22.5 18"R	3 3 4								
442.7	23.5			SS-10 23.5-25.0 18"R	1 3 8								
				SS-11 26.0-27.5 18"R	0 2 2								
				SS-12 28.5-30.0 18"R	2 6 13								
				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**
 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-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	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
						1	2	3	4	5	
454.1	0.0		Black and brown silty clay topsoil	CL							Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
			SS-1 1.0-2.5								
			SS-2 3.5-5.0								
			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							qu=0.5**tsf
			SS-5 11.0-12.5 16"R	1 2 2							
440.6	13.5		Black organic clay, medium plasticity, medium stiff, dry	OL							qu=1.5**tsf
			SS-6 13.5-15.0 18"R	2 3 4							
438.1	16.0		Brown and gray silty clay, trace to little coarse to fine sand, medium stiff, dry	CL							qu=2.0**tsf Sand pack 17.0'-29.0' Set screen (slot 0.010") 19.0'-29.0'
			SS-7 16.0-17.5 18"R	4 4 4							
			SS-8 18.5-20.0								

DRILLING CONTRACTOR **Groff Testing**
 DRILLING METHOD **4.25" I.D. HSA**
 DRILLING EQUIPMENT **CME 550 ATV**
 DRILLING STARTED **10/4/10** ENDED **10/4/10**

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.

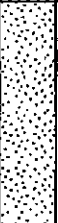
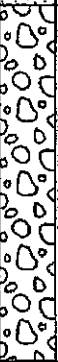
21053.070

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					NOTES & TEST RESULTS	
						PL	LL					
						10	20	30	40	50		
Unconfined Compressive Strength (TSF) *						1	2	3	4	5		
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
CLIENT
PROJECT & NO.
LOCATION

B-MW-11-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

LOGGED BY MPG

GROUND ELEVATION 468.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL Unconfined Compressive Strength (TSF) * LL					NOTES & TEST RESULTS
						1	2	3	4	5	
468.1	0.0		Cinders, gravel, sand, silt FILL								Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				SS-3 6.0-7.5							
				SS-4 8.5-10.0							qu=NT
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						
				SS-6 13.5-15.0 17"R	2 2 3						
452.1	16.0		Brown and gray silty clay, trace fine gravel, trace fine sand, stiff, dry CL								qu=1.5**tsf
				SS-7 16.0-17.5 18"R	1 3 4						
449.6	18.5		Gray clayey silt, organics, very soft, moist ML								qu=0.5**tsf
				SS-8 18.5-20.0 18"R	WOH 2 2						

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 488.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
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
				SS-16 38.5-40.0 18"R	2 3 4						qu=NT
428.1	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 **9/28/10** 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
CLIENT Midwest Generation
PROJECT & NO. 21053.070
LOCATION Powerton

SHEET 1 OF 2

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 10 20 30 40 50 LL Unconfined Compressive Strength (TSF) %					NOTES & TEST RESULTS
						1	2	3	4	5	
470.0	0.0		Black cinders, fine gravel, silty clay, dry FILL	SS-1 1.0-2.5							Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-2 3.5-5.0							
				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
				SS-7 16.0-17.5 18"R	6 7 6						qu=NT
				SS-8 18.5-20.0 18"R	1 5 2						Sand pack 18.0'-35.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'
451.5	18.5		Gray silt, little to some coarse to fine sand, trace clay, very soft, saturated								
450.5	19.5										

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
CLIENT
PROJECT & NO.
LOCATION

B-MW-12-Po
Midwest Generation
21053.070
Powerton

SHEET 2 OF 2

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					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF)			LL	
						10	20	30	40	50	
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	SS-11 26.0-27.5 18"R	WOH WOH 2						qu=0.5**tsf
			OH	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	SS-14 33.5-35.0 18"R	4 6 6						qu=2.5**tsf
435.0	36.0		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**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21053.070**
 LOCATION **Powerton**

SHEET **1** OF **2**

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Black cinders, sand, rock, dry	FILL							Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 2.5-4.0							
				SS-3 6.0-7.5							
			Black cinders, medium sand	FILL							qu=NT
457.7	10.0			SS-4 8.5-10.0							
				SS-5 11.0-12.5 14"R	5 9 7						
				SS-6 13.5-15.0 15"R	3 3 2						
			Some organic silt, moist								qu=NT
				SS-7 16.0-17.5 18"R	WOH 1 1						
450.2	17.5		Gray/olive gray organic silt, very soft	OL							qu=0.0**tsf
				SS-8 18.5-20.0 18"R	1 0 0						
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.

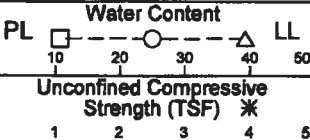
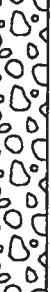
21053.070

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  LL					NOTES & TEST RESULTS
						Unconfined Compressive Strength (TSF) *					
						1	2	3	4	5	
447.7	20.0		Dark gray and black organic clay, very soft, moist	OH							qu=0.25**tsf
			SS-9 21.0-22.5 18"R	WOH 2							
445.2	22.5		Dark gray and black organic silt, very soft, moist	OL							qu=0.25**tsf
			SS-10 23.5-25.0 18"R	WOH 1 1							
441.7	26.0		Dark gray and black organic clay, soft, dry	OH							qu=1.0**tsf
					SS-11 26.0-27.5 18"R	WOH 1 2					
			Medium stiff								
438.2	29.5										Sand pack 28.0'-40.0' qu=1.5**tsf
					SS-12 28.5-30.0 18"R	0 2 3					
437.2	30.5										Set screen (slot 0.010") 30.0'-40.0' qu=2.0**tsf
436.2	31.5		Gray silty clay, some coarse to fine sand, trace fine gravel, wet	CL	SS-13 31.0-32.5 18"R	2 4 5					
433.7	34.0		Stiff								qu=2.0**tsf
			Brown coarse to fine gravel, trace coarse to medium sand, silt, medium dense, saturated	GP	SS-14 33.5-35.0 6"R	2 3 2					
											qu=NT
				SS-15 36.0-37.5 8"R	4 6 6						
				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
CLIENT
PROJECT & NO.
LOCATION

B-MW-14-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

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) *					NOTES & TEST RESULTS
						1	2	3	4	5	
467.7	0.0		Cinders, gravel, sand, silt, dry FILL								Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-1 1.0-2.5							
				SS-2 3.5-5.0							
				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								Sand pack 18.0'-30.0'
				SS-5 11.0-12.5 18"R	4						
					4						
					4						
				SS-6 13.5-15.0 16"R	4						
					3						
					4						
				SS-7 16.0-17.5 16"R	2						
			Black cinders		3						
					3						
448.2	18.5		Gray organic silt, some fine sand,	SS-8 18.5-20.0 18"R	3						
					3						
					1						

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.

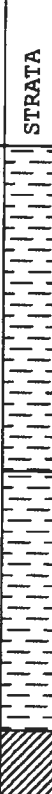
21053.070

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					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
						10	20	30	40	50		
						1	2	3	4	5		
447.7 447.2	20.0 20.5		very loose, low plasticity, saturated OL								Set screen (slot 0.010") 20.0'-30.0' qu=NT qu=0.25**tsf qu=0.25**tsf qu=1.25**tsf	
			SS-9 21.0-22.5 18"R	1 0 0								
			SS-10 23.5-25.0 18"R	1 1 2								
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								
438.7	29.0		Gray and black organic clay, medium stiff, moist OH	SS-12 28.5-30.0 18"R	2 3 4							
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.

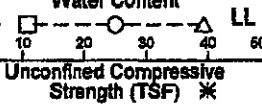
WATER LEVEL (ft.)
 ▽ 19.5
 ▽ 20.5
 ▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-15-Po**
 CLIENT **Midwest Generation**
 PROJECT & NO. **21063.070**
 LOCATION **Powerton**

SHEET **2** OF **2**

LOGGED BY **MPG**
 GROUND ELEVATION **468.3**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL  LL Unconfined Compressive Strength (TSF) *					NOTES & TEST RESULTS
						1	2	3	4	5	
448.3	20.0		Gray fine sand, trace medium sand, loose, saturated SM	SS-9 21.0-22.5 18"R	1 1 1						Set screen (slot 0.010") 20.0'-30.0' 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'
 ▼

PATRICK ENGINEERING INC.

BORING NUMBER
CLIENT
PROJECT & NO.
LOCATION

B-MW-15-Po
Midwest Generation
21053.070
Powerton

SHEET 1 OF 2

LOGGED BY MPG

GROUND ELEVATION 468.3

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *					LL
						10	20	30	40	50		
468.3	0.0		Black cinders, fine gravel, sand, silt, dry									Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
			FILL	SS-1 1.0-2.5								
				SS-2 3.5-5.0								
				SS-3 6.0-7.5								
				SS-4 8.5-10.0								
458.3	10.0		Black cinders, fine gravel, coarse sand, silt, dry									Sand pack 17.0'-30.0'
			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							
				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
▽

GEOLOGIC LOG OF MW-16

(Page 1 of 1)

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

KPRG Project No. 18311.21

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

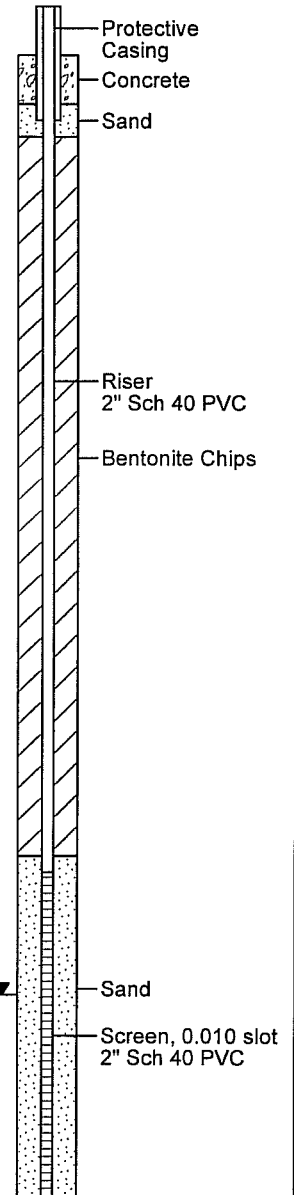
Surf.
Elev.
468.957

DESCRIPTION

PID

% Recovery

Well Diagram: MW-16



FILL: Black to brown silty clay with sand and gravel (Hydrovac from 0-10')

Approximate extent of fill

Tan medium to fine grained SAND with some gravel

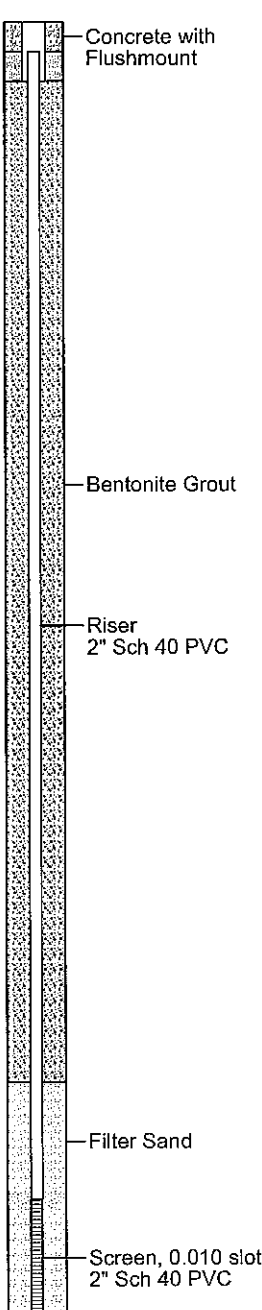
- Gravel layer approximately 2" thick

- Thin layer of fine grained sand

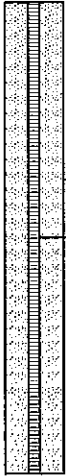
- Wet

End of boring at 35'

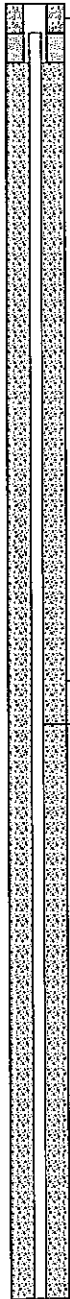
 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-17 (Page 1 of 2)		Total Boring Depth : 30.0 feet Well Bottom Depth : 30.0 feet Surface Elev. : xxx feet above MSL TOC Elev. : xxx feet above MSL Groundwater Elev. : xxx feet above MSL Riser Material : 2" Sch 40 PVC Screen Material : 2" Sch 40 PVC, 0.010 slot Coordinate N : Coordinate E : Logged By : P. Allenstein	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			
Depth in Feet	Surf. Elev. 575	DESCRIPTION		% RQD	% Recovery
0	575	Asphalt Roadway over sand, silt, gravel mix, brown, dry.			
1	574	SILTY SAND, fine to coarse, black, slightly moist, occ silty layers. - begin black with orange brown - some gray silt laminates SILT, gray, laminated with SILTY SAND, moist - increase to very moist then wet SILT, gray, laminated with light brown silt, trace organics, wet.			
2	573				
3	572				
4	571				
5	570				
6	569				
7	568				
8	567				
9	566				
10	565				
11	564				
12	563				
13	562				
14	561				
15	560				
16	559				
17	558				
18	557				
19	556				
20	555				
21	554				
22					

Well Diagram:
 

 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-17 (Page 2 of 2)		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	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			
Depth in Feet	Surf. Elev. 575	DESCRIPTION		% RQD	% Recovery
22	553	SILTY SAND, black and dark gray, fine to meduim, wet.			
23	552				
24	551				
25	550	SILT and SAND, gray and black, wet.			
26	549				
27	548				
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 KPRC and Associates, Inc.		GEOLOGIC LOG OF MW-18 (Page 1 of 2)		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	
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.			

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:
0	575	SILTY CLAY, brown, trace gravel, slightly moist.			 Concrete with Flushmount Bentonite Grout Riser 2" Sch 40 PVC
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					

KPRC ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-18 (Page 2 of 2)		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		
Midwest Generation, LLC Powerton Station Pekin, Illinois Project No. 15315.7		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.				
Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:	
22	553				Bentonite Grout Riser 2" Sch 40 PVC Filter Sand Screen, 0.010 slot 2" Sch 40 PVC	
23	552					
24	551					
25	550					
26	549					
27	548					
28	547					
29	546					
30	545	CLAY, gray, some black, moist.				
31	544					
32	543	CLAY, dark gray, trace organics, moist.				
33	542					
34	541					
35	540					
36	539					
37	538	CLAY, greenish gray, trace organics, moist.				
38	537					
39	536	SILTY SAND, tan, some gravel, very moist.				
40	535					
41	534	End of Boring at 40 feet.				
42	533					
43	532					
44						

GEOLOGIC LOG OF MW-19
 (Page 1 of 2)

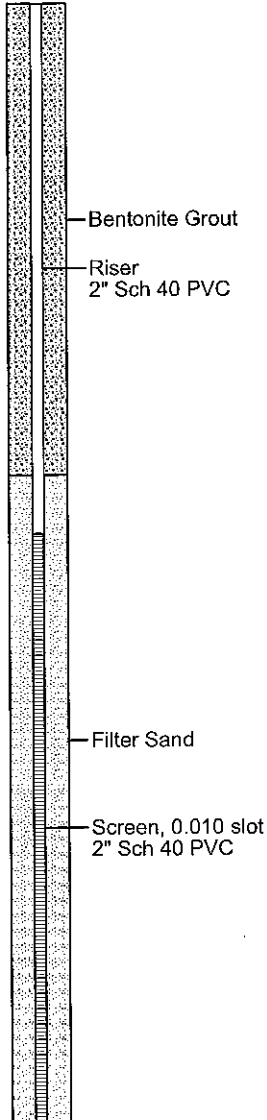
Midwest Generation, LLC
 Powerton Station
 Pekin, Illinois

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	Well Diagram:
0	575	SILTY SAND, black, fine to coarse, occasional clayey layers slightly moist.			
1	574				
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					

 ENVIRONMENTAL CONSULTATION & REMEDIATION KPRG and Associates, Inc.		GEOLOGIC LOG OF MW-19 (Page 2 of 2)		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	
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.			

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery	Well Diagram:
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	End of Boring at 41 feet.			
42	533				
43	532				
44					

ATTACHMENT 9-3
HISTORICAL CCA GROUNDWATER DATA

Attachment 9-3 Historical CCA Groundwater Data - Midwest Generation LLC, Powerton Station, Pekin, IL.

[illegible][illegible][illegible]

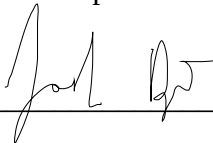
[illegible]

**ATTACHMENT 9-4
CERTIFICATION OF GROUNDWATER MONITORING
WELL SYSTEM**

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:



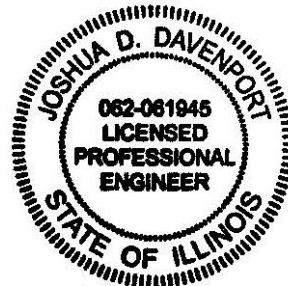
Date:

10/29/21

Joshua Davenport, P.E.

Professional Engineer Registration No.: 062-061945

KPRG and Associates, Inc.



ATTACHMENT 9-5
CCR COMPLIANCE STATISTICAL APPROACH



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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2.0 STATISTICAL METHOD SELECTION and BACKGROUND DATA EVALUATION	2
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2.8 Prediction Limit Calculation for Non-Normally Distributed Data	5
3.0 GROUNDWATER MONITORING	6
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FIGURE

Figure 1 – Monitoring Well Location Map

TABLE

Table 1 – Section 845.600 Parameters

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 SanitasTM 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 as 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:

$$95\% \text{ Prediction Limit} = \bar{x} + t_{1-0.05/m, n-1} S \sqrt{1 + \frac{1}{n}}$$

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 student's 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.

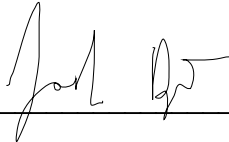
If it is decided not to complete an ASD or if Illinois EPA does not concur with and approve the ASD, a characterization of the nature and extent of the potential release must be completed in

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: _____



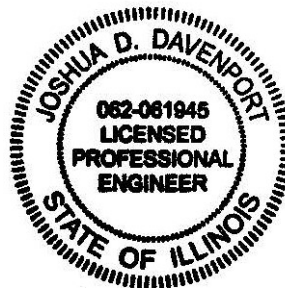
Date: _____

823/21

Joshua Davenport, P.E.

Professional Engineer Registration No. 062-061945

KPRG and Associates, Inc.



FIGURE



T:\projects\midwest\generation\12313.1\groundwater\figures\powerton\ccr\powerton_ccr_4q2018_gw_map.dwg

TABLE

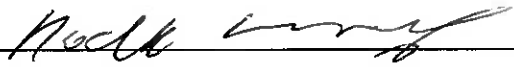
Table 1. Section 845.600 Groundwater Monitoring Parameter List

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 11-1
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: 

Title: Plant Manager

ATTACHMENT 11-2
PUBLIC MEETING GENERAL SUMMARY

**Midwest Generation, LLC
Powerton Generating Station
Ash Surge Basin Retrofit and Metal Cleaning Basin Retrofit
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 retrofits of Powerton Generating Station’s Ash Surge Basin and Metal Cleaning 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 two miles of the facility on March 23, 2023, which totaled 1,104 residential mailing addresses. The notice was also posted in 29 public locations within 10 miles of the facility boundary.

The public meetings for Powerton Generating Station’s Ash Surge Basin and Metal Cleaning Basin were held on April 24, 2023 from 6:00 p.m. to 8:00 p.m. and on April 25, 2023 from 10:00 a.m. to 12:00 p.m. The meetings were held in person. Two members of the public attended the April 24th meeting. Seven members of the public, including one who attended the previous meeting, attended the April 25th meeting. 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 meeting. All attendees requested a copy of the meeting summary and transmittal of their email address to the Agency to be added to the Agency’s listserv for the facility. All email addresses received will be transmitted to the Agency. After an introduction and approximate 30-minute presentation on the proposed retrofit construction plans, the public was given approximately 1.5 hours 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 Ash Surge Basin and Metal Cleaning Basin by removing the remaining material in the basin, retaining and decontaminating the existing geomembrane liner as an additional protective layer under the new composite liner system, and installing a new composite liner system and leachate collection and removal system.

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETING

Retrofit Design and Process

Questions were asked about the longevity of the retrofitted ponds. The HDPE geomembrane liner and geosynthetic clay liner materials proposed to be used in the retrofit plans are designed to meet the standards outlined by the U.S. Environmental Protection Agency and Illinois EPA in their respective CCR Rules. These liners are used in many environmental applications across the country and ongoing research estimates these geosynthetic materials, which will be covered, can last hundreds of years.

Questions were asked about the leachate collected after the retrofit and how it is treated. Leachate collected after the retrofit of the ponds will be collected, treated, and discharged via the Powerton Station's NPDES wastewater permit.

A question was asked about the retrofit timelines. The current plan is to retrofit the Metal Cleaning Basin first, followed by the Ash Surge Basin. While MWG will attempt to retrofit both the Ash Surge and Metal Cleaning Basins in parallel, construction cannot begin until permits are issued by the Illinois EPA, and limits on materials delivery and availability of contractors may prohibit this.

A question was asked about how the liner will be protected from damage during the decontamination and retrofit processes. There are two common methods that a contractor could use to remove material above the basins' existing liners: (1) traditional excavation and (2) hydro-excavation. Under a traditional excavation, the contractor could use front-end loaders, excavators, or other conventional excavation equipment with rubber-surfaced buckets, blades, etc. to protect the existing geomembrane liners as material is removed from the sideslopes and floors of the basins. Under a hydro-excavation, the contractor could use specialized equipment to apply pressurized water to break-up the existing materials and an industrial vacuum to remove the broken-up material, all while avoiding damage to the existing geomembrane liners. Ultimately, the means and methods used to decontaminate the basins' existing geomembrane liners will be determined by the contractor hired by MWG to retrofit the basins. Regardless of the actual means and methods implemented, the contractor will be responsible for taking all necessary precautions to avoid damaging the basins' existing geomembrane liners. In the rare instance where an existing liner is accidentally damaged, the contractor will be responsible for assessing the extent of the damage and patching the damaged area(s).

A question was asked about the size of the retrofitted basins. The footprints of the retrofitted basins will be the same as the current basins: the Ash Surge Basin is approximately 8.4 acres and the Metal Cleaning Basin approximately 2.3 acres in size. The overall footprints will not change.

A question was asked about ash handling during the retrofit process. Any ash that is removed from the pond during the retrofit construction process will be dewatered and sent off-site to a permitted landfill or beneficial use site.

A question was asked whether the material that underlies the current HDPE geomembrane liners of the ponds will be remediated during the retrofit process. The plan for retrofitting the Ash Surge and Metal Cleaning Basins 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 subgrade. The competency of the pond's existing HDPE geomembrane liners 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.

Groundwater Monitoring

Questions were asked about remediation plans for CCR constituents that may leak into groundwater. The Illinois CCR Rule outlines a corrective action process that would be implemented should groundwater monitoring identify a release of CCR constituents into groundwater. The process includes notification to the Illinois EPA, characterization of the nature and extent of the release, development of an assessment of corrective measures, public meetings, and submittal of a corrective action plan permit application. The corrective action plan must be approved by the Illinois EPA in the form of an issued permit. Once the permit is granted, corrective action would commence. Groundwater monitoring is conducted quarterly, as required by the Illinois CCR Rule.

Current Design

A question was asked about the separation distance between the groundwater and bottom of the ponds. The Metal Cleaning Basin's base is at least five feet above the upper limit of the site's uppermost aquifer. The Ash Surge Basin's base is within five feet of the upper limit of the site's uppermost aquifer, but there is no intermittent, recurring, or sustained hydraulic connection between any portion of the base of the Ash Surge Basin and the uppermost aquifer due to normal fluctuations in groundwater elevations. Therefore, both the Ash Surge Basin and Metal Cleaning Basin meet the Illinois CCR Rule's required separation between a CCR surface impoundment and the upper limit of the uppermost aquifer.

A question was asked about whether the sides of the ponds are lined. The sides of both ponds are currently lined with a 60-mil high density polyethylene (HDPE) liner and will also be lined with a composite liner system required by the Illinois CCR Rule once retrofitted.

Metal Cleaning Basin

A question was asked about an orange area visible on the overview map of the station slide and whether the color was indicative of acid mine drainage and high metals. The area in question was the south end of the Metal Cleaning Basin. Due to nature of the boiler wash water sluiced to the Metal Cleaning Basin, there are some metals in that wastewater; however, the water is treated via a wastewater treatment process to remove metals prior to discharge through the Station's NPDES permitted discharge. The clarifier solids are disposed in a permitted landfill or are beneficially reused.

A question was asked about beneficial use of ash in mine reclamation processes. The ash is sampled to ensure it meets the requirements and specifications of the end users.

Written Comments

The Central Illinois Heathy Community Alliance presented a letter addressed to MWG and Illinois EPA at the April 25th meeting, signed by Tracy Fox. With regard to the issues raised in that letter, MWG has no indication that soils beneath either basin are "damaged" and require remediation. Additionally, as stated above, ash that is removed from either basin during the retrofit process will be sent off-site to either a permitted landfill or beneficially reused. Midwest Generation, LLC is fully committed to complying with environmental laws and regulations.

Future

A question was asked about whether carbon capture sequestration was an option at the Powerton Station. MWG is not currently planning carbon capture sequestration at Powerton Station.

General concerns were raised about potential future impacts to the ponds due to climate change, such as groundwater level fluctuations and flooding, historic fill, and impacted soils under the basins. During the useful life of the impoundments and throughout the closure and post-closure care periods (if applicable), groundwater monitoring will continue, which includes monitoring and reporting the groundwater levels in the monitoring wells. Additionally, the impoundments will continue to be inspected by qualified staff and annually by a certified Professional Engineer. MWG has no evidence that groundwater levels around the impoundments at Powerton Station is rising, year-over-year.

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 Ash Surge Basin and the Metal Cleaning Basin 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.

Powerton Generating Station Public Meetings
Metal Cleaning Basin and Ash Surge Basin
April 24 & 25, 2023

Email Address	Name	General Summary	Listserv
annschreifels@gmail.com	Ann Schreifels	Yes	Yes
joblumen@yahoo.com	Joyce Blumenshine	Yes	Yes
bradley.wrighthulett@gmail.com	Bradley Wright-Hulett	Yes	Yes
jahchoices@gmail.com	Joyce Harat	Yes	Yes
moosersrus@yahoo.com	Jim & Bernie Humphrey	Yes	Yes

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

APPENDIX C

Design Specifications and Drawings – Capping of ASB Weir Wall

August 2026

CONSTRUCTION SPECIFICATIONS FOR **CAPPING CONCRETE WEIR WALL**

Ash Surge Basin

Powerton Generating Station

Pekin, IL

Prepared by:

Weaver Consultants Group

for Submission to Illinois EPA in:

Application for Groundwater Corrective Action Construction Permit

dated August 2026

Section 000110

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DIVISION 31 – EARTHWORK AND GEOSYNTHETICS

Sections 319005/319020	Earthwork and Geosynthetics
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ATTACHMENTS

Attachment 1	Design Drawings
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SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

- 101.1 Owner: Midwest Generation, LLC (MWG)
- 101.2 Design Engineer: Weaver Consultants Group
- 101.3 Project Name: Ash Surge Basin Weir Wall Capping
- 101.4 Project Location: Powerton Generating Station
13082 E. Manito Rd.
Pekin, IL 61554

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

- 102.1 The purpose of this project is to cap the concrete weir wall within the Ash Surge Basin at Midwest Generation, LLC's Powerton Generating Station. This construction is being proposed as a portion of the groundwater corrective action plan in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845, and with the U.S. Environmental Protection Agency's (EPA) CCR Rule, 40 CFR Part 257 Subpart D.
- 102.2 The Ash Surge Basin weir wall will be capped by first removing all remaining CCR and CCR-mixed materials immediately adjacent to the weir wall; removing the basin's existing gravel warning, sand cushion, and riprap layers immediately adjacent to the weir wall; removing the existing geomembrane concrete attachment (i.e., batten strips) and grinding or cutting off the batten bolts from the concrete weir wall; and decontaminating the basin's existing geomembrane liner and appurtenant structures, which will remain in place. Following material removal and decontamination of the basin facilities remaining in-place, a new geotextile and geomembrane will be installed to cap the exposed surface of the concrete weir wall and welded to the existing geomembrane liner.

103. SCOPE OF WORK

- 103.1 In general, this Specification covers the technical requirements for a General Work (GW) Contractor to cap the Ash Surge Basin weir wall at the Powerton Generating Station. The Work includes the following activities:
- a. Furnishing and installing temporary sediment and erosion control best management practices (BMPs) as needed prior to and during all phases of earth disturbance work.
 - b. Capping the Ash Surge Basin weir wall by:
 - b1. Removing all remaining CCR, gravel warning layer, sand cushion, and riprap layers above the basin's existing geomembrane liner on each side of the weir wall with offsite disposal of dry waste material in a permitted landfill approved by the Owner and disposal of liquid waste in the on-site retrofitted Bypass Basin, or as otherwise directed by the Owner.
 - b2. Decontaminating the basin's existing geomembrane liner and appurtenant structures

within proximity of the weir wall, for re-use in the basin.

- b3. Ensuring all appropriate measures are taken to protect the Ash Surge Basin's existing HDPE geomembrane liner system from damage.
- b4. A new geotextile and geomembrane liner will be installed to cap the exposed surface of the concrete weir wall and welded to the existing geomembrane liner.
- b6. Reinstallation of a 12-inch cushion layer over the completed geomembrane installation in proximity of the concrete weir wall.
- b8. Reinstallation of the Protective Warning Layer above the cushion layer on the basin floor in proximity of the concrete weir wall.
- c. Restoring and cleaning the project site.

103.2 In addition, the Work shall include but not be limited to the following:

- a. Engineering and construction services required to perform or install the Work.
- b. Surveying to ensure the Work is located as indicated on the Design Drawings.
- c. Furnishing all installation equipment and tools including any calibrated instruments required for monitoring and testing.
- d. Maintaining the project site in a dry condition that includes dewatering of all areas that collect storm water or groundwater in the area controlled by the General Work (GW) Contractor, redirecting any surface water as a result of rainfall or water generated by the installation Work. Any groundwater and/or surface water which requires removal from the area of work shall be disposed of in compliance with the Powerton Generating Station's National Pollutant Discharge Elimination System (NPDES) discharge permit in effect at the time of the Work. The methods and proposed place of discharge shall be approved by the Owner prior to disposing of the water.
- e. Disposing of excess excavated material and other construction related debris in an off-site permitted landfill approved by the Owner.
- f. Maintaining a record of the installation (i.e., as-built drawings) in accordance with the technical requirements of this Specification.
- g. Furnishing the services of qualified personnel at the project site to perform the Work.
- h. Progress reporting as specified in the Commercial Terms and Conditions.
- i. Daily site cleanup and disposal of waste and debris.
- j. Participation in the Owner's on-site safety program, including the Owner's CCR Safety and Health Plan Training.
- k. GW Contractor shall allow access to all work areas by Owner, Design Engineer, CQA Contractor staff, and other parties as approved by Owner. GW Contractor shall not install, modify, repair or work on any elements of the project that are subject to the CQA testing and inspection services without notifying the CQA Contractor at least 2 workdays in advance. Work on weekends or holidays shall be scheduled as soon as possible with the CQA Contractor. Failure to provide CQA Contractor adequate advanced notice to staff the site shall result in a hold on work until the CQA Contractor staff arrive on site.

103.3 The Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The Work shall be performed exclusively by the GW Contractor's trained and competent personnel or, where permitted, that of its

subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of all people located on the work site, including the GW Contractor's personnel [or that of its subcontractor(s)] performing the Work.

- 103.4 Performance of the Work shall include all the labor, supervision, administration, management, material procurement, tools, installation and testing equipment, miscellaneous material, and consumables to perform the Work specified herein.
- 103.5 Provide all installation equipment and all incidental items not shown or specified but reasonably implied for successful completion of the Work and in strict accordance with the Design Drawings and this Specification, including inspection, testing and quality standards.
- 103.6 Provide installation quality assurance and quality control submittals where required.
- 103.7 Prepare red-lined as-built drawings for review upon completion of the Work to document any variances between the construction issue of the Design Drawings and the actual installation. Finalize as-built drawings after the Owner and the Design Engineer review.
- 103.8 All other work as indicated on the Design Drawings, as specified herein, or as required to properly complete the Work.

104. DIVISION OF RESPONSIBILITY & CONTRACTOR QUALIFICATIONS

104.1 Owner:

- a. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor. The Owner will ultimately be responsible for the weir wall capping construction for the Ash Surge Basin and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings.

104.2 Design Engineer:

- a. Weaver Consultants Group is the Design Engineer and is responsible for designing the concrete weir wall capping features for the Ash Surge Basin.
- b. The Design Engineer will assure that the concrete weir wall capping design meets or exceeds the construction requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.
- c. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.

104.3 Permitting Authority:

- a. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit application for capping the Ash Surge Basin weir wall to assure compliance with state regulations and for granting the construction permit for the project.
- b. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm the Ash Surge Basin weir wall was capped as specified in Project Specifications and the

Design Drawings.

104.4 GW Contractor:

- a. The GW Contractor is the firm with whom the Owner establishes a contract for the satisfactory performance of the Work.
- b. The GW Contractor is responsible for the work, quality, and safety of their staff and all subcontractors and suppliers.
- c. The GW Contractor may devise the Work into the following division of responsibilities between an Earthwork Contractor and a Geosynthetics Contractor.

104.5 Earthwork Contractor:

- a. The Earthwork Contractor is the contractor responsible for:
 - a1. Earthwork and sitework.
 - a2. Removal of existing CCR and protective layers above the Ash Surge Basin's existing geomembrane liner in proximity of the concrete weir wall.
 - a3. Placement of fill material to support the basin's new geomembrane over the weir wall (as needed) and to establish the lines and grades of cushion layer and warning layer as required.
 - a4. The GW Contractor may self-perform or subcontract the Earthwork Contractor's scope of work.
- b. Geosynthetics Contractor:
 - c. The Geosynthetics Contractor is the contractor responsible for supplying and installing all geosynthetic materials for the project, including non-woven geotextile and high-density polyethylene (HDPE) geomembrane.
 - d. The GW Contractor may self-perform or subcontract the Geosynthetics Contractor's scope of work.
 - e. Qualifications:
 - c1. The Geosynthetics Contractor shall be approved by the manufacturer(s) of the geosynthetics materials for installing the geosynthetic materials supplied for the project.
 - c2. The Geosynthetics Contractor shall be approved by the Owner.
 - c3. The Geosynthetics Contractor shall have a minimum 5-year history of successfully performing similar work.

104.6 Construction Quality Assurance (CQA) Contractor:

- a. The CQA Contractor is the firm with whom the Owner establishes a contract to perform all CQA work as specified on the Design Drawings and in this Specification.
- b. The CQA Contractor is independent of the GW Contractor and their subcontractors.

105. MATERIAL AND SERVICES FURNISHED BY OTHERS

105.1 The following work has been, or will be, performed and/or provided by Others:

- a. Initial dewatering and removal of a significant quantity of CCR from the Ash Surge Basin in proximity of the concrete weir wall (as required).

- a1. The GW Contractor shall be responsible for dewatering (if necessary) and removing any remaining smaller quantities of CCR and CCR-mixed materials remaining in proximity of the concrete weir wall after the GW Contractor mobilizes to the site.
- a2. Estimated quantity of CCR and existing protective layer materials to be removed from the basin in proximity of the concrete weir wall will be provided by Owner during the bid period for the Work.
- b. Construction Quality Assurance services as detailed in the Specifications will be procured by the Owner.

106. DEFINITIONS

- 106.1 The term "Design Drawing" means the Design Engineer's drawing(s) indicating the Work to be performed.
- 106.2 The term "Work" means the material and services furnished to cap the Ash Surge Basin weir wall as identified on the Design Drawings and as specified herein.
- 106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material that has been accepted by the Owner.

107. INTENT OF DOCUMENTS

- 107.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor, material, equipment, and transportation necessary for the proper execution of the Work, as described in this Specification.
- 107.2 Discrepancies between the Design Drawings and this Specification or errors or omissions, or mis-descriptions in either the Design Drawings or in this Specification, shall be referred to the Design Engineer for interpretation and adjustment prior to beginning the Work. Do not proceed without the Design Engineer's written acceptance.

108. PERFORMANCE OF THE WORK

- 108.1 The GW Contractor shall provide materials and employ construction practices that are sustainable to the greatest extent possible, including disposal of waste.
- 108.2 The GW Contractor shall provide a representative that will input and provide daily force reports and daily production reports.
- 108.3 The performance of the Work, as specified herein and as indicated on the Design Drawings, shall comply with the current safety and health standards authorized by the U.S. Department of Labor's Occupational Safety and Health Administration, as well as state and local jurisdictional requirements.
- 108.4 The GW Contractor shall take all appropriate precautions to ensure the safety of all people working on site.
- 108.5 The GW Contractor shall maintain the necessary skilled and qualified labor force for the Work to ensure the on-time completion of the Work.
- 108.6 The GW Contractor's personnel shall be competent, capable, qualified, and able to perform the duties required to the satisfaction of the Owner. A supervisor vested with authority to make decisions binding on the GW Contractor shall be assigned to the task to resolve installation problems as they may arise so as not to delay completion of the Work.

108.7 The GW Contractor shall be solely responsible for advising the Design Engineer in writing of any conflicts between this Specification and the Design Drawings and the GW Contractor's drawings, including performance and levels of quality. The GW Contractor agrees that its obligations, liabilities, and warranties shall not be diminished or extinguished due to its meeting the requirements of this Specification and the Design Drawings.

109. REGULATORY REQUIREMENTS

109.1 The GW Contractor shall at all times be solely responsible for complying with all applicable laws, ordinances, regulations, and codes, including those relating to safety of all persons, in connection with the Work. No obligation of the Owner or Design Engineer shall impose upon them any duty to review the GW Contractor's compliance with safety measures.

110. PROTECTION OF PROPERTY AND PERSONNEL SAFETY

110.1 The GW Contractor shall take adequate precautions to protect existing structures, fences, pavements, above-ground utilities, and underground utilities and to avoid damage thereto. The GW Contractor shall, at no addition expense to the Owner, repair any damage caused by its operations or by that of its subcontractors.

110.2 The GW Contractor shall conduct safety training of all its personnel (including any subcontractors) in accordance with the Owner's safety requirements, including the Owner's CCR Safety and Health Plan.

110.3 The GW Contractor shall take adequate precautions to protect the Illinois River, other waterways, and adjacent properties from environmental damage.

111. CLEAN-UP AND DISPOSAL OF DEBRIS

111.1 The GW Contractor shall be responsible for clean-up and disposal of all debris resulting from the installation work. All excess excavated material and other construction related debris shall be properly disposed of (i.e., in an environmentally responsible way) offsite in a permitted landfill approved by the Owner.

111.2 Clean up, disposal, and site restoration, if required, shall be in compliance with the applicable requirements of all access permits. If any additional permits are required for disposal of debris, these shall be the responsibility of the GW Contractor.

111.3 Work areas shall be kept clean and orderly at all times with as little disturbance as possible to existing conditions. Upon completion of work at each site, all tools, equipment, material, and debris shall be completely removed and the area left in a clean condition.

112. EXISTING SITE CONDITIONS

112.1 Prior to performing any Work in any part of the project site, the GW Contractor shall make a thorough field check for the purposes of verifying existing conditions that may affect the Work. The GW Contractor shall include a thorough investigation of the potential interferences and difficulties that it may encounter in the proper and complete execution of the Work, including the field location and identification of underground and overhead utilities within and adjacent to the limits of the Work. The GW Contractor shall advise the Owner immediately of the discovery of any conditions, including the existence of underground and overhead utilities that may affect the timely and safe execution of the Work.

112.2 The GW Contractor shall be responsible for location of underground utilities and

obstructions prior to performance of the Work and shall promptly notify Owner of any potential interferences that may impact performance of the Work. Modifications to the design to resolve these interferences shall not be implemented until approved by the Owner.

- 112.3 The GW Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface material and obstacles, including underground or embedded utilities, to be encountered insofar as this information is reasonably ascertainable from:
- a. An inspection of the site (including field location and identification of underground utilities).
 - b. Reference drawings made available by the Owner.
 - c. Drawings and specifications that are a part of the Contract.
 - d. The character and extent of existing work within or adjacent thereto.
 - e. Any other work being performed thereon at the time of the submission of bids.
- 112.4 Should the GW Contractor fail to perform any of the obligations set forth above, the GW Contractor's later plea of ignorance of existing or foreseeable conditions which create difficulties or hindrances in the execution of the Work will not be considered as an excuse for any failure on the part of the GW Contractor to fulfill in every detail the requirements of the Contract nor will such a plea be acceptable as the basis of a claim for additional compensation or time to complete the work.
113. VERIFICATION OF DIMENSIONS ON DRAWINGS AND MEASUREMENTS AT SITE
- 113.1 The GW Contractor shall make a thorough field check for the purpose of verifying existing conditions that may affect the Work, such as existing topographic data shown on the Design Drawings, difficulties that might be encountered in the execution of the Work for any reason, and dimensions and other questions relating to interconnection of the Work with the existing Ash Surge Basin weir wall construction.
- 113.2 The GW Contractor shall satisfy itself as to the accuracy of the dimensions of the existing Ash Surge Basin weir wall construction as such dimensions relate to the dimensions given on any drawing issued by the Design Engineer. It shall be understood that neither the Design Engineer nor the Owner guarantee the exactness of such dimensions.
- 113.3 Should the GW Contractor discover any variation in the dimensions of existing conditions and the dimensions given on any drawings issued by the Design Engineer, the GW Contractor shall give immediate notice thereof to the Owner and the GW Contractor shall not proceed with the Work until such variation is resolved.
114. LINES AND GRADES
- 114.1 The GW Contractor shall use the existing benchmarks established at the site, as identified on the survey drawings included in the reference documents for the project, to lay out lines and grades on the project site. The GW Contractor is fully responsible for the correctness of such lines and grades and for proper execution of work to such lines and grades.
- 114.2 The Owner reserves the right to verify correctness of lines and grades during progress of the Work. Such verification by the Owner will not relieve the GW Contractor of responsibility as herein specified.
- 114.3 The GW Contractor shall preserve and maintain existing benchmarks and reference

points established at the project site. Should the GW Contractor, during execution of the Work, destroy or remove any existing benchmark or reference point, the cost to the Owner for re-establishing the benchmark or reference point will be charged to the GW Contractor.

115. CONTROL AND CHARGE OF CONTRACTOR'S WORK

115.1 The Design Engineer shall have no authority to stop the Work by the GW Contractor for any reason.

115.2 The GW Contractor shall be responsible for the safety of its employees and subcontractors and for maintaining the safety of the job site.

115.3 The GW Contractor shall be solely responsible for construction means, methods, techniques, sequences, and procedures used in the construction of the Work. The Owner, however, reserves the right to request, and the Contractor shall supply, detailed information regarding the Work such as procedures or work methods.

115.4 Only the Owner (or its authorized representative) has the authority to stop the Work (in accordance with the Commercial Terms and Conditions) if such Work is determined to be not in accordance with this Specification, the Design Drawings, or the Contract documents.

116. DESIGN DRAWINGS

116.1 The Design Drawings prepared by the Design Engineer indicate the physical dimensions of the Work to be installed as defined by the Scope of Work and form a part hereof.

116.2 Refer to Attachment 1 of this Specification for the applicable Design Drawings for this project.

END OF SECTION 011100

SECTION 319005 and 319020

**EARTHWORK AND GEOSYNTHETICS - HIGH-DENSITY POLYETHYLENE GEOMEMBRANE LINER AND
CUSHION GEOTEXTILE**

PART 1 - GENERAL

101. EXTENT

- 101.1 This section defines the material and work requirements associated with preparing the area near the Ash Surge Basin concrete weir wall for capping and defines the minimum material and installation requirements for the high-density polyethylene (HDPE) geomembrane liner to be used as for the concrete weir wall capping, and the minimum material and installation requirements for the geotextile to be used as a cushion between the concrete weir wall and the HDPE geomembrane in the Ash Surge Basin, in accordance with the Design Drawings and as specified herein.
- 101.2 The Work shall include, but not be limited to, the following items:
- a. Excavating the granular protective layers in proximity of the weir wall.
 - b. Preparing concrete surfaces that will come into contact with geosynthetic materials.
 - c. Disposing excess or unsuitable excavated earthen material and debris in an off-site permitted landfill approved by the Owner.
 - d. Manufacture, shipping, handling, and storage of HDPE geomembrane and cushion geotextile.
 - e. Removal of the existing batten bar attachment and cutting of batten bolts flush with the concrete surface.
 - f. Preparation and inspection of surfaces to be lined.
 - g. Placement and seaming of the geotextile.
 - h. Placement and seaming of geomembrane.
 - i. Non-destructive field testing of geomembrane seams.
 - j. Removal of samples of geomembrane seams and transportation to an independent third-party laboratory for destructive testing.
 - k. Repair of defective geomembrane seams.
 - l. Repair of defects in the geomembrane and at locations where samples were taken.
 - m. Visual inspection of the completed geomembrane liner.
- 101.3 Definitions and Qualifications:
- a. The following definitions of terms shall apply throughout this section:
 - a1. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor's work.

- a2. GM/GT Manufacturer: The manufacturer who is responsible for manufacturing and transporting the HDPE geomembrane liner and geotextile materials to the site.
- b. Qualifications:
 - b1. The GM/GT Manufacturer shall be approved by the Owner. Owner's considerations when approving the GM/GT Manufacturer may include, but are not limited to, financial, safety, and prior performance aspects of the manufacturer.
 - b2. The GM/GT Manufacturer shall have an internal QA/QC program to ensure and to verify the manufactured products consistently meet or exceed the requirements of this section.
 - b3. The GM/GT Manufacturer shall have at least 10 years of experience manufacturing products similar to those required for this Work.

102. REFERENCE DOCUMENTS

- 102.1 Standards, specifications, manuals, codes, and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.
- 102.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- 102.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.
- 102.4 ASTM — ASTM International:
 - a. D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - b. D1004 Test Method for Tear Resistance of Plastic Film and Sheeting.
 - c. D1505 Test Method for Density of Plastics by the Density-Gradient Technique.
 - d. D4218 Standard Test Method for Determination of Carbon Black Content of Polyethylene Compounds by the Muffle-Furnace Technique.
 - e. D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.
 - f. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - g. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - h. D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - i. D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
 - j. D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products.
 - k. D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

- l. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
- m. D5397 Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
- n. D5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
- o. D5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
- p. D5721 Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.
- q. D5820 Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
- r. D5885 Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry.
- s. D5994 Test Method for Measuring the Thickness of Geomembranes.
- t. D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- u. D6392 Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-fusion Methods.
- v. D6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
- w. D7238 Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus
- x. D7466 Standard Test Method for Measuring Asperity Height of Textured Geomembranes
- y. D8117 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by Differential Scanning Calorimetry.
- 102.5 Geosynthetic Research Institute (GRI):
 - a. GM6 Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembrane.
 - b. GM9 Cold Weather Seaming of Geomembranes
 - c. GM10 Specification for the Stress Crack Resistance of Geomembrane Sheet.
 - d. GM13 Standard Specification for Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
 - e. GM19a Standard Specification for Seam Strength and Related Properties of Thermally Bonded Homogenous Polyolefin Geomembranes/Barriers.
- 102.6 Industrial Fabrics Association International (IFAI):
 - a. Field Sewing of Geotextiles by V. Diaz and B. Myles, 1989.

103. SUBMITTALS

- 103.1 The GW Contractor shall submit the following drawings and data as specified. The GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).
- 103.2 Submittals with the Bid Proposal:
- a. Geosynthetics Contractor:
 - a1. Geosynthetics Contractor's name, address, and telephone number.
 - a2. Geosynthetics Contractor's qualifications.
 - a3. Installer's qualifications if the Geosynthetics Contractor is proposing to subcontract the geomembrane and/or geotextile installation work.
 - b. HDPE Geomembrane and Geotextile Materials:
 - b1. GM/GT name, address, and telephone number for the products being provided.
 - b2. GM/GT Manufacturer's Quality Control and Quality Assurance Policies and Procedures for the geomembrane and drainage geocomposite materials being supplied for the project.
 - c. Warranty:
 - c1. Written warranties from the GM/GT Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as applicable.
 - c1.1 The minimum period of warranty for materials shall be 20 years with first year non-prorated.
 - c1.2 The minimum period of warranty for installation shall be 5 years with the first year non-prorated.
 - c2. Warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the GM/GT Manufacturer and the Geosynthetics Contractor.
- 103.3 Submittals After Award:
- a. The GM/GT manufacturer shall submit certification that all rolls manufactured for the Project have been produced in accordance with these Specifications along with results from a quality control program. This information must be submitted for review prior to material delivery. The Engineer reserves the right to halt installation until proper certification is submitted and determined acceptable for use.
- 103.4 Submittals After Installation is Complete:
- a. Geosynthetics Contractor:
 - a1. As-built panel layout.
 - a2. Drawing showing locations of repairs and types of repairs made.
 - a3. Locations of destructive tests.
 - a4. Results of destructive tests.

- a5. Results of non-destructive tests.

104. QUALITY ASSURANCE

- 104.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of the responsibility for providing materials and installation in compliance with specified requirements.
- 104.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.
- 104.3 CQA activities shall be performed as described herein and in Specification P-1803 developed by Sargent & Lundy and included in the July 2023 Construction Permit Application for retrofitting the Ash Surge Basin previously submitted to the Illinois EPA.

PART 2 - PRODUCTS

201. HIGH-DENSITY POLYETHYLENE GEOMEMBRANE

201.1 Manufacturers of HDPE Geomembrane Products:

- a. The products of the following manufacturers meeting the requirements herein are acceptable:

- a1. AGRU America, 500 Garrison Road, Georgetown, South Carolina 29440.
- a2. Solmax, 19103 Gundle Road, Houston, Texas 77073.
- a3. Skaps, 335 Athena Drive, Athens, Georgia 30601
- a4. Others as approved by the Owner.

201.2 General Requirements:

- a. All HDPE geomembrane shall be textured on both sides and meet the requirements of GRI-GM13.
- b. The top surface of the HDPE geomembrane shall be white.
- c. The HDPE geomembrane shall be manufactured from first quality, virgin resin. Blending of resins shall not be allowed.
- d. The resin used to produce the HDPE geomembrane shall be formulated to be resistant to chemical and ultraviolet degradation.
- e. The HDPE geomembrane shall be free of plasticizers, leachable additives, and per- and polyfluoroalkyl substances (PFAS).
- f. During manufacture, each roll of HDPE geomembrane shall be continuously monitored across the width to assure uniformity of thickness. Thickness measurements shall meet the requirements of GRI-GM13.
- g. The HDPE geomembrane shall be free from dirt, oil, foreign matter, scratches, cracks, creases, bubbles, blisters, pits, tears, holes, pores, pinholes, voids, undispersed raw material, any sign of contamination or other defects that may affect serviceability, and

shall be uniform in color, thickness, and surface texture.

- h. Panels of HDPE geomembrane shall be capable of being seamed in the field to yield seams that are as resistant to waste liquids as the sheeting.
- i. The HDPE geomembrane shall be manufactured in the United States or Canada.

201.3 Packaging and Shipping:

- a. All HDPE geomembrane liner material shall be shipped to the project site in rolls. No HDPE geomembrane liner material shall be folded.
- b. Packaging and transportation of all HDPE geomembrane liner materials to the project site shall be the responsibility of the GM/GT Manufacturer, who shall retain responsibility of the material until the material is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the HDPE geomembrane liner material at the project site.
- c. A label shall be attached or adhered to each roll of the HDPE geomembrane. The label shall identify the following:
 - c1. Name of GM/GC Manufacturer.
 - c2. Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier's name, resin production plant, resin brand name type, and production date of the resin).
 - c3. Order number.
 - c4. Date of manufacture.
 - c5. Manufacturing lot number.
 - c6. Geomembrane thickness and type.
 - c7. Roll identification number.
 - c8. Roll dimensions (length and width) and weight.

202. GEOTEXTILE

202.1 Manufacturers of Geotextile Products:

- a. The products of the following manufacturers meeting the requirements herein are acceptable:
 - a1. AGRU America, 500 Garrison Road, Georgetown, South Carolina 29440.
 - a2. Solmax, 19103 Gundle Road, Houston, Texas 77073.
 - a3. Skaps, 335 Athena Drive, Athens, Georgia 30601
 - a4. Others as approved by the Owner.

General Requirements:

- b. Non-Woven Geotextiles:
 - b1. The geotextiles shall be non-woven, spun bonded fabric manufactured from long chain

polymeric filaments, yarns, staple fibers, or other structural components of polyester or polypropylene formed into a stable network (mesh).

b2. The nominal weight of the geotextile shall be 16 oz/sy.

202.2 Material Requirements:

a. The geotextile shall meet the requirements of Table 1

TABLE 1
GEOTEXTILE MATERIAL REQUIREMENTS

Property	Value	ASTM Test Method	Test Frequency
Geotextile			
Mass per Unit Area	16 oz/sy (MARV)	D5261	Manufacturers Standard
Grab Strength	425 lb (MARV)	D4632	
Grab Elongation	50% (MARV)	D4632	
Tear Strength	150 lb (MARV)	D4533	
CBR Puncture Strength	1200 lb (MARV)	D6241	
Permittivity	0.57 sec ⁻¹ (MARV)	D4491	
AOS	100 US Sieve (MAX ARV)	D4751	
UV Resistance	70% Retained (500 hr)	D4355	

- 202.3 Packing and Shipping:
- a. The geotextile shall be shipped to the project site in rolls.
 - b. Packaging and transportation of all geotextile materials to the project site shall be the responsibility of the GM/GT Manufacturer, who shall retain responsibility until the drainage geocomposite is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the geotextile material at the project site.
 - c. A label shall be attached or adhered to each roll of the geotextile. The label shall identify the following:
 - c1.1 Name of GM/GT Manufacturer.
 - c1.2 Product identification (e.g., brand name, product code).
 - c1.3 Date of manufacture.
 - c1.4 Manufacturing lot number.
 - c1.5 Geotextile thickness and type.
 - c1.6 Roll identification number.
 - c1.7 Roll dimensions (length and width) and weight.

PART 3 – EXECUTION

301. EXCAVATION
- 301.1 All protective granular material in proximity of the Ash Surge Basin Weir Wall and above the existing geomembrane liner shall be carefully removed. The limits and specifications for this excavation work are specified on the Design Drawings.
- 301.2 All material excavated from the Ash Surge Basin shall be disposed of as specified on the Design Drawings.
302. PREPARATION OF CONCRETE SURFACES TO BE LINED
- 302.1 All concrete weir wall surfaces that will come in contact with any geosynthetic material shall be free of sharp edges or rough spots that can puncture or abrade the liner materials. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor. Where specified on the Design Drawings, geotextiles shall be placed between the concrete surface and the geomembrane liner to act as protective cushioning layers for the geomembrane liner.
303. CLEAN-UP
- 303.1 All waste, excess materials, and debris shall be disposed of in an offsite disposal area approved by the Owner.
304. ONSITE HANDLING AND STORAGE
- 304.1 Unloading:
- a. Handling and unloading geosynthetic materials shall be responsibility of the

Geosynthetics Contractor.

- b. Upon arrival at the site, the rolls of geomembrane liner and geotextile shall be carefully unloaded by the Geosynthetics Contractor in accordance with the GM/GT Manufacturer's recommendations and in a manner to ensure that the material is not damaged.

304.2 Inspection:

- a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of geomembrane and geotextile for damage or defects.
- b. Any damage or defects shall be noted and immediately reported to the Owner, the GM/GT Manufacturer, and the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner (or their authorized representative), is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.

304.3 Storage:

- a. The Owner will provide on-site, outdoor storage space in a location near the area to be lined.
- b. The Geosynthetics Contractor shall store and stage the rolls such that on-site transportation and handling are minimized.
- c. The Geosynthetics Contractor shall be responsible for protecting the rolls of geomembrane liner and geotextile from damage, moisture, theft, and vandalism.
- d. The rolls of geomembrane and geotextile shall be placed on a smooth surface free of rocks and standing water.

305. INSTALLATION OF GEOTEXTILE

305.1 General Requirements:

- a. In the presence of wind, all geotextiles shall be weighted with sand bags or the equivalent. Weights shall be installed during deployment as necessary and shall remain in place until deployment of the geomembrane.
- b. All necessary precautions shall be taken to prevent damage to existing and new geomembrane during placement of the geotextile.
- c. During placement of the geotextile, care shall be taken not to entrap stones that could damage the adjacent geomembrane.

305.2 Placement of Geotextile:

- a. The geotextile shall be positioned by hand covering the weir wall.
- b. The geotextile shall be placed with no horizontal seams along either side of the weir wall.
- c. The geotextile shall be positioned on weir wall so that the geotextile overlaps the existing geotextile by a minimum of 4 inches.

305.3 Joining Geotextile:

a. Seaming:

a1. The geotextile seams between adjacent geotextile panels shall be continuously sewn or continuously heat bonded in accordance with the GM/GT Manufacturer's recommendations.

a2. Sewing Requirements:

c1. If sewn, Sewing shall be done using polyester or heat-set UV stabilized polypropylene sewing thread with chemical and ultraviolet light resistance properties.

c2. Seams shall be "prayer" or "flat" seams. Seams shall be formed by mating the edge of the geotextile and sewing together with continuous stitches.

c3. Sewing procedures shall conform to the latest procedures recommended by the GM/GT Manufacturer.

c4. Seam Inspections:

c5.1 Visual examinations shall be conducted to ensure that 100 percent of the seams are sewn or heat bonded as required.

c5.2 Seam sampling and testing are not required.

305.4 Protection of HDPE Geomembrane:

a. The Geosynthetics Contractor shall be responsible for protection of the HDPE geomembrane liner during installation of the geotextile and shall be responsible for repair of any damage caused to the liner by installation of the geotextile.

306. ATTACHMENT TO PIPE PENETRATIONS

306.1 Geomembrane shall be attached to pipe penetrations through the lining in accordance with details on the Design Drawings.

306.2 Prefabricated or field fabricated HDPE sleeves (pipe boots) used for attaching the geomembrane to the pipe shall be supplied by the GM/GC Manufacturer.

307. INSTALLATION OF HDPE GEOMEMBRANE LINER

307.1 Weather:

a. Geomembrane shall not be placed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds that acceptable welds can be made at the prevailing temperature. Trial welds shall be as described in Paragraph 303.7c. Under no circumstances shall geomembrane be deployed when the air temperature is below 5°F.

a1. If the air temperature is above 32°F, trial welds shall be as described in Paragraph 303.6c.

a2. If the air temperature is at or below 32°F, trial welds and field seaming shall be as described in GRI Test Method GM9.

b. Geomembrane shall not be deployed or placed in any of the following conditions:

- b1. During any rainfall or snowfall.
 - b2. In ponded water.
 - b3. During high winds.
 - b4. In the presence of excessive moisture due to fog or dew.
 - b5. On frozen subgrade.
- 307.2 Precautions to Prevent Wind Damage:
- a. If possible, work shall be oriented in the direction of the prevailing wind.
 - b. To prevent uplift of the geomembrane by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the edges of the exposed sheets using sandbags, tires, or other means which will not damage the geomembrane.
- 307.3 Other Precautions to Prevent Damage:
- a. Protection of the geomembrane from damage due to foot traffic shall be provided.
 - b. Provisions of facilities for safe entrance and egress of employees from sloped depressions shall be provided.
- 307.4 Panel Deployment:
- a. The methods and equipment used to deploy the panels shall not damage the geomembrane or the supporting surface.
 - b. Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the geomembrane at the lowest expected operating temperature.
- 307.5 Replacement of Damaged Geomembrane:
- a. Any area of a panel which, in the judgement of the Owner and/or the CQA Contractor, becomes seriously damaged (torn, twisted, or crimped permanently) shall be replaced at no additional cost to the Owner.
- 307.6 Field Seaming:
- a. Method of Seaming:
 - a1. The primary welding procedure for seams shall be double wedge fusion welding.
 - a2. Extrusion welding shall be used only for repairs, detail work, and for seaming where double wedge fusion welding is not possible.
 - a3. The rods used for extrusion welding shall be the same type of resin as the geomembrane, unless otherwise approved by the Owner.
 - a4. The use of solvents or adhesives is not permitted.
 - b. General Requirements for Seaming:
 - b1. No horizontal seams may be installed on either side of the weir wall. The geomembrane panel must extend over the wall onto the floor on each side.

- b2. The seaming of panels shall to the existing geomembrane shall be performed at the coolest time of the day to allow for contraction of geomembrane.
- c. Trial Welds Prior to Beginning Seaming:
 - c1. Trial welds are required for pre-qualification of personnel, equipment, and procedures for making seams on identical geomembrane material under the same climatic conditions as the actual field production seams will be made.
 - c2. Trial welds shall be made as follows:
 - c2.1 Prior to each seaming period.
 - c2.2 Every 5 hours (i.e., at the beginning of the work shift and after the lunch break).
 - c2.3 Whenever personnel or equipment are changed.
 - c2.4 When climatic conditions result in wide changes in geomembrane temperature.
 - c2.5 When requested by CQA Geosynthetics Inspector for any seaming crew or piece of welding equipment if problems are suspected.
 - c3. Once qualified by passing a trial weld, welding technicians shall not change parameters without performing another trial weld.
 - c4. Trial welds shall be made on both double wedge fusion welds and on extrusion welds.
 - c5. A test strip shall be prepared by joining two pieces of geomembrane, each piece shall be at least 6 inches wide. The length of double wedge fusion welded seams shall be a minimum of 10 feet long. The length of an extrusion welded seam shall be a minimum of 4 feet long. The CQA Geosynthetics Inspector shall witness the fabrication of each test strip.
 - c6. All test welds shall be tested by destructive testing. Testing can be done as soon as the seam cools.
 - c7. A minimum of six 1-inch wide sample strips shall be cut from each test strip. Three test strips shall be tested in peel at 2 inches per minute and three test strips shall be tested in shear at 2 inches per minute using a field tensiometer. The CQA Geosynthetics Inspector shall witness all tests.
 - c8. If any of the test specimens fail, a new test strip shall be fabricated and the tests repeated for the new strip. If additional specimens fail, the seaming apparatus and the seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and successful trial welds have been achieved.
 - c9. The trial weld is considered acceptable if, when tested for peel adhesion using the field tensiometer, all specimens meet the criteria specified in GRI-GM 19a for both peel and shear.
 - c10. If the specimens pass the tests, production seaming operations can begin.
 - c11. The Geosynthetics Contractor shall document all data on each trial weld, including:
 - c11.1 Date.
 - c11.2 Time.

- c11.3 Operator.
- c11.4 Machine number.
- c11.5 Ambient temperature.
- c11.6 Operating temperature.
- c11.7 Speed setting.
- c11.8 Pass/Fail designation.
- d. Preparation for Seaming:
 - d1. Prior to seaming, the surface of the geomembrane shall be wiped with a clean cloth to ensure that it is clean and free from moisture, grease, dust, dirt, and debris of any kind before seam welding is started.
 - d2. The panels shall be adjusted so that the seams are aligned to eliminate wrinkles and fish mouths. Where necessary, fish mouths and wrinkles shall be cut to achieve flat overlap.
- e. Seaming:
 - e1. Seaming shall be performed in accordance with the GM/GT Manufacturer's accepted procedure.
 - e2. Double Wedge Fusion Welds:
 - e2.1 The panels shall be overlapped a minimum of 4 inches prior to welding.
 - e3. Extrusion Fillet Welding:
 - e3.1 Geomembrane overlap shall be a minimum of 3 inches for extrusion welding.
 - e3.2 Geomembrane panels shall be temporarily bonded using a hot air device prior to extrusion welding.
 - e3.3 The seam overlap shall be ground (abraded) no more than one hour prior to welding.
 - e3.4 All grind marks shall be covered with extrudate.
- 307.7 Non-Destructive Field Testing
 - a. General:
 - a1. All non-destructive field testing shall be performed and documented by the Geosynthetics Contractor.
 - a2. The CQA Geosynthetics Inspector shall observe all non-destructive test procedures.
 - a3. One hundred (100) percent of the seam length shall be tested using non-destructive procedures to check the continuity of the field seams. Non-destructive testing is not meant to qualify seam strength.
 - a4. Air pressure testing shall be performed in accordance with ASTM D5820 and GRI GM6.
 - a5. Vacuum box testing shall be performed in accordance with ASTM D5641 and as

specified herein.

a6. Double Wedge Fusion Welded Seams:

- b1. Double wedge fusion welded seams shall be tested using air pressure testing.
- b2. The procedure for testing shall be as specified in GRI GM6 for the type and thickness of geomembrane in use.
- b3. The following pressures are applicable to all HDPE geomembrane. After an initial 2-minute pressure stabilization period, the pressure shall be maintained between 27 and 30 psi for 60 mil HDPE geomembrane. The pressure shall be sustained for a minimum of 5 minutes. The loss of pressure shall not exceed a maximum of 3 psi in 5 minutes. If the pressure does not stabilize in the first two minutes or the pressure loss exceeds the loss specified, the seam test shall be considered a failure.
- b4. For every seam that fails a seam test:
 - b4.1 The leak or suspected leak shall be located and repaired.
 - b4.2 The repaired seam shall be re-tested as required until all leaks are identified and repaired and the seam passes a subsequent air pressure test.
- b5. When the geometry of a double wedge fusion weld makes air testing impossible or impractical, vacuum testing may be used to test the seam.

b. Extrusion Welded Seams:

- c1. Extrusion welded seams shall be tested using vacuum chamber testing in accordance with ASTM D5641.
- c2. The completed seam shall exhibit no leakage when tested between 5 psi minimum vacuum for approximately 10 seconds.
- c3. If leaks are discovered during vacuum box testing, they shall be located, marked, and repaired.
- c4. The repaired area shall be re-tested and exhibit no leakage.
- c. Inaccessible Seams:
 - d1. Where extrusion welded seam locations make use of vacuum box testing impractical, then the electric wire method of testing shall be used.
 - d2. The electric wire test method shall consist of placing a 24-gauge copper wire 1/8 inch beneath the top sheet overlap of the two sheets prior to welding with the extruder. The wire shall be embedded in the seam. After welding, a holiday spark detector, operating at 20,000 volts, shall be connected to one end of the wire, and slowly moved over the length of the seam. A seam defect between the probe and the embedded wire shall result in an audible alarm indicating where the defect is located.

d. Test Reports:

- e1. Test reports for all air pressure tests shall contain all data specified in ASTM D5820 and GRI GM6.
- e2. Test reports for vacuum box testing shall contain all of the data specified in ASTM

D5641.

e3. Test reports for other types of non-destructive tests shall contain the following data for each test as a minimum:

e3.1 Location.

e3.2 Type of test.

e3.3 Test parameters.

e3.4 Test data.

e3.5 Test number.

e3.6 Name of tester.

e3.7 Outcome of the test.

307.8 Destructive Testing

a. Testing:

a1. Destructive testing shall be performed by an independent third-party laboratory employed by the CQA Contractor on samples cut from production welds in the field by the Geosynthetics Contractor.

a2. Samples shall be taken by the Geosynthetics Contractor to the third-party laboratory and tested for shear strength and peel adhesion. For double wedge seam samples, both welds shall be tested for peel adhesion.

b. Location and Frequency:

b1. Test locations shall be determined after seaming. The location where the test samples shall be taken shall be marked by the CQA Geosynthetics Inspector. Locations may be prompted by the appearance of excessive heating, contaminations, offset welds, or a suspected defect. Destructive test samples shall be taken at a minimum average frequency of one per every 500 linear feet of seam length.

b2. Each sample location shall be numbered and marked with permanent identification, and every sample location shall be indicated on a plan drawing prepared and maintained by the Geosynthetics Contractor. The following shall be recorded for each sample:

b3.1 Date and time.

b3.2 Ambient temperature.

b3.3 Seam number and location.

b3.4 Welding apparatus used.

b3.5 Initials of Seamer.

b3.6 Test results.

b4. Samples shall be cut by the Geosynthetics Contractor in the presence of the CQA Geosynthetics Inspector.

- b5. Test samples shall be cut every shift and taken by the CQA Geosynthetics Inspector to the third-party laboratory the same day that the sample is prepared.
- c. Sample Size:
 - c1. The minimum sample size shall be 12-inches wide with a seam 36-inches long centered length wise in the sample.
- d. Field Testing:
 - d1. A one-inch wide specimen shall be cut from each end of each sample for field testing.
 - d2. Each one-inch wide specimen shall be tested with a field tensiometer for peel adhesion.
 - d3. The CQA Geosynthetics Inspector shall witness each field test.
 - d4. A test is considered acceptable if a specimen meets the criteria specified in GRI-GM19a.
- e. Laboratory Testing:
 - e1. Samples shall be tested for shear strength and peel adhesion in accordance with ASTM D6392. Five specimens shall be tested for each test method.
 - e2. All samples shall meet minimum requirements for shear strength and peel adhesion of GRI-GM 19a.
- f. Test Results:
 - f1. Re-Testing if Failure Occurs:
 - g1. If a seam fails testing, one additional sample shall be taken 10 feet on each side of the location of the failed test. Additional samples shall continue to be taken at 10-foot intervals until tests show that seam strength is adequate and the zone in which the seam requires reconstruction is identified. Additional field and laboratory tests required to determine failed seams and any necessary patching and rework shall be performed at no additional cost to the Owner.
 - g2. All passing seams shall be bounded by two locations from which samples passing laboratory destructive tests have been taken.
 - g3. The entire seam length failing strength tests shall be reconstructed at no additional cost to the Owner.
 - g4. If the length of reconstructed seam exceeds 150 feet, a sample shall be taken of the reconstructed seam every 150 feet and shall pass destructive testing.
- 307.9 Inspection:
 - a. After seaming is complete, the Geosynthetics Contractor and the CQA Geosynthetics Inspector shall conduct a detailed walk-down to visually check all seams and non-seam areas of the HDPE geomembrane liner.
 - b. All defects, holes, blisters, tears, signs of damage during installation, areas of undispersed carbon, and holes from destructive or non-destructive testing shall be marked and repaired.

307.10 Repair of Defects and Seams

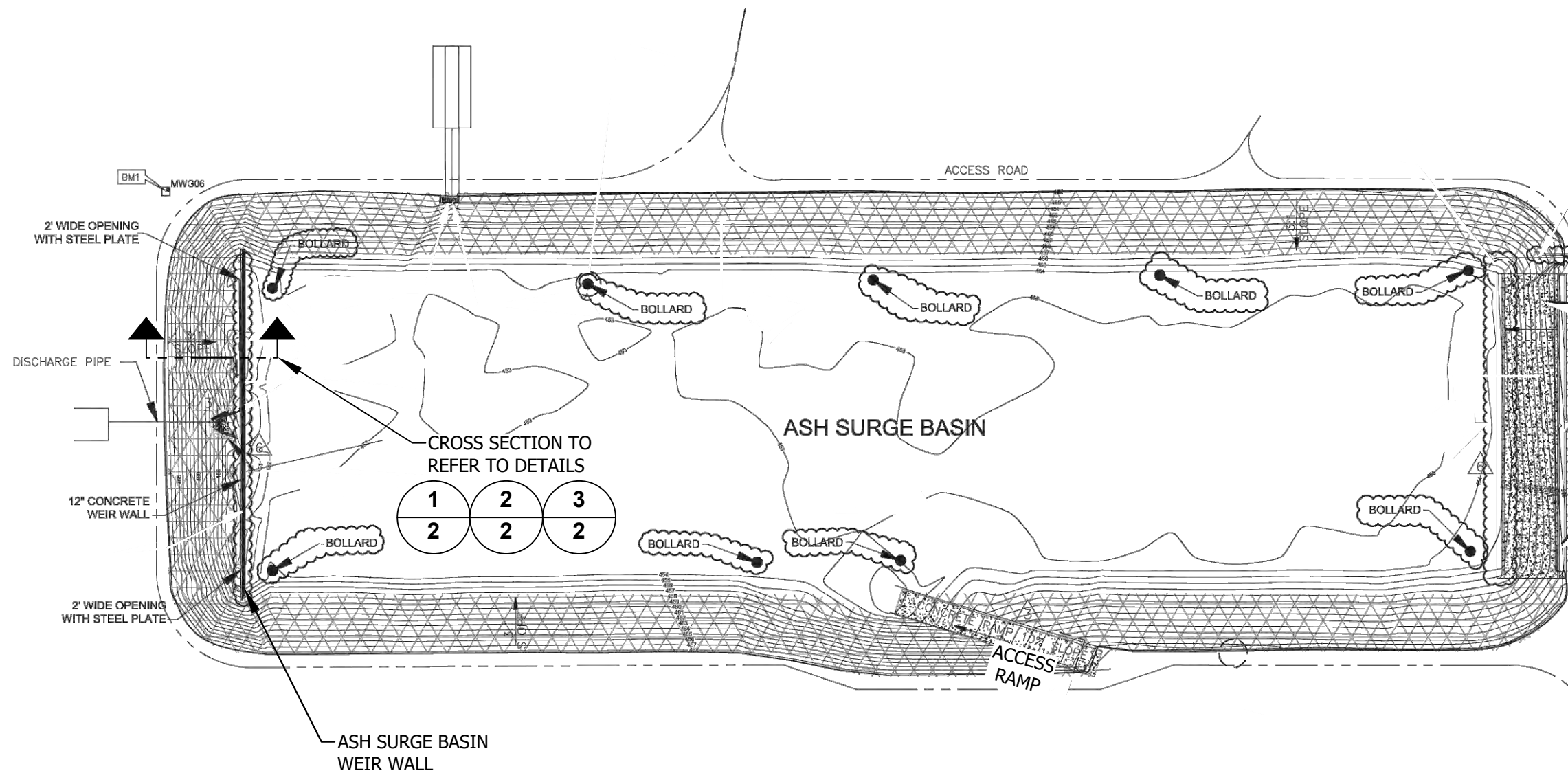
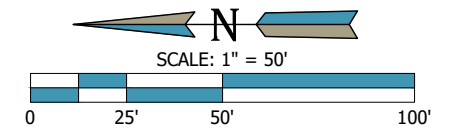
- a. Patching:
 - a1. Patching shall be used to repair large holes, tears, and destructive sample locations.
 - a2. All patches shall be round or oval or shall have rounded corners.
 - a3. All patches shall be made of the base HDPE geomembrane material and shall extend a minimum of 3 inches beyond the edges of the defect.
 - a4. Patches shall be extrusion welded to the base sheet.
- b. Grinding and Welding:
 - b1. Grinding and welding shall be used to repair sections of extruded fillet seams with small defects.
- c. Spot Welding:
 - c1. Spot welding shall be used to repair small tears, pinholes, or other minor localized flaws.
- d. Capping:
 - d1. Capping shall be used to repair lengths of extrusion welded seams with large defects and to repair double wedge fusion welded seams.
 - d2. Cap strips shall be made with strips of the same type and thickness of the geomembrane being installed. Strips shall extend a minimum of 6 inches beyond the weld and shall have rounded corners.
 - d3. Cap strips shall be extrusion welded to the base sheet.
- e. Cut Out and Replacement:
 - e1. When approved by the Owner, a length of defective seam may be cut out and replaced with a strip of new material seamed into place.
- f. Verification of Repairs:
 - f1. All repairs shall be non-destructive tested using one of the procedures described in Paragraph 303.8.
 - f2. Repairs passing non-destructive testing shall be deemed acceptable.
 - f3. Repairs of a seam in excess of 150 feet in length shall have one destructive seam test per 150 feet in length.

END OF SECTION 319005/319020

ATTACHMENT 1

DESIGN DRAWINGS

- Sheet 1: Plan View – Ash Surge Basin Weir Wall Capping
- Sheet 2: Details Sheet – Ash Surge Basin Weir Wall Capping



LEGEND

FINAL SURFACE CONTOUR

ACCESS ROAD

BOLLARD LOCATION

HDPE GEOMEMBRANE

CONCRETE

SOURCE NOTES:

1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 3B-0-2071, DATED 5-12-78.
3. FINAL SURFACE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED OCTOBER 8, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

☐ RELEASED FOR BID
☐ APPROVED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

13082 E. MANITO RD.
PEKIN, IL 61554

PLAN VIEW

POWERTON GENERATING SYSTEM - MIDWEST GENERATION
PEKIN, ILLINOIS

[illegible]

Weaver
Consultants
Group

BEAVER CONSULTANTS GROUP
2930 3 MILE ROAD, NW
AND RAPIDS, MICHIGAN 49534
(616) 458-8052

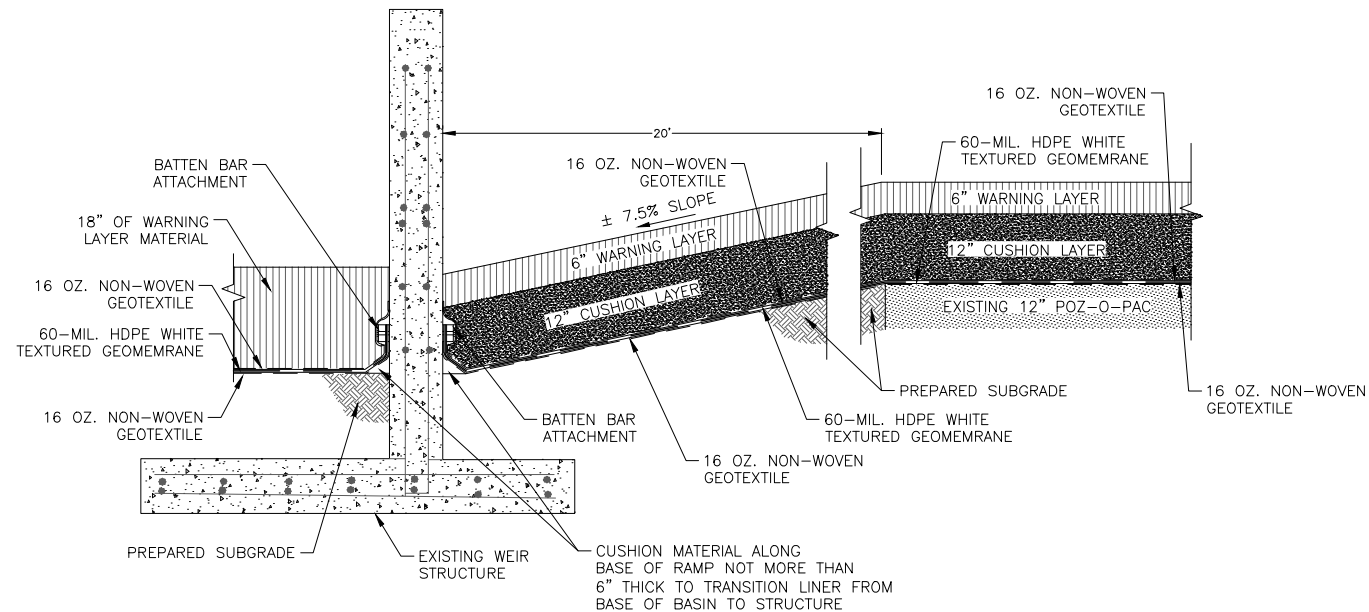
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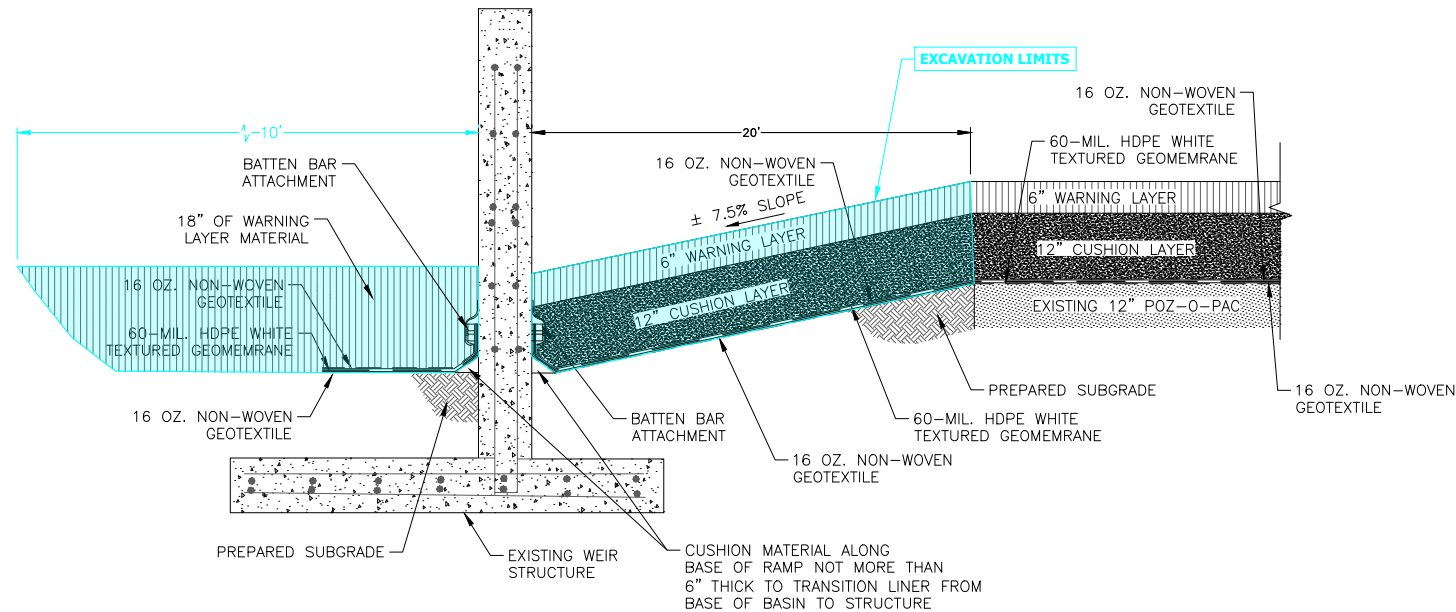
DRAWN BY: JDA
 REVIEWED BY: JB
 DATE: 08/05/2026
 PJ: 5053-300-01-03
 WERTON PLAN VIEW

SHEET 1

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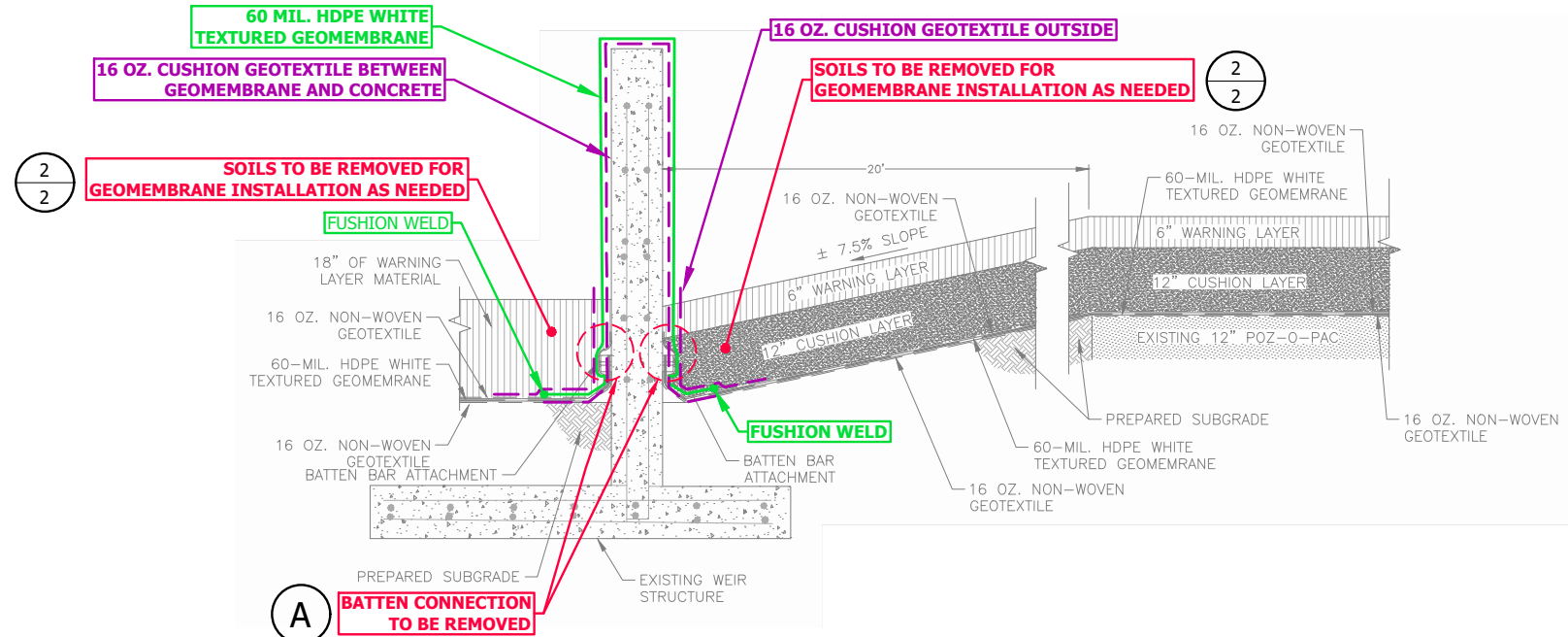
1
2
EXISTING CONCRETE WEIR GEOMEMBRANE SECTION
NTS



2
2
EXCAVATION LIMITS
NTS



A
BATTEN CONNECTION TO BE REMOVED



3
2
PROPOSED CONCRETE WEIR GEOMEMBRANE CAP
NTS

DRAFT
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CLIENT APPROVAL BY: _____

PREPARED FOR:
13082 E. MANITO RD.
PEKIN, IL 61554

ASH SURGE BASIN WEIR WALL CAPPING
DETAILS SHEET
POWERTON GENERATING SYSTEM - MIDWEST GENERATION
PEKIN, ILLINOIS

NO.	DATE	REVISION DESCRIPTION	BY

Weaver
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CONCRETE_WEIR_SECTION-Details

SHEET 2

Application for Groundwater Corrective Measures Construction Permit
13082 Manito Road, Pekin, IL 61554

APPENDIX D

Corrective Action Plan



August 10, 2026

WCG Project No.: 5053-300-01-03

CORRECTIVE ACTION PLAN

POWERTON GENERATING STATION

Illinois Environmental Protection Agency Identification Numbers:

Ash Surge Basin: - Pond ID W1798010008-01

Metal Cleaning Basin – Pond ID W1798010008-03

13082 EAST MANITO ROAD
PEKIN, ILLINOIS

Prepared on behalf of: Midwest Generation, LLC

Prepared for: Illinois Environmental Protection Agency

Prepared by:



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ABBREVIATIONS AND ACRONYMS

Term	Definition/Description
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
CMA	Corrective Measures Assessment
cm/sec	Centimeters per second
COC	Constituent of concern
DO	Dissolved Oxygen
ELUC	Environmental Land Use Control
GMZ	Groundwater Management Zone
GWPS	Groundwater Protection Standards
GWPT	Groundwater Pump & Treat
IAC	Illinois Administrative Code
Illinois EPA	Illinois Environmental Protection Agency
MWG	Midwest Generation, LLC
MNA	Monitored natural attenuation
MSL	Mean sea level
PRB	Permeable Reactive Barrier
Redox	Reduction and Oxidation
SOP	Standard Operating Procedure
TACO	Tiered Approach to Corrective Action Objectives
WCG	Weaver Consultants Group

1 INTRODUCTION

On behalf of Midwest Generation, LLC (MWG), Weaver Consultants Group North Central, LLC (WCG) has prepared this Corrective Action Plan (CAP) pursuant to Illinois's Coal Combustion Residuals (CCR) Rule at 35 Illinois Administrative Code (IAC) 845.670 for certain CCR units at the Powerton Generating Station (Site). This CAP presents an analysis of corrective action alternatives pursuant to 35 IAC 845.670(e) and identifies the selected remedy to address confirmed statistically significant increases in groundwater for various natural inorganic constituents identified near the permitted CCR units known as the Ash Surge Basin and Metal Cleaning Basin. A Site Layout Map showing the location of the Ash Surge Basin and Metal Cleaning Basin along with various other relevant Site features is included as **Figure 1**.

1.1 Background Information

The Site is implementing a groundwater monitoring program pursuant to 35 IAC Part 845 Subpart F, Groundwater Monitoring and Corrective Action and the CCR Residual Surface Impoundment Operating Permit 2024-CO-100029 issued by the Illinois EPA most recently dated September 29, 2025 (Operating Permit).¹ Under the above referenced regulations and Operating Permit, groundwater data is collected on a quarterly basis from a network of monitoring wells upgradient and downgradient of the Ash Surge Basin and Metal Cleaning Basin and analyzed for a list of 20 CCR constituents. Monitoring wells are screened in two different units:

1. An upper clay/silty clay unit
2. A lower sand and gravel unit

The groundwater concentrations are compared to site-specific Groundwater Protection Standards (GWPS) established in the Operating Permit. The groundwater monitoring network for the State groundwater monitoring program is shown on **Figure 2**.

The laboratory analysis is performed on unfiltered groundwater samples and therefore represents the total fraction of metals (i.e., both particulate fraction and dissolved fraction of metals). This represents a conservatively high estimate for metals because positively charged metal ions commonly attach themselves to negatively charged clay or silt sized particles suspended in the groundwater. The established State standards included in the Illinois CCR Rules are based on 35 IAC 620 Class I potable

¹ Illinois EPA originally issued the Operating Permit on July 3, 2024. On November 6, 2024, MWG appealed Special Conditions 6, 11, 14, 15, 16, 17, 19, 20, 21, 22, 25, 26, and 28 of the Operating Permit. *Midwest Generation LLC. v. Illinois EPA*, PCB 25-4 (Nov. 6, 2024). The appeal was to correct typographical errors, correct internal inconsistencies, correct inconsistencies with Part 845, remedy impractical or unreasonable deadlines, and clarify ambiguous language. The Board stayed Special Conditions 6, 11, 14, 15, 16, 17, 19, 20, 21, 22, 25, 26, and 28 pending the appeal. On September 29, 2025, Illinois EPA issued an updated permit, however, because of retained errors MWG had appealed, Illinois EPA and MWG continue to negotiate the terms of the Operating Permit. The negotiations have taken longer due to the transfer of the CCR Program from the Bureau of Water to the Bureau of Land.

groundwater standards. Potable water is typically filtered prior to distribution/consumption and some of these suspended sediments would be filtered out of the sample if analyzed for the dissolved metals fraction. The metals ions attached to suspended sediments are also not as mobile in the groundwater as the dissolved fraction. For these reasons, exceedances of the dissolved metals fraction represent a greater risk to human health and the environment, compared to the total fraction.

The groundwater corrective action process was initiated in response to the observation of confirmed detections in groundwater at concentrations above the GWPS during the fourth quarter 2024 groundwater monitoring period for the following constituents and Operating Permit monitoring wells:

Clay/Silty Clay Unit:

- Sulfate: MW-14
- Total dissolved solids (TDS): MW-14 and MW-18A
- Thallium (total): MW-14

Sand and Gravel Unit:

- Cobalt (total): MW-07
- Arsenic (total): MW-07

Molybdenum (total) and cobalt (total) were also confirmed in the groundwater during the fourth quarter 2024 at concentrations above the GWPS at MW-14 and MW-18A, respectively. However, the subsequent Nature and Extent of Impacts Evaluation data collected in February 2025 indicated molybdenum (total) and cobalt (total) concentrations were below the applicable GWPS at MW-14 and MW-18A, respectively. Concentrations of molybdenum (total) and cobalt (total) at MW-14 and MW-18A respectively have remained below the GWPS from February 2025 through February 2026.

During the 1st quarter 2025 groundwater sampling event, the following confirmed concentrations were also noted above the currently established GWPS within the sand and gravel unit:

- Boron (total): MW-10
- Cobalt (total): MW-10

The boron (total) concentration at MW-10 was below the GWPS during the 3rd and 4th quarter sampling events in 2025, but above the GWPS during the 1st quarter 2026. Concentrations of cobalt (total) were not detected above the GWPS at MW-10 during the 4 consecutive quarterly monitoring events performed from 2nd quarter 2025 to 1st quarter 2026.

1.2 Document Organization

This CAP includes the following:

- Overview of the groundwater corrective action process (Section 1.3)
- Discussion of relevant Site conditions, including the subject CCR units, geology/hydrogeology, and nature and extent of groundwater impacts (Section 2)
- Corrective Measures Assessment previously implemented, including goals and corrective measures criteria evaluation (Section 3)
- Description of remedy evaluation/selection and schedule (Section 4/5)

1.3 Groundwater Corrective Action Process

The first step in the groundwater corrective action process according to the 35 IAC 845 Rules is the Corrective Measures Assessment (CMA). The CMA Report was submitted to Illinois EPA on August 11, 2025. The purpose of the CMA was to begin the process of selecting a corrective measure to address groundwater impacts based on further evaluation using the process and criteria outlined in 35 IAC Section 845.660. Potential corrective measures were identified based on their ability to prevent further releases from the CCR units, remediate existing releases, and restore the affected area, where applicable. Each potential corrective measure was analyzed in its effectiveness to meet the following criteria, pursuant to 35 IAC Section 845.660(c)(1) - (3):

- The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to residual contamination;
- The time required to begin and complete the corrective action plan; and
- The institutional requirements, such as State or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the corrective action plan.

Quarterly groundwater monitoring activities required by the 35 IAC 845 rules have continued during the corrective action process. A Semi-Annual Progress Report on selection of a remedy dated January 14, 2026 was prepared by the permittee and submitted to the Illinois EPA pursuant to 35 IAC 845.670(a).

This CAP must meet the following requirements pursuant to 35 IAC Section 845.670(c):

- Be based on the results of the corrective measures assessment conducted under 35 IAC Section 845.660;
- Identify a selected remedy that at a minimum, meets the standards listed in 35 IAC 845.670(d) (listed below in Section 4.1);
- Contain the corrective action alternatives analysis pursuant to 35 IAC 845.670(e); and

- Contain a proposed schedule for implementation of the corrective action plan, including an analysis of the factors in determining the schedule listed in 35 IAC 845.670(f).

2 SITE CONDITIONS

The Site conditions relevant to the groundwater corrective action process are summarized below with references to previously submitted technical documents pertaining to the Powerton groundwater monitoring program and the nature and extent (N&E) evaluation performed in response to identification of the confirmed exceedances in groundwater above the GWPS.

2.1 Subject CCR Units

The Metal Cleaning Basin is used during station outages for boiler wastes to receive and treat sluiced boiler wash water. The Metal Cleaning Basin was constructed in 1978 with a 12-inch Poz-o-Pac™ layer on the bottom and a Hypalon® liner on the sides. The Metal Cleaning Basin was relined in 2010 with the 12 inches of Poz-o-Pac™ remaining in place on the bottom, with the addition of a bottom geotextile cushion, a 60 mil HDPE liner, a top geotextile cushion, a sand cushion, and a limestone warning layer. Wastewater is periodically pumped from the basin, treated to remove dissolved metals and suspended solids, and discharged into the Bypass Basin under the Station's NPDES permit. Other than boiler wastes and precipitation falling on the basin, the basin has no regular flow. Occasionally, the Metal Cleaning Basin is used for treatment of boiler wash water and also is used as a temporary laydown area for ash, but not at the same time.

The Ash Surge Basin was previously the primary settling basin used for the treatment/collection of CCR at the Powerton Station. The Ash Surge Basin was constructed in 1978 with at least a 12-inch Poz-o-Pac™ layer on the bottom topped with a bituminous seal coat and a Hypalon® liner on the sides of the basin. The Ash Surge Basin was relined in 2013 with a bottom geotextile cushion layer placed on top of the Poz-o-Pac™, 60-mil HDPE geomembrane liner, a top geotextile cushion, a 12-inch-thick sand cushion layer, and a 6-inch-thick limestone warning layer. The Ash Surge Basin has been removed from service as of October 14, 2024. The Powerton Station has developed alternate CCR processing capacity and is currently not using the treatment/collection capacity previously provided by the Ash Surge Basin.

Based on the current status of both units as described above, neither the Ash Surge Basin, nor the Metal Cleaning Basin is believed to represent an ongoing source of groundwater impacts. Further, as described in the CMA Report, a leak location survey conducted within the Ash Surge Basin and Metals Cleaning Basin in April/May 2025 identified localized compromises in the existing geomembrane liner in both basins. These compromises were subsequently repaired/patched. Accordingly, even if the units were still in regular operation as part of CCR sluicing/treatment, neither basin is believed to represent an ongoing source of groundwater impacts.

2.2 Geology and Hydrogeology

The soils beneath the CCR impoundments at the Site consists of unconsolidated deposits, primarily composed of alluvial sands and gravels with interspersed clays and silty clays. The unconsolidated deposits are underlain by shale, limestone, and coal bedrock from the Carbondale Formation. Boring logs indicate three distinct geologic units at the Site. The uppermost unit consists of fill observed to be mostly tan, brown, and black fine to medium sand to silty sand with some gravel and clay seams. Some areas include indications of cinders and brick fragments within boring logs. The fill unit is generally located above the water table within the vadose zone. Beneath this unit, the geology consists of a discontinuous clay to silty clay to silt unit. The clay/silty clay unit generally extends from the area of the Ash Surge Basin/Metal Cleaning Basin to the south and west portions of the Site. Some boring logs indicate the absence of silty clay, while others document a unit up to 18 feet thick (KPRG, 2025A). Boring logs for wells on the north and east portion of the Site generally indicate no observed clay/silty clay unit. The sand and gravel unit lies below the clay/silty clay unit. The sand and gravel unit consists mostly of light brown, brown and/or gray medium to coarse sands and gravels.

The Illinois River is located north of the Site, and Powerton Lake is to the west-northwest. Groundwater at the Site is typically encountered between 18 and 32 feet below ground surface (KPRG, 2021 and KPRG, 2022). Both the lower portions of the clay/silty clay and sand and gravel geologic units are saturated at most locations. The screened intervals of most monitoring wells across the Site have been set in either the clay/silty clay unit or the underlying sand and gravel unit. The groundwater elevation observed in these two units demonstrates two distinct but hydraulically connected groundwater units. Groundwater contour maps have historically been generated for each unit (KPRG, 2025A). As indicated in the *Illinois CCR Compliance Powerton Ash Basins Annual Groundwater Monitoring and Corrective Action Report - 2024* (KPRG, 2025B) dated January 31, 2025, groundwater in the clay/silty clay unit moves to the east towards the Former Ash Basin and west to the former intake channel from the vicinity of the Ash Surge Basin and Metal Cleaning Basin, driven by the thinning of the clay/silty clay unit. Groundwater in the deeper sand and gravel unit moves generally to the north-northwest, towards the Illinois River (KPRG, 2025B). Groundwater contour maps show some temporal fluctuations, with the highest water levels generally occurring within the first and second quarters of the year.

2.3 Nature and Extent of Groundwater Impacts

After detections above the GWPS were confirmed for certain constituents at the permitted monitoring wells, pursuant to 35 IAC 845.650(d), a N&E Evaluation was initiated on behalf of MWG by KPRG and Associates, Inc. (KPRG). The N&E Evaluation consisted of collecting and analyzing groundwater samples from monitoring wells onsite (both permitted monitoring wells and other wells not part of the permitted network), soil samples from berms surrounding the Ash Surge Basin and Metal Cleaning Basin, surface water and pore water samples from the Former Intake Canal just west of the Ash Surge Basin and Metal

Cleaning Basin, and installation and sampling of a new monitoring well screened in the sand and gravel unit downgradient of the Ash Surge Basin and Metal Cleaning Basin. The N&E Evaluation procedures and analytical results are presented and discussed in the *Illinois CCR Compliance Nature and Extent of Impacts Evaluation, Powerton Generating Station*, dated June 9, 2025 (KPRG, 2025A) and previously submitted to Illinois EPA under separate cover. An addendum to the Nature and Extent of Impacts Evaluation was also prepared by KPRG, submitted to Illinois EPA under separate cover, and dated May 20, 2026.

2.3.1 Extent of Impacts – Clay/Silty Clay Unit

The constituents/monitoring wells previously exhibiting confirmed concentrations above the GWPS within the clay/silty clay unit are listed above in **Section 1**. Groundwater and pore water sampling data collected during the N&E Evaluation indicates the following with respect to the individual constituents previously identified at confirmed concentrations above the GWPS within the clay/silty clay unit:

- The extent of sulfate impacts within the clay/silty clay unit has been defined in all directions. The sulfate concentration above the GWPS appears to be fairly isolated to the vicinity of monitoring well MW-14, located adjacent to the Metal Cleaning Basin.
- The extent of TDS impacts has been defined in all directions. The area with TDS concentrations above the GWPS is limited to monitoring wells MW-14, MW-15, MW-17, and MW-18A, which are each located adjacent to the Metal Cleaning Basin and Ash Surge Basin.
- Concentrations of total cobalt were below the GWPS at MW-18A during the N&E Evaluation.
- Total molybdenum was not detected in the groundwater during the N&E Evaluation at a concentration exceeding the GWPS. As no groundwater impacts were identified during the N&E Evaluation, the prior concentration of total molybdenum at MW-14 observed during the 4th quarter 2024 is likely a temporal or statistical anomaly.
- The extent of total thallium impacts above the GWPS has been defined in all directions. The area with total thallium concentrations above the GWPS is limited to the vicinity of monitoring well MW-14, located just west of the Metal Cleaning Basin.

2.3.2 Extent of Impacts – Sand and Gravel Unit

Groundwater analytical data collected from assessment monitoring well MW-24 showed that the extent of impacts for total cobalt in the sand and gravel unit has been sufficiently defined downgradient of the permitted CCR surface impoundments. The impacts appear to be limited to the vicinity of monitoring wells MW-07 and MW-10, although the concentration of total cobalt at MW-10 has been below the GWPS for 4 consecutive quarterly monitoring events from 2nd quarter 2025 to 1st quarter 2026.

The N&E Evaluation also indicates that the extent of impacts for total boron has been sufficiently defined in all directions. The extent of impacts does not extend downgradient of either the Metal Cleaning Basin

or Ash Surge Basin. The impacts appear to be limited to the vicinity of monitoring well MW-10, located upgradient/cross-gradient of the Ash Surge Basin. However, the concentration of total boron at MW-10 does not consistently exceed the GWPS, as it was below the GWPS during the 3rd and 4th quarters of 2025.

The initial phase of the N&E Evaluation data indicated concentrations of total arsenic above the GWPS at new downgradient assessment monitoring well MW-24 on the west side of the Former Intake Canal, screened in the sand and gravel unit. A verification sample collected in April 2025 also exhibited a total arsenic concentration slightly above the GWPS. Additional investigations showed that the elevated arsenic concentrations in MW-24 are likely not related to the subject regulated units (i.e., the Ash Surge Basin and Metal Cleaning Basin), but instead may be related to a potential historic source. Even though it is not possible to precisely identify the exact source of the arsenic detected in MW-24, the extent of arsenic impacts within the sand and gravel unit to the northwest of the regulated units is sufficiently defined at this time.

2.3.3 Other Nature and Extent Evaluation Data

In addition to groundwater sampling from previous and newer monitoring wells, soil samples collected from the impoundment berms surrounding the Metal Cleaning Basin and Ash Surge Basin were analyzed using the Synthetic Precipitation Leaching Procedure (SPLP). The SPLP is a method referenced in the 35 IAC 742 Tiered Approach to Corrective Action Objectives (TACO) regulations for evaluation of the Soil Component to the Groundwater Ingestion Exposure Pathway. The results from these soil samples indicate that the CCR constituents listed in the Operating Permit are not leaching into groundwater at a concentration that would cause GWPS exceedances. No impacts to pore water or surface water within the Former Intake Canal were observed. Additional groundwater samples collected from existing wells onsite visually indicate decreasing concentrations in the short-term, with some locations and constituents within the clay/silty clay unit decreasing below the GWPS (MW-14: total molybdenum and MW-18A: total cobalt) through February 2026.

A survey of the existing geomembrane liner in the Ash Surge Basin and Metal Cleaning Basin was performed in April/May 2025. A leak location survey was conducted on both basins using a combination of soil covered and exposed geomembrane survey methodologies. The results from this survey identified four minor tears in the geomembrane of the Ash Surge Basin and one in the geomembrane of the Metal Cleaning Basin. Potential leak points at geomembrane batten strip connections in the Ash Surge Basin were also identified, including along the north side of the weir wall, where the geomembrane liner was observed to be pulling away from batten strip connections, creating holes. Minor leak points were observed in the Metal Cleaning Basin at the corners, where batten strip connections were made.

Compromises observed in the geomembranes for both basins have been repaired in accordance with the maintenance requirements outlined in the Operating Permit. Locations in which minor leak points were

identified due to insufficient batten strip connections have also been repaired at the Metal Cleaning Basin and Ash Surge Basin. Modifications to the batten strip connections at the Ash Surge Basin weir wall were included as a potential corrective measure in the Corrective Measures Assessment.

3 CORRECTIVE MEASURES ASSESSMENT

3.1 Corrective Measures Assessment Goals

The goal of the CMA was to, within the framework of the 35 IAC Section 845 regulations, develop practical alternatives to address groundwater exceedances believed to be attributable to prior releases from the Ash Surge Basin and/or Metal Cleaning Basin. This framework requires that:

1. Human exposure be controlled; and
2. Groundwater be restored to concentrations below the GWPS.

Each potential corrective measure was evaluated using the corrective measure assessment process, as described in Section 1.3 of the CMA Report (WCG, 2025).

3.2 Potential Corrective Measures

The CMA Report (WCG, 2025) was prepared for the permittee by Weaver and submitted to the Illinois EPA to comply with the requirements of 35 IAC 845.660. The following presents a summary of the findings from the CMA Report.

As required by 35 IAC 845.660(c), the CMA Report included an analysis of the effectiveness of potential corrective measures in meeting the requirements and objectives of the corrective action plan, addressing the following:

- Performance
- Reliability
- Ease of implementation
- Potential safety impacts
- Cross-media impacts
- Exposure control to residual contamination
- Time to begin and complete the corrective action
- Institutional requirements, such as State or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the corrective action

The potential corrective measures considered in the CMA Report for the Ash Surge Basin and Metal Cleaning Basin are:

- Alternative 1: Capping of the Ash Surge Basin Weir Wall
- Alternative 2: Basin Retrofit

- Alternative 3: Closure by Removal
- Alternative 4: Monitored Natural Attenuation
- Alternative 5: Hydraulic Containment
- Alternative 6: Physical Containment/Hydraulic Barrier
- Alternative 7: Permeable Reactive Barrier

A summary of the corrective measures criteria evaluation was presented as Table 1 in the CMA Report. While each of the above potential remedial alternatives exhibited certain inherent advantages and disadvantages, in general, the criteria evaluation presented in the CMA Report indicated that Alternatives #1, #2, #3, and #4 were deemed more viable than Alternatives #5, #6, and #7. A more detailed analysis of the various remedial alternatives is presented in this Corrective Action Plan.

Because it was expected that implementation of any single above remedial alternative by itself would be difficult to satisfy the regulatory criteria included in the Illinois CCR Rules, in order to select and implement a groundwater remedy that best meets the regulatory criteria, the CMA Report indicated that the Corrective Action Plan developed after the Assessment of Corrective Measures will likely be comprised of a combination of one or more of the possible corrective measures listed above.

4 REMEDY SELECTION

4.1 General Requirements

Pursuant to 35 IAC 845.670(d), the selected remedy in the Corrective Action Plan must:

1. Be protective of human health and the environment;
2. Attain the groundwater protection standards specified in 35 IAC 845.600;
3. Control the sources of releases or reduce or eliminate, to the maximum extent feasible, further releases of constituents listed in 35 IAC 845.600 into the environment;
4. Remove from the environment as much of the contaminated material that was released from the CCR surface impoundment as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
5. Comply with the standards for management of wastes as specified in 35 IAC 845.680(d) (as applicable).

A description of how the selected remedy meets the above requirements is presented below in **Sections 4.3.1, 4.3.2, 4.3.3, and 4.3.4** below.

4.2 Selected Remedy

Based on the evaluations presented within this Corrective Action Plan (CAP), the groundwater corrective action remedy will consist of a combination of the individual alternatives presented in the CMA, specifically including:

- CMA Alternative #1: Capping of the Ash Surge Basin Wier Wall;
- CMA Alternative #2: Retrofitting the Ash Surge Basin and Metal Cleaning Basin to a dual composite liner and leachate collection system pursuant to 35 IAC 845 Subpart D; and
- CMA Alternative #4: Monitored natural attenuation to address concentrations of the constituents of concern in the groundwater downgradient of the Ash Surge Basin and Metal Cleaning Basin.

The proposed dual composite liner to be installed during the retrofit process will be constructed above the existing geomembrane liner. Capping the Ash Surge Basin concrete weir wall will be performed as described in this CAP.² The Ash Surge Basin weir wall is comprised of 12-inch thick concrete and extends above the liquid line of the Ash Surge Basin. The current design includes batten strips or bar attachments used to anchor the existing geomembrane near the bottom of the Ash Surge Basin concrete weir wall.

² Only the weir wall of the Ash Surge Basin is required because the design of the geomembrane connection to the Metal Cleaning Basin weir wall is different than the Ash Surge Basin, and does not require a cap.

The capping of the Ash Surge Basin weir wall will include removal of the existing batten bar attachments, welding of a new geomembrane liner section to the exposed/existing geomembrane to allow for extension of the geomembrane liner over the top of the weir wall and anchoring of the geomembrane liner to the exterior of the weir wall with new batten bars.

The retrofit liner design criteria for the dual composite liner will be in accordance with 35 IAC 845.400. The retrofit liner system for both the Ash Surge Basin and Metal Cleaning Basin will be comprised of a new 60-mil HDPE textured geomembrane over a geosynthetic clay liner (GCL). The lower GCL liner will have a maximum hydraulic conductivity (k) of 1×10^{-9} cm/sec. The GCL will be installed above the existing 60-mil HDPE geomembrane. The GCL liner will be placed on top of a layer of structural fill soil along the basin floor to establish a minimum slope of 3% towards the location of the new leachate collection pipe that will be installed near the center of the basins. The installation of the above composite liner above the existing geomembrane liner will result in a triple liner that will effectively control the potential for seepage from the units into the underlying soils.

As areas of the Ash Surge Basin and Metal Cleaning Basin are lined with the new composite liner system, the new leachate collection and removal system (LCRS) components will be installed. The two primary components of the proposed LCRS are (1) a drainage geocomposite and (2) a perforated leachate collection pipe. The drainage geocomposite will consist of an HDPE geonet core with a non-woven geotextile layer heat laminated to each side of the geonet core. The transmissivity of the drainage geocomposite will be at least 6×10^{-4} m²/sec pursuant to 35 IAC 845.420(a)(B). The perforated leachate collection pipe will be installed in the leachate collection trench along the middle of the basins and will ultimately convey collected leachate to a discharge pipe. The leachate collection system is expected to operate only when the basins are occasionally cleaned out and at closure.

An Application for Retrofit Construction Permit for the Metal Cleaning Basin was previously prepared on behalf of MWG by Sargent & Lundy, dated July 19, 2023, submitted to the Illinois EPA, and is under review (Sargent & Lundy, 2023a). An Application for Retrofit Construction Permit for the Ash Surge Basin was prepared by Sargent & Lundy, dated July 26, 2023, also submitted to the Illinois EPA and is also presently under review (Sargent & Lundy, 2023b).

Monitored natural attenuation (MNA) will be the final component of the selected remedy. MNA is defined by the USEPA as 'reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods.' As discussed in further detail in **Section 4.3.3** below, the installation of the dual composite liner and leachate collection system at the Ash Surge Basin and Metal Cleaning Basin will effectively control potential seepage from the units into the underlying soil/groundwater. Once the potential seepage is controlled, the groundwater flow/contaminant transport model as discussed throughout this document and presented in **Appendix A**

indicates that the GWPS will be achieved within a reasonable time period comprised of less than 8-10 years. MNA is appropriate when paired with other source control remedies for the Site because Site data indicates that there is no threat to human health or the environment posed by the existing conditions, while implementation of the remedy, and once reviewed and approved by the Illinois EPA, will only further improve groundwater quality downgradient of the Ash Surge Basin and Metal Cleaning Basin.

Potential feasible groundwater remedies have been identified in the prior CMA Report, as listed above in **Section 3.2**. The next step to be accomplished within the CAP is a comprehensive evaluation of the potential remedies to support the selection of the above specific remedy.

4.3 Selected Remedy Criteria

The following sections present a description documenting how the selected remedy meets the criteria listed in 35 IAC 845.670(d).

4.3.1 Protection of Human Health and Environment

The remedy selected protects human health and the environment by effectively controlling the assumed source of the releases with an upgraded dual composite impermeable barrier liner and leachate collection system. The dual composite liner will be installed above an existing 60-mil geomembrane liner, effectively resulting in a triple impermeable liner. The remedy will achieve groundwater protection standards, primarily because it will further control the source of the releases at the Ash Surge Basin and Metal Cleaning Basin. Finally, wastes produced during the installation of the new dual composite liner and leachate collection system will be managed as specified in 35 IAC 845.680(d).

The mere presence of certain constituents in the groundwater at concentrations above a GWPS is only one of the components needed for a complete exposure pathway that could theoretically pose an unacceptable risk to human health. In order for an unacceptable risk to be posed by the impacted groundwater, there must be a viable pathway by which the impacts could reach receptor(s) and receptor(s) must also be present and be exposed to the impacted groundwater. As described in more detail below, there is not a complete pathway by which impacted groundwater downgradient of these units will pose an unacceptable threat to human health or the environment.

4.3.1.1 Exposure Scenarios

Potential human exposure to impacted groundwater could theoretically occur as follows:

1. Human ingestion of impacted groundwater, through potable use.
2. Human dermal contact of impacted groundwater, through potable use.
3. Human inhalation of vapors emanating from impacted groundwater.

4. Human ingestion or dermal contact while exposed to impacted groundwater during environmental sampling.

Potential potable use of groundwater downgradient of the Ash Surge Basin and Metal Cleaning Basin has been previously investigated as part of various prior permitting efforts at the Site, including the Construction Permit Applications for the Operating Permit and the Construction Permit Application for the Ash Surge Basin and Metal Cleaning Basin retrofits. While groundwater at the Site is considered Class I Potable Resource Groundwater in accordance with 35 IAC 620.210, an Environmental Land Use Control (ELUC) and a Groundwater Management Zone (GMZ) have been established at the Site. An ELUC is a legal instrument that is permanently attached to the property deed prohibiting groundwater use for potable purposes. An ELUC is an acceptable institutional control for addressing the Groundwater Ingestion Pathway under the 35 IAC 742 TACO regulations. The aerial extent of the established and approved GMZ and ELUC are provided on **Figure 1** and occupy the same extent of the Powerton property.

Multiple investigations/surveys have also been conducted concerning water wells within proximity of the Ash Surge Basin and Metal Cleaning Basin. These surveys indicate there is no risk to human health or the environment posed by the impacted groundwater immediately downgradient of the Ash Surge Basin and Metal Cleaning Basin.

A survey of potable water sources within a 2,500-foot radius of the Site was performed in 2009. The following databases and sources of information were consulted to assess community water source and water well locations in the vicinity of the Ash Surge Basin and Metal Cleaning Basin:

- 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.

In support of preparation of the initial operating permit application for the Ash Surge Basin and Metal Cleaning Basin pursuant to 35 IAC 845.230(d), additional water well research was conducted in 2021-22. This included review of the Illinois State Geological Survey database and interactive map reference, "ILWATER". The survey results are presented in the prior Operating Permit Applications submitted to Illinois EPA (KPRG, 2021 and KPRG, 2022). Twelve wells were identified from this research within a 2,500-foot radius of the units. Two wells are off-site to the east and upgradient of the Ash Surge Basin and Metal Cleaning Basin and thus not affected by Site groundwater. Eight wells were identified during this research on the Station's property on the ILWATER interactive map, each an older well installed by previous ownership. Prior discussions with facility personnel indicate that all eight of these wells were previously 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 prior evaluation) are part of the six water wells currently on Station

property that are in use (the remaining four wells are located further west, outside the 2,500-foot search radius). Wells 9 and 10 are screened within the sand/gravel aquifer, but are upgradient and/or side-gradient of the Ash Surge Basin or Metal Cleaning Basin. Wells 9 and 10 are also separated from the Ash Surge Basin and Metal Cleaning Basin by the Station's former Intake Canal and Discharge Canal. Wells 9 and 10 are regularly sampled and analyzed for potable water constituents and the results have consistently been in compliance with potable water regulations.

The above-information documents that there are no potential receptors downgradient of the Ash Surge Basin and Metal Cleaning Basin that could use impacted groundwater in a potable manner for ingestion or be exposed to dermal contact of impacted groundwater. Thus, the human exposure to impacted groundwater pathway is incomplete.

The constituents of concern identified in the groundwater at concentrations above the GWPS are limited to naturally occurring inorganic constituents that are not volatile and therefore will not produce organic vapors. Therefore, the human inhalation of groundwater vapors pathway is incomplete and not a concern at the Site.

Potential human contact with impacted groundwater could possibly occur during regular environmental sampling of the groundwater. However, groundwater sampling activities are subject to the Safety and Health Plan (SHP) presented in the Construction Permit Application for the Site Operating Permit. This SHP specifies that the work is to be performed using appropriate personal protective equipment (PPE) that will safeguard the sampling team from exposure to impacted groundwater. The SHP also requires various training, including the Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements of 29 CFR 1910.120, OSHA 10 Hour or 30 Hour Voluntary Compliance Training for Construction, and the Hazard Communication 29 CFR 1910.1200. Implementing the groundwater sampling pursuant to the SHP addresses concerns associated with human dermal contact or ingestion during implementation of the regular groundwater sampling program.

4.3.1.2 Ecological Exposure

Impacted groundwater only presents a potential significant concern to ecological receptors once the groundwater discharges to surface water. The nearest surface water to the Ash Surge Basin and Metal Cleaning Basin is the Former Intake Canal for the station, located just west of the Metal Cleaning Basin, and extending north to the Illinois River. The Discharge Canal is located farther to the west of the Former Intake Canal, and also extends to the north into the Illinois River. Both of these channels are man-made and unlikely to represent high quality ecological habitat. Nevertheless, potential ecological receptors associated with these surface water features could theoretically include benthic organisms in the sediment or aquatic organisms.

The N&E Evaluation confirmed that groundwater flowing towards the Former Intake Canal has not impacted sediment pore water or surface water within the Former Intake Canal. Surface water data collected during the N&E Evaluation were compared against General Use (Surface) Water Quality Standards, and no exceedances were observed (KPRG, 2025A). Therefore, the existing groundwater conditions do not present a threat to ecological receptors.

4.3.2 Attainment of Groundwater Protection Standards

In order to assist in the demonstration that the selected remedy will attain GWPS, groundwater modeling was performed, as required by 35 IAC 845.220(c). This regulation requires that the following items be included in Construction Permit Applications for Corrective Action Construction relative to groundwater modeling:

- Results of groundwater contaminant transport modeling and calculations showing how the corrective action will achieve compliance with the applicable groundwater standards;
- All modeling inputs and assumptions;
- Description of the fate and transport of contaminants with the selected corrective action over time; and
- Capture zone modeling, if applicable.

While Site data indicates only limited areas exhibit concentrations of constituents above the GWPS, a conservative model was built that likely overestimates the groundwater impacts caused by the units. The model is based on a theoretical distribution of dissolved contaminants beneath the Ash Surge Basin and Metal Cleaning Basin, assuming these units are the source of the groundwater impacts identified to date. The modeling investigates theoretical, potential impacts from these units, conservatively assuming that the units constantly contain both CCR and water and that a liner is non-existent. These assumptions make for a conservative model because:

- The units have actually had some form of liner since the late 1970s and upgraded geomembrane liners were installed in the early 2010s.
- Most of the CCR materials were removed from the units in 2024 and they have not been regularly utilized for treatment of CCR since 2024.
- A recent leak location survey performed in 2025 identified only localized compromises in the existing geomembrane liner that were repaired shortly after identification.

To conduct the support modeling, the initial baseline model simulation consisted of a theoretical unit source with a concentration of “1” beneath the entire footprint of the units. Although statistically significant increases have only recently been identified, the baseline model conservatively assumes that

the units have been serving as a source of impacts since the existing geomembrane liners were added in the early 2010s. Accordingly, a 15-year transport simulation with advection and dispersion, with a steady-state flow model was run to establish hypothetical baseline concentrations in groundwater in the vicinity of the units. This equilibrated distribution (baseline case) of the mass was then used as the initial concentrations in the groundwater for model runs to simulate the positive influence on groundwater quality resulting from the proposed corrective action, in comparison to the baseline case scenario.

The groundwater modeling inputs and parameters are discussed further in the groundwater modeling report in **Appendix A** of this CAP.

The installation of the dual composite liner comprised of a geomembrane underlain by a GCL substantially reduces the potential for seepage into the subsurface beneath the units. These calculations are presented in greater detail in **Section 4.3.3** below. The groundwater modeling results indicate that the proposed remedy will reduce the hypothetical groundwater concentrations beneath the Site approximately to 40-50% of the original concentrations at the source with further reduction at the Illinois River within 5 years. Further, only minimal dissolved mass remains at the Illinois River within 25-30 years. Finally, the GWPS will be achieved at the various monitoring wells currently exhibiting concentrations above the GWPS within less than 8-10 years after installation of the retrofitted dual composite liners. For the reasons discussed above, these model estimated timeframes are conservative estimates. The actual groundwater conditions may result in attainment of the GWPS within a shorter time than indicated by the model.

4.3.3 Source Control and Removal of Contaminated Material

The installation of the dual composite liner and leachate collection system intended to be constructed on top of the existing geomembrane liners will result in a triple impermeable liner system. The quantity of potential seepage through the proposed new dual composite liner system is discussed below. This triple liner system will only serve as a further safeguard against potential future seepage from the units, if they are put back into use for CCR sluicing/treatment.

The flux/seepage through the retrofitted dual liner system has been evaluated using the Giroud and Bonaparte (1997) methodology, which accounts for pressure head-dependent flux (i.e., flow) through geomembrane defects, instead of permeation through the geosynthetic materials themselves. This methodology provides a more conservative analysis, acknowledging that perfect installation of a composite liner in the field is unrealistic and as a result, in practice, flow is driven by installation defects instead of permeation through the materials themselves. The Revised Giroud Equation³ estimates flow through defects in a geomembrane liner as a function of:

³ Giroud, J.P., 1997, "Equations for Calculating the Rate of Liquid Migration Through Composite Liners Due to Geomembrane Defects", *Geosynthetics International*, Vol. 4, Nos. 3-4, pp. 335-348.

- Hydraulic head on the liner
- Geomembrane and underlying barrier soil/material interface conditions (good vs. poor contact)
- Hydraulic conductivity of the layer beneath the geomembrane
- Defect frequency and size

The generalized Giroud equation takes the following forms:

Good Contact between geomembrane and underlying layer

$$q = 0.21 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_S^{0.74})$$

Poor Contact between geomembrane and underlying layer

$$q = 1.15 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_S^{0.74})$$

Based on the above equations, flow through a composite liner is strongly influenced by head (h) and the resulting hydraulic gradient across the liner system, rather than assuming a simple Darcy flux through a perfectly intact geomembrane barrier. This method is widely accepted for composite liner performance evaluation and is more representative of field conditions where seepage is controlled by discrete defects, rather than permeation through the geomembrane and GCL layers.

The following key parameters were used in the seepage calculations through the retrofit dual composite liner:

- Liquid head in basin based on operating practices: 2 feet
- GCL Liner thickness: 0.25 inches
- Geomembrane defect density: 4 holes per acre⁴
- Geomembrane defect area: 1 cm² per defect⁵
- GCL Hydraulic conductivity: ~1×10⁻⁹ cm/sec

⁴ UEPA, 1994, "The Hydrologic Evaluation of Landfill Performance (HELP) Model, User's Guide for Version 3", EPA United States Environmental Protection Agency, EPA/600/B-94/168a, September 1994.

⁵ Giroud et al. 1994, "Evaluation of landfill liners." *Proc., 5th Int. Conf. on Geotextiles, Geomembranes, and Related Products*, International Geosynthetics Society, Minneapolis, 981-986.

The calculations produced the following flow rates through the composite liner (see **Appendix B**). The seepage rate is reported in three different units: (1) Metric unit flux rate, (2) English unit flux rate, and (3) Metric unit rate.

Calculated Liner Seepage Rates – Proposed Composite Retrofit Liner			
Liquid Dept (feet)	Seepage Rate (m ³ /sec*acre)	Seepage Rate (gal/day*acre)	Seepage Rate (mm/year)
<i>Good Liner Contact</i>			
2.0	1.34 x 10 ⁻⁸	0.306	0.104
<i>Poor Liner Contact</i>			
2.0	7.34 x 10 ⁻⁸	1.674	0.572

To quantify the improved source control efficiency of the proposed retrofit dual composite liner, the same calculations/methodology as above were used to calculate seepage through the existing (single) geomembrane liner. According to the as-built drawings developed after installation of the existing geomembranes, a 16-oz nonwoven geotextile underlies the 60 mil HDPE geomembrane. This layer is not intended to be a low permeability liner, but instead functions more like a drainage layer. Accordingly, the hydraulic conductivity of this geotextile is assumed to be 1 x 10⁻² cm/sec.

The following key parameters were used in the seepage calculations through the existing single geomembrane liner:

- Liquid head in basin based on operating practices: 2 feet
- Geotextile layer thickness: 0.118 inches
- Geomembrane defect density: 4 holes per acre⁶
- Geomembrane defect area: 1 cm² per defect⁷
- Geotextile Hydraulic conductivity: ~1x10⁻² cm/sec

The calculations produced the following flow rates through the single geomembrane liner.

Calculated Liner Seepage Rates – Existing Single Geomembrane Liner			
Liquid Dept (feet)	Seepage Rate (m ³ /sec*acre)	Seepage Rate (gal/day*acre)	Seepage Rate (mm/year)
<i>Good Liner Contact</i>			

⁶ UEPA, 1994, "The Hydrologic Evaluation of Landfill Performance (HELP) Model, User's Guide for Version 3", EPA United States Environmental Protection Agency, EPA/600/B-94/168a, September 1994.

⁷ Giroud et al. 1994, "Evaluation of landfill liners." *Proc., 5th Int. Conf. on Geotextiles, Geomembranes, and Related Products*, International Geosynthetics Society, Minneapolis, 981-986.

Calculated Liner Seepage Rates – Existing Single Geomembrane Liner			
Liquid Dept (feet)	Seepage Rate (m ³ /sec*acre)	Seepage Rate (gal/day*acre)	Seepage Rate (mm/year)
2.0	3.90 x 10 ⁻³	88,851	30,368
<i>Poor Liner Contact</i>			
2.0	2.13 x 10 ⁻²	486,566	166,302

Based on the above calculations, the dual composite liner proposed to be installed during the basin retrofits will cutoff over 99.99% of the potential seepage that is theoretically occurring through the existing single geomembrane liner. Thus, the proposed retrofit composite liner will serve as an extremely efficient means of source control.

4.3.4 Waste Management

During installation of the retrofit dual composite liners and leachate collection system, as indicated in the Construction Permit Applications submitted to Illinois EPA in July 2023, CCR waste materials produced will be managed in accordance with applicable provisions of the Resource Conservation and Recovery Act (RCRA) and all applicable standards, including 35 IAC 845.680(d). To the extent CCR materials currently remain in the units, they will be removed, dewatered, and sent off-site to a permitted landfill or a beneficial use site located in Canton, IL.

4.4 Remedy Selection Factors

The CMA was the first step in the process of developing and eventually implementing a groundwater remedy. It's possible that multiple potential remedies could be identified as potentially effective at achieving the corrective action objectives outlined in 35 IAC 845.670. Thus, following the CMA, the Site must evaluate the remedial options using the corrective action objectives listed above in **Section 1.3**.

In selecting a remedy plan to meet the above objectives, criteria are set forth in 35 IAC 845.670(e) to weigh which option(s) are most appropriate based on site-specific conditions. The factors include the following:

- 1) The long- and short-term effectiveness and protectiveness of each potential remedy, along with the degree of certainty that the remedy will prove successful based on consideration of the following:
 - a) Magnitude of reduction of existing risks;
 - b) Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;
 - c) The type and degree of long-term management required, including monitoring operation, and maintenance;

- d) Short-term risks that might be posed to the community or environment during implementation of a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminants;
 - e) Time until groundwater protection standards in 35 IAC 845.600 are achieved;
 - f) The potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, containment, or changes in groundwater flow;
 - g) The long-term reliability of the engineering and institutional controls, including an analysis of any off-site, nearby destabilizing activities; and
 - h) Potential need for replacement of the remedy.
- 2) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following potential factors:
- a) The extent to which containment practices will reduce further releases; and
 - b) The extent to which treatment technologies may be used.
- 3) The ease or difficulty of implementing each potential remedy based on consideration of the following types of factors:
- a) Degree of difficulty associated with constructing the technology;
 - b) Expected operational reliability of the technologies;
 - c) Need to coordinate with and obtain necessary approvals and permits from other agencies;
 - d) Availability of necessary equipment and specialists; and
 - e) Available capacity and location of needed treatment, storage, and disposal services.
- 4) The degree to which community concerns are addressed by each potential remedy.

The regulations do not indicate that any of the specific factors identified in 35 IAC 845.670(e) are given greater weight over others. After balancing the various factors, the rules provide facilities with discretion in selecting the final remedy plan, so long as it will achieve the remedial objectives in 35 IAC 845.670(d). Therefore, faster and/or more aggressive technologies may not always comprise the most suitable options for a Site.

The following sections explain how the selected remedy meets the above factors.

4.5 Corrective Action Alternatives Analysis

A summary of the corrective action alternatives analysis illustrating the pros and cons of each alternative is presented in **Table 1** and a more detailed discussion is presented below. The positive/neutral/negative grades listed in **Table 1** are assigned assuming that each alternative was implemented as a stand-alone option, even though the remedy being proposed is a combination of corrective action alternatives #1

(Capping of Ash Surge Basin Weir Wall), #2 (Basin Retrofit), and #4 (Monitored Natural Attenuation). The proposed collective remedy stacks the benefits of the most beneficial corrective measures alternatives together to result in an overall remedy that meets the applicable regulatory criteria presented in 35 IAC 845.670.

The discussion below documents how the selected remedy meets the corrective action standards in 35 IAC 845.670(d), considering the evaluation factors presented in 35 IAC 845.670(e).

4.5.1 Short/Long-Term Effectiveness/Protectiveness and Probability of Success

According to 35 IAC 845.670(e)(1), the long- and short-term effectiveness and protectiveness of the potential remedy, along with the degree of certainty that the remedy will prove successful is to be an evaluation factor considered in the corrective action alternatives analysis. This evaluation is based on consideration of the factors listed below.

4.5.1.1 Risk Reduction

Both the capping of the Ash Surge Basin weir wall and basin retrofits with a dual composite liner and leachate collection system will essentially eliminate the potential seepage through the units (and thus control the source), which will result in almost immediate effectiveness, once the construction is completed. Regular inspections and maintenance will continue on the retrofitted units, which will result in the long-term effectiveness of the remedy. Implementation of monitored natural attenuation in combination with the above source control measures will effectively address residual groundwater impacts downgradient of the Ash Surge Basin and Metals Cleaning Basin.

Implementation of the combination of the capping of the Ash Surge Basin weir wall, basin retrofit, with monitored natural attenuation of groundwater downgradient of the units offers a high degree of certainty in achieving the GWPS of all the alternatives considered. The source reduction measures are expected to remain in place until the units are closed, or beyond, depending on the ultimate method of closure.

4.5.1.2 Residual Risks

Even under the existing conditions that exhibit concentrations of certain constituents above the GWPS downgradient of the basins, because of various institutional controls in place at the Site, as discussed in **Section 4.3.1**, there is minimal risk to human health and the data gathered during the N&E investigations has indicated that there is minimal risk to ecological receptors. Safe work practices and other health and safety planning associated with the planned basin retrofits will further minimize risks to workers performing the corrective actions. Workers will be properly trained and outfitted with all necessary PPE to ensure exposures are minimized.

While CCR material has already largely been removed from the Ash Surge Basin and Metal Cleaning Basin and neither unit is regularly operating, to the extent that residual CCR materials remain, these source

materials will be controlled through the installation of the basin retrofits and capping of the Ash Surge Basin weir wall. The residual CCR material will be further addressed when the units are formally closed under 35 IAC 845. Implementation of the selected remedy will adequately control existing risk until closure.

There will be no residual risk associated with implementation of monitored natural attenuation because there is no complete pathway for exposure of humans to impacted groundwater and the data collected during the N&E investigation has indicated there is minimal risk to ecological receptors.

4.5.1.3 Long-Term Monitoring and O&M

Regular inspections and maintenance of the retrofitted composite liners and leachate collection systems will be required until closure, including an annual inspection by a certified Professional Engineer. However, given that the inspection and maintenance program is already required by the Illinois CCR Rules and has been implemented since promulgation of these regulations in 2021, the O&M program will be relatively easy to implement.

The expected reductions to constituent concentrations in groundwater to be achieved through MNA will be tracked based on ongoing quarterly groundwater monitoring. Quarterly groundwater monitoring will continue under the Illinois CCR rule 35 IAC 845 throughout the remaining active life, during closure, and post-closure until the groundwater protection standards are attained for a period of three consecutive years pursuant to 35 IAC 845.680(c)(2). The groundwater contaminant transport modeling suggests that the groundwater protection standards should be attained within less than 8-10 years.

4.5.1.4 Short-Term Risks To Community During Remedy Implementation

Installation of the retrofit dual composite liner and leachate collection systems and capping of the Ash Surge Basin weir wall will have a minimal short-term risk to the community during remedy implementation. If any CCR material needs to be removed from the Site for transportation to appropriate off-site recycling/reuse/disposal facilities, the transportation will be performed by properly licensed carriers under proper manifests. Implementation of MNA will pose no short-term risk to the community because the impacted groundwater is confined to the Site boundaries and there are no complete exposure pathways that would present an unacceptable risk to the community.

4.5.1.5 Time to Groundwater Protection Standards Achieved

The groundwater contaminant transport modeling presented in **Appendix A** of this CAP indicates that the proposed corrective action will reduce the hypothetical groundwater concentrations beneath the Site to approximately 40-50% of the original concentrations at the source or less at the Illinois River within 5 years. Further, only minimal dissolved mass will remain at the Illinois River within 25-30 years. The groundwater model also indicates that the concentrations of the CCR constituents will be reduced below

the GWPS at the monitoring wells exhibiting exceedances within less than 8-10 years of the installation of the retrofit liner and leachate collection system.

4.5.1.6 Potential Exposure of Humans and Environmental Receptors

As described above in **Section 4.3.1**, implementation of the selected remedy will result in minimal potential for exposure of humans and environmental receptors.

4.5.1.7 Long-Term Reliability of Engineering/Institutional Controls

The dual composite liner system that would be installed during the basin retrofits is offered as an engineering control option in the Illinois CCR Rules because it is proven to be an effective, reliable, and durable means for installation of an impermeable barrier to prevent liquids, gases, and wastes from seeping into the surrounding soil or groundwater. These geosynthetic materials have been used successfully for decades at thousands of sites, including liquid containment facilities, landfills, and remediation sites. Similarly, the leachate collection system is also a requirement of the Illinois CCR Rules for surface impoundments to continue operating and has also proven to be a safe and effective long-term option for collection of liquid leachate.

The institutional controls that have been implemented at the Site to control human exposure to potentially impacted groundwater (i.e., ELUC/GMZ) have also proven to be effective in the long-term and are referenced as tools in various environmental regulations at the state and federal levels, including the Illinois TACO regulations.

4.5.1.8 Potential Need For Remedy Replacement

Ongoing research estimates that the geosynthetics included in the proposed retrofit dual liner and leachate collection system can last hundreds of years, when covered. This projected longevity is well beyond the current expected operational life of the facility. Once the basins are no longer needed to support power production at the Site, they will be closed under the Illinois CCR Rules. Accordingly, the need for replacement of the remedy is believed to be extremely small during the remaining active lifetime of these basins. However, groundwater monitoring will continue to be performed as part of the MNA remedy for the remaining active life, during closure, and during the post-closure period until the groundwater protection standards are consistently achieved pursuant to the Illinois CCR Rules.

4.5.2 Source Control Effectiveness

Pursuant to 35 IAC 845.670(e)(2), the effectiveness of the remedy in controlling the source to reduce further releases is to be considered in the corrective action alternatives analysis.

To the extent that seepage is occurring from the CCR units, installation of the dual composite liner system as part of the basin retrofits has been shown to cut off nearly all seepage from the basins into the

underlying soils and groundwater. The expected seepage (i.e., flux) through the composite liner system has been quantified based on the analysis presented above in **Section 4.3.3**.

4.5.2.1 Extent Containment Reduces Further Releases

The seepage calculations presented above in **Section 4.3.3** indicate that practically no seepage will occur through the proposed dual composite geomembrane/GCL liner, in comparison to the potentially minimal seepage occurring through the existing single geomembrane liner. The groundwater model indicates that once the source is essentially cut off by the retrofit liner installation, groundwater quality will consistently improve so that the GWPS are achieved in a reasonable time period of less than 8-10 years.

4.5.2.2 Treatment Technologies

Because the installation of the dual composite liners will control nearly all seepage from the basins as documented in the calculations presented in **Section 4.3.3**, there is no need for further treatment to control the source.

4.5.3 Implementability

According to 35 IAC 845.670(e)(3), the ease or difficulty of implementing the potential remedies is to be an evaluation factor considered in the corrective action alternatives analysis.

The technology for the dual composite liner and leachate collection system has been proven over many decades of use for varying different environmental applications across the country. These types of dual composite liners and leachate collection systems have proven to be reliable and are commonly installed to comply with various environmental regulations, including land regulations applying to solid and hazardous waste landfills, as well as water regulations applying to various types of ponds and/or surface impoundments. The construction quality assurance (CQA) procedures have also been well-established, which will verify that the liners and leachate collection system are installed in accordance with standard industry accepted protocols, the Illinois CCR regulations, and the Operating Permit. The CQA will be performed under the direction of an Illinois licensed Professional Engineer (P.E.) and the CQA Report will also be signed and stamped by an Illinois P.E.

This CAP is being submitted as part of a construction permit application to the Illinois EPA. Accordingly, implementation of the selected remedy will not be initiated in the field until a construction permit is issued by the Illinois EPA. Other than this construction permit from the Illinois EPA, no other approval or permits from other government agencies are expected to be required to implement the selected remedy presented in this CAP.

Once a construction permit has been issued by Illinois EPA, the basin retrofits will be installed by a contractor hired by MWG. As these types of liners and leachate collection systems have been utilized for decades across the country, contractors and equipment necessary to perform the work are expected to

be readily available. To the extent to which off-site treatment, storage, disposal or reuse facilities may be needed to receive CCR materials generated during the basin retrofits, those facilities should also be readily available, given that the majority of the CCR materials have already been removed from the basins.

4.5.4 Community Concerns

According to 35 IAC 845.670(e)(4), the degree to which community concerns are addressed is to be an evaluation factor included in the corrective action alternatives analysis.

On July 6-7, 2026, MWG held two in-person public meetings in the vicinity of the Site to present and discuss the current Site conditions and both potential and preferred remedial actions for the Ash Surge Basin and Metals Cleaning Basin to address the identified groundwater impacts. The meeting was held in accordance with 35 IAC 845.670(b) as part of the Illinois CCR Rule requirements to gather public input and incorporate that information into the final remedy selection. After an introduction and approximate 60-minute presentation on the proposed groundwater corrective action plans, the public was afforded the opportunity to ask questions concerning the proposed corrective action plan.

Some questions and comments from the public were directly related to the proposed groundwater corrective action plan, while others pertained to different topics. The questions and comments received from the public during the above public meetings pertained to the following subjects:

- Retrofit Design and Process
- Groundwater Monitoring and Modeling
- Groundwater Corrective Action Plan
- NPDES Permit
- Ash Handling

A summary of the above public meetings is presented in **Appendix C** of this CAP. This summary presents the questions posed by the public and additional information being provided in response to the questions. This summary has also been posted on MWG's CCR public website, www.midwestgenerationllc.com.

After careful consideration of the questions and comments received during the above public meetings, this Corrective Action Plan is proposing the groundwater corrective action for the Metal Cleaning Basin and Ash Surge Basin as described herein. As discussed in this Corrective Action Plan and during the above public meetings, the proposed corrective action consists of a combination of three different corrective action alternatives previously presented in the Corrective Measures Assessment Report. The proposed corrective action remains subject to regulatory review and approval and also prioritizes the environment and community well-being.

5 SCHEDULE

The owner or operator must specify, as part of the Corrective Action Plan, a schedule for implementing and completing remedial activities. The schedule must require completion of remedial activities within a reasonable time, taking into consideration the factors listed in 35 IAC 845.670(f), including:

- Nature and extent of the groundwater impacts, as determined by prior characterization efforts;
- Reasonable probability of the remedial technologies achieving compliance with the GWPS and other objectives of the remedy;
- Availability of treatment or disposal capacity for CCR managed during implementation of the remedy,
- Potential risks to human health and the environment from exposure to contamination before completion of the remedy; and
- Resource value of the aquifer.

MWG estimates that after receipt of the construction permit from Illinois EPA, it will take approximately 7-8 months to retrofit the Metal Cleaning Basin and an additional approximately 12-13 months to retrofit the Ash Surge Basin (i.e., these will be done consecutively and not concurrently due to working area constraints). This schedule is weather-dependent. The following tables provide more detailed planning level schedules for retrofitting both the Metal Cleaning Basin and Ash Surge Basin.

Table 5-1: Planning Level Schedule for Retrofitting the Metal Cleaning Basin

Activity	Estimated Duration
Prepare Retrofit Construction Design Documents	2 Months
Obtain Retrofit Construction Permit from Illinois EPA	Based on Agency Workload
Hire Contractor for Retrofit Activities in Accordance with Illinois EPA Permit	4 Months
Remove Protective Granular Layers Above Existing Liner	2 Weeks
Decontaminate Existing Liner and Basin Appurtenances (Including Laboratory Testing)	6 Weeks
Obtain Approval from Illinois EPA to Re-Use Existing Liner as Supplemental Liner	Based on Agency Workload
Install Composite Liner System	2 Weeks
Install Leachate Collection/Removal System (including Filter and Protective Layers)	2 Weeks
Submit Retrofit Completion Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Retrofit Completion Report and Certification from Illinois EPA	Based on Agency Workload

Table 5-2: Planning Level Schedule for Retrofitting the Ash Surge Basin

Activity	Estimated Duration
Prepare Retrofit Construction Design Documents	2 Months
Obtain Retrofit Construction Permit from Illinois EPA	Based on Agency Workload
Hire Contractor for Retrofit Activities in Accordance with Illinois EPA Permit	4 Months
Remove Protective Granular Layers Above Existing Liner	1 Month
Decontaminate Existing Liner and Basin Appurtenances (Including Laboratory Testing)	3 Months
Obtain Approval from Illinois EPA to Re-Use Existing Liner as Supplemental Liner	Based on Agency Workload
Install Composite Liner System	6 Weeks
Install Leachate Collection/Removal System (including Filter and Protective Layers)	6 Weeks
Submit Retrofit Completion Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Retrofit Completion Report and Certification from Illinois EPA	Based on Agency Workload

The capping of the Ash Surge Basin weir wall will likely take place in parallel with the retrofitting and will be completed within the same 12-13 month timeframe, following receipt of the construction permit from the Illinois EPA.

5.1 Nature and Extent of Impacts

The schedule presented above is deemed to represent a reasonable and timely response based on the extent and nature of groundwater impacts as identified during the ongoing regular quarterly groundwater monitoring activities and supplemental nature and extent data collection activities. The nature and extent data indicates that groundwater impacts from the Ash Surge Basin and Metal Cleaning Basin have been adequately characterized and shown not to pose a substantial risk to human health or the environment to on-site or off-site receptors.

5.2 Reasonable Probability of Achieving Compliance

The numerical groundwater modeling presented in **Appendix A** of this CAP indicates that the proposed corrective action consisting of multiple alternatives described herein will result in a high probability of achieving compliance with GWPS within a relatively short time period following installation of the dual composite liners. According to the numerical groundwater model, following installation of the retrofit composite liners, the GWPS will be attained within approximately 2 to 10 years or less.

The calculations and groundwater monitoring included in this CAP demonstrate that the combination of source control remedial alternatives and monitored natural attenuation have a high probability of achieving compliance with the GWPS in a time frame that may be even shorter than the results exhibited from the groundwater model. This is because the starting aquifer conditions in the groundwater model likely overestimate the extent of groundwater impacts, which means that the GWPS will likely be achieved sooner than predicted by the model.

5.3 Disposal Capacity

While only minimal CCR remains in both the Metal Cleaning Basin and the Ash Surge Basin, there is adequate availability of disposal capacity to handle CCR that may be generated during implementation of the corrective action program described herein. To the extent that CCR remains in the units, it will be removed during the retrofit process and either beneficially reused at a local site or sent off-site to a permitted landfill.

5.4 Potential Risks to Human Health and Environment

The discussion in **Section 4.3.1** pertaining to protection of human health and the environment demonstrates that there is currently no risk to human health or the environment resulting from the existing groundwater conditions. The human health and ecological exposure pathways are incomplete. Consequently, there is not a heightened urgency to immediately address an imminent threat associated with the groundwater conditions to keep human or ecological receptors safe.

5.5 Resource Value of the Aquifer

The portion of the aquifer located downgradient of the Metal Cleaning Basin and Ash Surge Basin prior to discharge into the local surface water bodies is not currently utilized for residential, agricultural, commercial industrial, or ecological purposes. Potential future use of this portion of the aquifer is prohibited by the Environmental Land Use Control (ELUC). Therefore, the current resource value of the aquifer is limited.

Due to the hydrogeologic characteristics of the facility and surrounding land, there is adequate available water supply. The facility utilizes six water wells up and/or side-gradient of the Metal Cleaning Basin or Ash Surge Basin, which are installed outside the ELUC area and approximately 2,500 feet or more to the southwest of the Metal Cleaning Basin. The six water wells are regularly sampled and analyzed for an extensive list of constituents of concern to verify that the water can continue to be used for potable purposes. This data is regularly provided to the Illinois Department of Public Health. The historical sampling has included metals, nitrite/nitrate, cyanide, E coli, coliform, volatile organic chemicals, synthetic organic chemicals (including semi-volatile chemicals, polychlorinated biphenyls, pesticides, and herbicides), as well as per- and polyfluoroalkyl substances. These groundwater results from the six wells have consistently indicated that the groundwater meets potable water standards. Facility operations have withdrawn approximately 3.8M cubic meters of groundwater for employee/sanitary and industrial use in 2025.

As described in this Corrective Action Plan, the data collected during the regular quarterly groundwater monitoring from the Operating Permit monitoring wells surrounding the Ash Surge Basin and Metals Cleaning Basin listed in the Operating Permit, supplemented with the data collected during the nature and extent evaluation has indicated minimal impact to the subsurface ecosystem, wildlife, other natural

resources, crops, vegetation, and physical structures caused by exposure to CCR constituents detected in the groundwater.

In closing, effective elimination of the source via the installation of the retrofit dual composite liner system paired with monitored natural attenuation is expected to restore the resource value of the aquifer. The existing owner is expected to retain ownership of the Site into the foreseeable future. It's expected that future Site operations will include some period of continued power generation, followed by closure of the CCR units, and a post-closure care period during which operation and maintenance activities on the CCR units will continue to be performed, along with groundwater monitoring.

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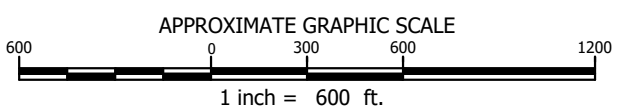
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Figures

LEGEND

- PROPERTY NOT OWNED BY MWG
- APPROXIMATE EXTENT OF ENVIRONMENTAL LAND USE CONTROL (ELUC)
- APPROXIMATE EXTENT OF GROUNDWATER MANAGEMENT ZONE (GMZ)
- APPROXIMATE CCR PONDS
- POND SUBJECT OF CORRECTIVE MEASURES ASSESSMENT BASED ON RESULTS OF THE NATURE AND EXTENT EVALUATION

NOTE: ASH SURGE BASIN, BYPASS BASIN, AND FORMER ASH BASIN ARE SUBJECT TO FEDERAL AND STATE CCR RULES.



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SITE LAYOUT MAP - POWERTON STATION

13082 E. MANITO ROAD
PEKIN, IL

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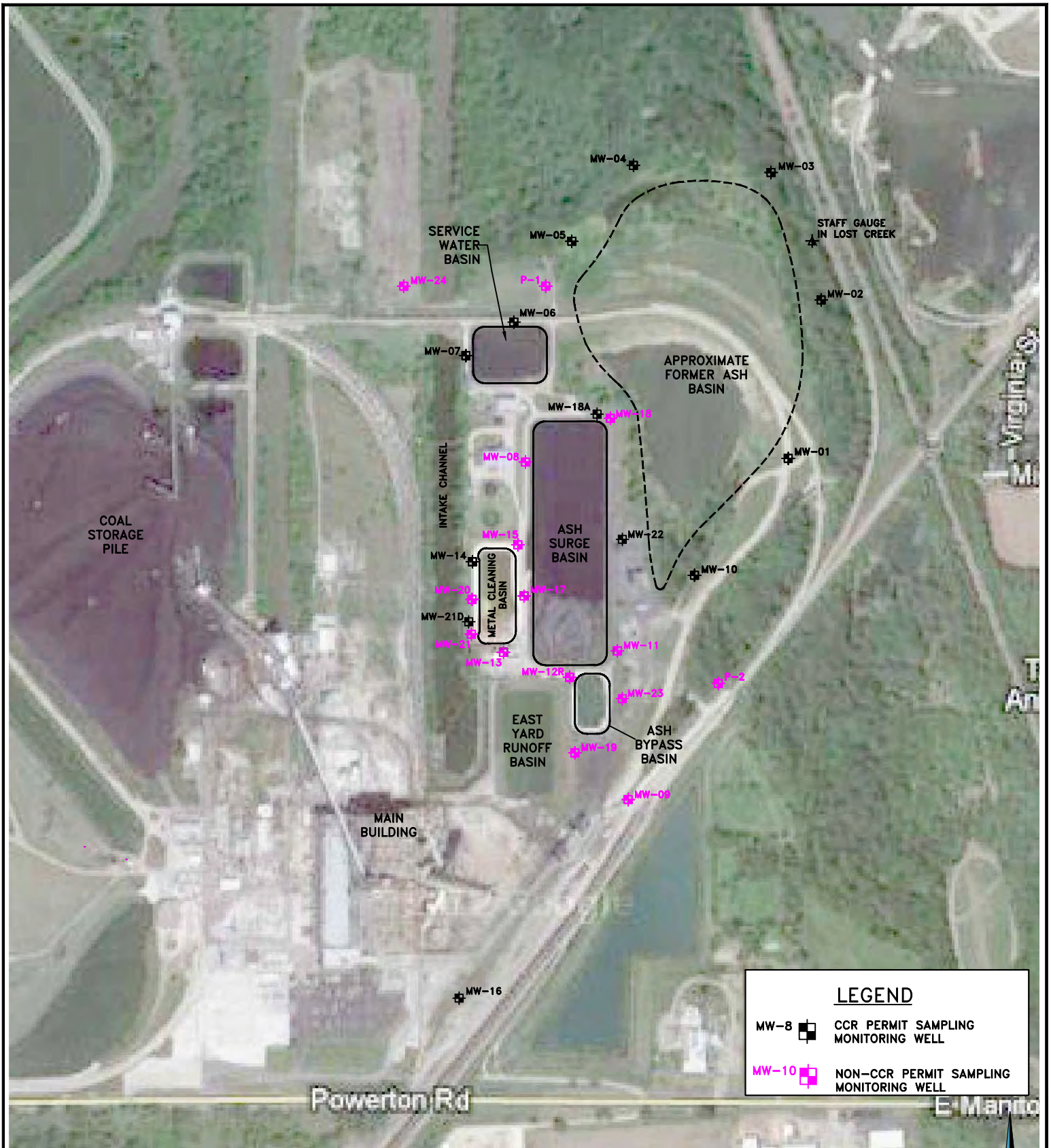


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FILE:	5053-300
CAD:	PowertonSite2026.dwg

FIGURE 1



SOURCE: IMAGE ADAPTED FROM KPRG CCR PERMIT MONITORING WELL SITE MAP
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PREPARED FOR:

POWERTON STATION

GROUNDWATER MONITORING NETWORK POWERTON STATION PEKIN, ILLINOIS

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FIGURE 2

Tables

Table 1 Corrective Action Alternatives Analysis Powerton Generating Station Pekin, IL								
Evaluation Factors and applicable regulation		Corrective Action Alternatives Presented in Corrective Measures Assessment						
		#1: Capping of the Ash Surge Basin Weir Wall	#2: Basin Retrofit	#3: Closure by Removal	#4: Monitored Natural Attenuation (MNA)	#5: Hydraulic Containment/Barrier	#6: Physical Containment	#7: Permeable Reactive Barrier
35 IAC Section 845.670(e)(1)	Long- and short-term effectiveness and protectiveness, degree of certainty remedy will be successful	+ Resulting reduced infiltration further protects groundwater with minimal management. Minimal short-term risks during implementation. Alternative is reliable and unlikely to need replacement during remaining operating life of the unit.	++ Modeling shows large reduction in magnitude of risks and exposure potential, reduction of further releases, but some future management likely required. Minimal short term risks posed to community or environment during implementation. Groundwater protection standards (GWPS) attained in reasonable time period, high long-term reliability, and minimal need for replacement during remaining operating life of the unit.	++ Large reduction of risk and decreased likelihood of further releases, reduced potential for exposure, some future management required, minimal short-term risks posed to community or environment during implementation, some time likely required to attain GWPS, high long-term reliability and minimal need for replacement.	+ If source is addressed with another alternative, reduction in risk and exposure potential, but future groundwater monitoring required to monitor, no short-term risk to community or environment to implement, some time required to attain GWPS, potential for exposure to remaining wastes low, if paired with another alternative controlling the source, high long-term reliability and small likelihood remedy needs to be replaced.	0 Moderate reduction in magnitude of risks and exposure potential, extensive long-term management required, minimal short-term risks posed to community or environment during implementation, longer time until GWPS achieved, still potential for exposure to remaining wastes, moderate long-term reliability and moderate need for replacement of remedy.	- Moderate reduction in magnitude of risks and exposure potential, some long-term management required (likely need to be paired with hydraulic control), minimal short-term risks posed to community or environment during implementation, longer time until GWPS achieved, still potential for exposure to remaining wastes, low long-term reliability and moderate-high need for replacement of remedy.	- Low to moderate reduction in magnitude of risks and exposure potential, extensive long-term management required, minimal short-term risks posed to community or environment during implementation, longer time until GWPS achieved, still potential for exposure to remaining wastes, low long-term reliability and moderate-high need for replacement of remedy.
35 IAC Section 845.670(e)(2)	Effectiveness in controlling source	++ Reduced infiltration will effectively control source, and would not require further treatment technologies.	++ Installation of a dual composite liner and leachate collection system is shown by modeling to effectively nearly eliminate the source of further releases, and would not require further treatment technologies.	++ Closure under the 35 IAC 845 regulations would likely eliminate source of further releases and would not require further treatment technologies.	- Would not control the source and thus would need to be implemented in combination with another alternative(s) that would control the source and would not require treatment technologies.	- Would not control the source to reduce further releases, but would heavily rely on treatment technologies for removal of the constituents of concern from groundwater.	- Would not control the source to reduce further releases and would not rely on treatment technologies, unless paired with hydraulic control that required treatment of pumped groundwater.	-- Would not control the source to reduce further releases, but would rely on treatment technologies to reduce concentrations of constituents of concern in groundwater in-situ.
35 IAC Section 845.670(e)(3)	Ease or difficulty of implementation	++ Easy to implement using proven technology and available equipment and labor, minimal need to attain other approvals beyond Illinois EPA approval of Construction Permit to implement, no need for treatment, storage, and disposal (TSD) services.	+ Easy to implement using proven technologies and available equipment and labor (Construction Permit Application to implement submitted in 2023 and under review by Illinois EPA), minimal need to attain other approvals beyond Illinois EPA approval of Construction Permit, if needed sufficient available capacity and location of TSD services.	+ Easy to implement using proven existing technologies and available equipment and labor, would still need to submit separate Construction Permit Application and attain Illinois EPA approval to implement, sufficient available capacity and location of TSD services.	++ Easy to implement with no constructing technologies needed, known to be reliable, if paired with effective source control, minimal need to attain other approvals beyond Illinois EPA approval of Construction Permit Application to implement, no need for TSD services for CCR/soils.	-- Moderate to difficult to implement, low operational reliability of the technology, may need approval from various other agencies to implement (in addition to approval of Construction Permit Application from Illinois EPA), good availability of equipment and labor, and minimal need for TSD services (i.e., for CCR/soils).	- Moderate difficulty to implement, moderate operational reliability of the technology, minimal need to attain other approvals beyond Illinois EPA approval of Construction Permit to implement, and minimal need for TSD services (i.e., for CCR/soils).	-- Moderate difficulty to implement, low operational reliability of the technology, minimal need to attain other approvals beyond Illinois EPA approval of Construction Permit to implement, and minimal need for TSD services (i.e., for CCR/soils).
35 IAC Section 845.670(e)(4)	Degree to which community concerns are addressed	No concerns regarding this corrective action alternative were expressed by the community during public meetings.	Questions from the public concerning the retrofit process and MWG's responses are presented in the public meeting summary presented as Appendix C to this Corrective Action Plan.	A public comment questioned why closure by removal wasn't part of the proposed corrective action, given it rated similar to basin retrofit. It was pointed out that the basin retrofit eliminates the vast majority of seepage and thus is similarly protective. Also, the basins are needed for now to ensure electric generating operations can continue reliably. Closure of the basins will commence after electric generation ceases at the plant.	A question was posed by the public concerning the MNA mechanisms. As indicated in Appendix C, MNA relies upon natural groundwater flow processes to decrease concentrations in groundwater. MNA is most effective when used in conjunction with other source control measures, like the basin retrofits (Alternative #2).	No concerns regarding this possible corrective action alternative were expressed by the community during public meetings.	No concerns regarding this possible corrective action alternative were expressed by the community during public meetings.	No concerns regarding this possible corrective action alternative were expressed by the community during public meetings.

Notes:

+

 = Positive

++

 = Strongly Positive

0

 = Neutral

-

 = Negative

--

 = Strongly Negative

Grading based on implementation of each alternative as a stand alone option, although remedy proposed is a combination of three different Alternatives #1, #2, and #4.

Appendix A
Numerical Groundwater Flow Modeling Report

NUMERICAL GROUNDWATER FLOW MODELING REPORT

Groundwater Flow Modeling in Support of CCR
Compliance and Permitting
Powerton Generating Station
13082 E Manito Road, Pekin, IL 61554

Submitted to:

Roux Associates, Inc.

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Brookfield, WI 53005

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AUGUST 2026

NUMERICAL GROUNDWATER FLOW MODELING REPORT

Groundwater Flow Modeling in Support of CCR Compliance and Permitting
Powerton Generating Station
13082 E Manito Road, Pekin, IL 61554

BAS Project Number 25211402

Submitted to:

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Midwest Generation, LLC

Roux Associates, Inc.

Executive Summary

This report documents the results of a numerical groundwater modeling analysis of groundwater flow in the vicinity of the Ash Surge Basin (ASB) and the Metals Cleaning Basin (MCB) 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 ASB and MCB and provide a platform upon which the preferred corrective action groundwater remedy can be overlain and evaluated for short and long-term effectiveness relative to improvements of groundwater quality. The results of the modeling are intended for use in the evaluation of the preferred groundwater remedy being evaluated for the ASB and MCB. 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 ASB and MCB. 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.

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 ASB and MCB and allowed to discharge freely to groundwater for 15 years, the length of time since new liners were installed beneath the facilities. The resulting hypothetical distribution of concentrations served as the initial concentrations to a predictive scenario of the preferred groundwater remedy – a retrofit installation of a new composite liner and leachate collection system. The model scenario indicates improvement to groundwater quality, relative to CCR monitoring parameters that were detected above the established site-specific Groundwater Protection Standards (GWPSs), to below the GWPSs with implementation of the preferred groundwater remedy.

Under the preferred groundwater remedy, modeling shows that mass in groundwater dissipates over time, is essentially removed from groundwater within 50 to 100 years and is significantly reduced (below about 10%) by approximately 25 years. Modeling indicates that elevated constituents in groundwater will be reduced below site-specific, respective GWPSs within one to 10 years.

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Table of Abbreviations

Abbreviation	Definition
A	Cross-sectional area
ADAMP	Adaptive damping
ABB	Ash ByPass Basin
ASB	Ash Surge Basin
amsl	Above mean sea level
af/yr	Acre-feet per year
BAS	BAS Groundwater Consulting Inc
bgs	Below ground surface
CCR	Coal Combustion Residuals
cf/d	Cubic feet per day
dh/dl	Hydraulic gradient
FAB	Former Ash Basin
ft	Feet
ft/d	Feet per day
ft/s	Feet per second
ft ²	Square feet
ft/ft	Feet per foot
GHB	General head boundary
GIS	Geographic information system
GWPS	Groundwater Protection Standard
HCLOSEXMD	Head change closure criterion
IQR	Interquartile range
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

Abbreviation	Definition
K	Hydraulic conductivity
Kh	Horizontal hydraulic conductivity
Kv	Vertical hydraulic conductivity
MAP	Mean annual precipitation
MCB	Metals Cleaning Basin
mg/l	Milligrams per liter
mi	Mile
Midwest Generation	Midwest Generation, LLC
mm/yr	Millimeters per year
n/a	Not applicable
PCGn	Preconditioned Conjugate Gradient
phi	Sum of squared residuals
Powerton Station	Powerton Generation Station
Q	Darcy Flux
RMS	Root Mean Squared
TDS	Total Dissolved Solids
USGS	United States Geological Survey
%	Percent

1.0 INTRODUCTION

This report documents the results of a numerical groundwater modeling analysis of groundwater flow near the facilities at the Midwest Generation, LLC (Midwest Generation) Powerton Generating Station (Powerton Station), specifically in the vicinity of the Ash Surge Basin (ASB) and the Metals Cleaning Basin (MCB). 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 preferred groundwater remedy evaluation being completed for the ASB and MCB.

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 four CCR surface impoundments that are monitored/operated under CCR Surface Impoundment Operating Permit 2024-CO-100029. The four impoundments are:

- Former Ash Basin (FAB; inactive)
- Ash By-pass Basin (ABB)
- Ash Surge Basin (ASB)
- Metal Cleaning Basin (MCB)

As noted above, the FAB is inactive and an Initial Application for Construction Permit to close the impoundment has already been submitted to IEPA. The ABB was retrofitted with a double liner in 2024 and is currently in use. The ASB and the MCB are each currently lined with a single high-density polyethylene (HDPE) liner; however, these liners do not meet the new CCR Rule construction requirements and are the focus of this study/submittal.

The groundwater monitoring network specified in the above referenced permit is targeted to cover all four CCR impoundments and consists of the following 13 monitoring wells:

- MW-16 (upgradient for both the silty clay unit and the sand/gravel unit)
- Silty Clay/Silt Unit – MW-06, MW-14, MW-22, and MW-18A
- Sand/Gravel Unit – MW-01 through MW-05, MW-07, MW-10 and MW-21D

In addition to these specified permit monitoring points, there are an additional 12 monitoring wells used for water level measurements as well as, in some cases, for the nature and extent of impacts evaluation sampling required in support of the Corrective Measures study. All wells are located on Figure 2.

The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths at Powerton Station and potential remedy and closure options. The groundwater model was initially developed in 2022 and was used to evaluate closure alternatives for the Former Ash Basin (BAS, 2022). The model has been updated with recent information, and the focus of this report is on the preferred remedy evaluation for the ASB and MCB.

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 define 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 the preferred groundwater remedy for the ASB and MCB.
- 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 ASB and MCB.
- 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 that was presented in the 2022 modeling report (BAS, 2022). The numerical model was adjusted 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 compiled and averaged for monthly and annual averages for the 2022 modeling analysis (BAS, 2022) 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 Water 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 based on the 2022 groundwater model (BAS, 2022) 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 estimated from slug tests conducted in monitor wells MW-2, -5, -8, -9, and -10 and discussed in the 2022 modeling report (BAS, 2022). The geometric mean of the test data for these wells is approximately 120 feet per day (ft/d) (Table 3). 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. The highest value of hydraulic conductivity from these tests is 420 ft/d in monitor well MW-02, screened in gravel and sand.

4.4 Nature of Groundwater Flow

Groundwater contour maps provided within the 2024 Annual Groundwater Monitoring and Corrective Action 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 (KPRG, 2025). Monitor wells MW-06, -08, -12, -14, -15, -17, -18A, -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, there are components of groundwater flow to the west and east with discharge to the west being into the former intake channel and to the west into the unlined FAB. Within the underlying gravelly sand unit groundwater flow is generally to the north with some divergence to the northeast and northwest. Groundwater occurs under unconfined conditions with average depth to water since

2011 ranging from approximately 17 feet at monitor wells MW-06 and MW-10 to approximately 32 feet at monitor well MW-21D (KPRG, 2025).

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

The most recent Annual Corrective Action and Groundwater Monitoring Report (KPRG, January 31, 2026) identified that in the fourth quarter 2025 (November 2025) sampling under the State CCR Rule, concentrations of all 22 monitored water quality parameters in the downgradient monitoring wells were below the established site-specific GWPSs except in wells MW-07, MW-14, MW-18A, and MW-24. The GWPS exceedances in these wells are for the following constituents:

- Sulfate: MW-14
- Total Dissolved Solids (TDS): MW-14 and MW-18A
- Arsenic: MW-07 and MW-24
- Cobalt: MW-07
- Thallium: MW-14

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 mostly unchanged from the 2022 model (BAS, 2022) and is presented again 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 inches per year (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 (feet per foot (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 General Head Boundary (GHB) 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 GROUNDWATER FLOW MODEL DEVELOPMENT

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 MCB approximately 0.3 miles, south and east from the ASB approximately one-half mile and three-quarter to one mile, 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) (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 gravely 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. The model grid and layering is unchanged from the 2022 groundwater flow model (BAS, 2022).

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 435.26 feet. This stage was calculated by comparing the recorded gage 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 between 2015 and 2025. 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 some of the most northern monitoring wells resulting in a localized transient flow reversal and mixing zone. 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 between 2015 and 2025 and the recorded gage height from the same day (Table 5). The average difference was 0.15 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 average water levels in monitor well MW-04 during this period and used as the stage in the model's River boundary condition. The average difference between the gage elevation and the water level in MW-04 was calculated as 0.76 feet in the 2022 modeling report (BAS, 2022). This has been updated as explained here to 0.15 feet using a subset of the available data for MW-04 and the Kingston Mines gage (2015-2025). This more recent dataset was used for this calculation rather than including the earlier data (2011-2015) or the 2026 data because of concerns regarding data quality and concerns about the 2025 data. The earlier data (2011-2014) was not used in this updated calculation because the gage elevation reported by the USGS in current data downloads is now 427.17 feet above mean sea level (amsl), whereas previously the elevation was reported as 427.66 feet, indicating the gage may have been resurveyed since the 2022 modeling report, and making earlier data reliability unclear. In the more recent dataset from 2025, the water level in MW-04 is frequently lower than the river elevation at Kingston Mines gage, and although gradient reversals occur, the conceptual model of typical groundwater flow patterns is toward the river, so the 2025 data were not included to avoid biasing the steady state model calibration.

As with the 2022 model, 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. These boundaries were unchanged from the 2022 model and are defined 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-24. Model calibration then continued with parameter estimation techniques in PEST software (Doherty, 2010), used with pilot points within Groundwater Vistas. The approach to model calibration is the same as it was in the 2022 modeling report (BAS, 2022) although the calibration was recalculated with the updated water level datasets.

The flow model calibration relied on the measured water level data provided by KPRG for the site wells MW-01 through MW-24. 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 squared (RMS) error were used to objectively evaluate the calibration.

The RMS error was calculated as:

$$RMS = \left[\frac{1}{n} \sum_{i=1}^n (h_o - h_s)^2 \right]^{0.5}$$

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 although will vary based on site specific information (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 (K_h) 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 (K_v) was assumed initially to be equal to horizontal and was allowed to vary up to a ratio ($K_h:K_v$) 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 11 through 13. The calibrated model calculated groundwater level contours are shown on Figure 14 along with the spatial distribution of the calibration residuals. A scatter plot of the residuals are shown on Figure 15. 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 0.009 ft/d in the clay unit in model layer 1 to approximately 623 ft/d in the sand and gravel in model layer 2. 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, compared to the silty clay unit. The vertical hydraulic conductivity values (K_v) range from approximately equal to the horizontal values (K_h) (vertical anisotropy ratio of 1:1 $K_h:K_v$) to 10:1 $K_h:K_v$ in most of the model domain with a small area of higher vertical anisotropy (45:1 $K_h:K_v$) in layer 2 beneath the MCB, a calibration result to improve modeled water levels in this layer. Lower vertical anisotropy ratios are appropriate for sands, gravelly sands, and silty sands, compared to silty clay materials.

The calibrated values of hydraulic conductivity at wells MW-02, -05, -09, and -10 were compared to the field data for these wells (Table 3). The modeled value for MW-08 was not compared because of concerns over the validity

of hydraulic conductivity data in this well as discussed in Section 4.3. The modeled values of hydraulic conductivity are consistent with the estimates of hydraulic conductivity shown in Table 3:

- MW-02: 415 ft/d (this well falls between two model layers and this value is weighted accordingly),
- MW-05: 26 ft/d,
- MW-09: 110 ft/d, and
- MW-10: 37 ft/d (this well falls between two model layers and this value is weighted accordingly. Higher values are contained in the deeper model layer).

5.2.2.2 Calibrated Water Budget

The model calibrated water budget is provided in Table 6. Groundwater enters the model domain through recharge (84 af/yr) and lateral flow across the southern model boundary (176 af/yr). Groundwater both enters and exits the model laterally along the western boundary and at the GHBs representing the canals and American milling – exiting the model domain toward Powerton lake along the southern portion of the western boundary and entering the model along the northern portion of the western boundary where it flows north to discharge to the river. Groundwater discharges to the canals along the western side of the site and at American Milling, and like the northern portion of the western model boundary, water recharges groundwater from the canals and flows north to the river north of the site. Total inflows and outflows from lateral and canal exchanges are similar at 263 and 284 af/yr, respectively. Inflows from on-site ponds is 282 af/yr, and discharges to the Illinois River are approximately 344 af/yr (Table 6). Total inflows and outflows are balanced at approximately 628 af/yr, which is lower than the conceptual water budget estimated approximately 2,000 af/yr, but as discussed in Section 4.6, represented a rough estimate for initializing the model parameters.

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 -3.5 feet in well MW-24 northwest of the MCB to 1.94 feet in well MW-18 northeast side of the ASB. The average residual considering all calibration targets, with weighted residuals for the regional wells, is 0.02 feet, and is 0.17 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 0.33 ft) and within the clay unit (average residual of 0.08 ft). The RMS error for all weighted calibration targets is 1.3 feet, or 4 percent of the change in hydraulic head across the model domain. The RMS error for the site wells is 1.4 feet, or 8 percent of the change in hydraulic head across the site. The RMS error in the site sand and gravel unit wells is 1.3 feet, or 11 percent of the change in hydraulic head across these wells, and in the clay is 1.6 feet, or 13 percent. These results are all below or close to the recommended threshold of 10 percent for the scaled RMS error (Anderson, 2015).

The sum of squared residuals (ϕ) for the weighted calibration targets from the manual calibration was 162.8 square feet (ft^2), representing the starting point for the PEST calibration. The final, calibrated ϕ was 98.2 ft^2 , representing a significant improvement of the calibration by the PEST software.

The modeled water level contours and water level elevation in each calibration target (well) is shown on Figure 14. 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 14. 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 15. 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 2022 model calibration. The process of updating the model calibration did not change the underlying sensitivities observed during the previous sensitivity analysis, so the sensitivity analysis was not repeated, and the 2022 results are presented here. 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 in the clay unit to 212 percent. The RMS error of the calibration to the site wells increased 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.

6.0 PREDICTIVE MODEL SCENARIOS

A predictive, contaminant transport model was developed to demonstrate the impact to potential impacted groundwater from the preferred groundwater remedy scenario for the ASB and MCB – the retrofit installation of a new composite liner and leachate collection system at both basins. 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 15-year baseline transport simulation of a surrogate constituent from the ASB and MCB. The groundwater remedy scenario was designed to show the relative effect of the preferred groundwater remedy on current concentrations that exceed GWPSs in monitoring wells MW-07, MW-14, MW-18A, and MW-24 (section 4.5).

6.1 Baseline Model Simulation

To provide a platform upon which to evaluate the preferred groundwater remedy, a hypothetical release was modeled from the ASB and MCB for 15 years – the approximate time since the liners were replaced. The artificial baseline model simulates a hypothetical situation in which the ASB and MCB have continuously leached contaminants to groundwater for the past 15 years. The contaminants were simulated as a surrogate with a concentration of 100% by hypothetically introducing a concentration in groundwater of “1” beneath the ASB and MCB, as shown on Figure 16. The hypothetical mass was defined in groundwater beneath the ASB and MCB in model layer 1 using a constant source boundary condition and forward tracked for 15 years. Mass was moved through the groundwater system with advection and dispersion, and dispersion was simulated with a uniform value of 1 foot, and porosity was simulated at 35% in all directions. The resulting hypothetical plume is shown on Figure 17 and shows mass extending from the ASB and MCB to the Illinois River. The mass in groundwater at the ASB and MCB is continuous in this model simulation, therefore the mass is shown at the relative concentration of “1” beneath the ASB and MCB in Figure 17. This plume was the starting condition for the predictive scenario of the preferred groundwater remedy for the ASB and MCB to show the efficacy of the remedy on mass in groundwater.

6.2 Groundwater Remedy Scenario

A model scenario was developed to simulate what would happen to the mass in groundwater if the preferred groundwater remedy (the retrofit installation of a new composite liner and leachate collection system) was enacted. The 15-year hypothetical plume from the Baseline model simulation (Section 6.1) was used as the starting conditions of mass in groundwater emanating from the ASB and MCB. The preferred groundwater remedy was simulated as follows:

- The constant source of mass (i.e. concentration of “1”) was removed from the footprint of the ASB and MCB.

- It was assumed that seepage of mass (concentration of “1”) would continue through the new composite liner, at rates calculated from an assumed pond depth of 2 feet and assuming poor liner contact. The resulting seepage rate simulated was 0.572 millimeters per year (mm/yr).
- The groundwater flow model was simulated as a transient, 100-year simulation with specific yield = 20% and specific storage = $1\text{E-}04 \text{ ft}^{-1}$, and dispersivity and porosity simulated in all directions with values of 1 and 35%, respectively.
- Concentrations in groundwater downgradient of the ASB and MCB were tracked through a series of plan view maps and time-series concentration graphs at monitoring wells above GWPSs (MW-07, MW-14, MW-18A, and MW-24 (section 4.5)).

The efficacy of the groundwater remedy scenario is shown in plan view maps of maximum concentrations (regardless of model layer) of the hypothetical surrogate mass at years 5 (Figure 18), 10 and 15 (Figure 19), 20 and 25 (Figure 20), 30 and 35 (Figure 21), 40 and 50 (Figure 22), and 75 and 100 (Figure 23). These plan view maps of the hypothetical plume show that the preferred groundwater remedy scenario is effective, even considering an imperfect liner, on reducing concentrations in groundwater downgradient of the ASB and MCB. Hypothetical concentrations reduce steadily over time and by 25 years, are only above 10% in a small area (Figure 20), and by 100 years, are essentially removed from groundwater above 1% in any vertical profile of the unconsolidated materials. After 50 years, modeling shows residual concentrations will be below site-specific GWPSs. It should be noted that beyond year 50, concentrations above 10% are only present in the deepest model layer (layer 5), where the modeled permeability is low and without data for model calibration.

6.3 Relation to Constituent Concentrations

The trends of predicted reduction in the surrogate, hypothetical concentrations discussed in Section 6.2 were related to the recent (November 2025) GWPS exceedances in groundwater; specifically, sulfate, TDS, arsenic, cobalt, and thallium. The concentrations of these constituents were above GWPSs during the 4th quarter 2025 sampling period in downgradient monitoring wells MW-07, MW-14, MW-18A, and MW-24. The November 2025 concentrations above GWPS were used as the starting concentrations for this evaluation, and these are provided in Table 9. The percent decrease over time in the hypothetical surrogate concentrations determined in the model simulation of the preferred groundwater alternative was applied to the November 2025 concentrations of these exceedances to develop an estimated decay curve attributed to the preferred groundwater alternative. These decay curves are shown on Figures 24 through 28 and the efficacy of the preferred groundwater remedy can be summarized as follows:

- Sulfate concentrations reduce below the GWPS of 400 milligrams per liter (mg/l) in monitoring well MW-14 on the northwest corner of the MCB, from a starting concentration of 1,300 mg/l within approximately three years (Figure 24),

- TDS concentrations reduce below the GWPS of 1,200 mg/l in monitoring well MW-14, from a starting concentration of 3,100 mg/l within approximately three years, and from a starting concentration of 1,600 mg/l within approximately one year in MW-18A on the northeast side of the ASB (Figure 25),
- Arsenic concentrations reduce below the GWPS of 0.01 mg/l in monitoring well MW-07 northwest of the ASB, from a starting concentration of 0.12 mg/l within approximately 10 years, and within approximately eight years in monitoring well MW-24 further northwest, from a starting concentration of 0.023 mg/l (Figure 26),
- Cobalt concentrations reduce below the GWPS of 0.006 mg/l in monitoring well MW-07 from a starting concentration of 0.008 mg/l within approximately four years (Figure 27), and
- Thallium concentrations reduce below the GWPS of 0.002 mg/l in monitoring well MW-14 from a starting concentration of 0.0021 mg/l within approximately one year (Figure 28).

The decay curves for the preferred groundwater remedy show that current (November 2025) exceedances of GWPS of sulfate, TDS, arsenic, cobalt, and thallium in monitoring wells downgradient from the ASB and MCB will fall rapidly and remain below GWPS standards, even with an assumption of an imperfect liner system.

7.0 SUMMARY

A numerical groundwater flow model was created for the vicinity of the ASB and MCB at the Powerton generating station. The model was calibrated to long-term average water levels in site wells from updated datasets to reasonably replicate the groundwater flow patterns beneath the site. Groundwater flow paths from the site are predicted to the north toward the Illinois River. The current groundwater data indicate groundwater impacts above Section 845.600(a) GWPSs downgradient of the ASB and MCB in only four monitoring wells for five constituents including sulfate, TDS, arsenic, cobalt, and thallium. A predictive model scenario was developed to evaluate the efficacy of the preferred groundwater alternative: the retrofit of a new composite liner and leachate collection system beneath the ASB and MCB. The model was used to simulate a hypothetical release baseline scenario to establish a hypothetical plume of a surrogate mass distributed in groundwater as if the ASB and MCB have been leaching to groundwater for the past 15 years (since liners were last installed). The hypothetical surrogate mass travelled with the groundwater flow paths toward the Illinois River for 15 years to establish the initial concentrations downgradient of the ASB and MCB from which to evaluate the preferred groundwater remedy. The hypothetical distribution of mass served as the initial concentrations to a predictive scenario of the preferred groundwater remedy in which the source of mass to groundwater was reduced to a seepage rate representing an imperfect liner with poor contact and 2-feet of water, resulting in a seepage rate of 0.572 mm/yr. Under this scenario mass in groundwater dissipated over time, is essentially removed from groundwater within 50 to 100 years and is significantly reduced (below about 10%) by approximately 25 years. Modeling indicates that elevated constituents in groundwater, as noted above, will be reduced below site-specific, respective GWPSs within one to 10 years.

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Signature Page

BAS Groundwater Consulting Inc.

A handwritten signature in black ink that reads "Betsy Semmens". The signature is written in a cursive style with a large initial 'B' and a long, sweeping underline.

Betsy Semmens, RG
President/BAS Groundwater Consulting



TABLES

Table 1: Precipitation Data near Powerton Station

Month	Average Monthly Precipitation (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:

¹Total 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,

²Periods 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
121790048800	8	20	gray silty clay	Silt and Clay
121790048800	20	21	brown clay	clay

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
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
121792323500	0	4	topsoil	topsoil
121792323500	4	12	fine silty clay	Silt and clay
121792323500	12	48	medium sand	coarse sand and/or gravel

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
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
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

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
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
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

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
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
121792564300	38	85	coarse sand & gravel	coarse sand and/or gravel
121792560500	0	15	med sand light gravel	coarse sand and/or gravel
121792560500	15	25	med gravel w/ rocks	coarse sand and/or gravel
121792560500	25	35	med sand - med gravel w/ rocks	coarse sand and/or gravel
121792560500	35	37	med sand - med gravel	coarse sand and/or gravel
121792366700	0	2	topsoil	topsoil
121792366700	2	15	sand	sand
121792366700	15	39	big gravel	coarse sand and/or gravel
121792366700	39	100	sand & gravel	coarse sand and/or gravel
121792354800	0	3	(ML) silt, some clay, little sand	topsoil
121792354800	3	6	(SP) sand, little gravel	coarse sand and/or gravel
121792354800	6	14	(SW) sand, little gravel	coarse sand and/or gravel
121792354800	14	30	(SP) sand ltl gvl, SW sand some gvl @30'	coarse sand and/or gravel
121792354800	30	44	sand	sand
121792355100	0	3	(ML) silt, some clay, little sand	topsoil
121792355100	3	6	(SP) sand fine gravel little gravel	coarse sand and/or gravel
121792355100	6	14	(SW) sand, little gravel	coarse sand and/or gravel
121792355100	14	30	(SP) sand, little gravel	coarse sand and/or gravel
121792355100	30	65	(SW) sand, some gravel	coarse sand and/or gravel
121792355100	65	69	(SP) sand, little gravel	coarse sand and/or gravel
121792355100	69	77	(SW) sand, some gravel	coarse sand and/or gravel
121792355100	77	103	(SP) sand, little gravel	coarse sand and/or gravel
121792355000	0	3	(ML) silt, some clay, little sand	clay, sand
121792355000	3	6	(SP) sand fine gravel little gravel	coarse sand and/or gravel
121792355000	6	14	(SW) sand, little gravel	coarse sand and/or gravel
121792355000	14	30	(SP) sand ltl gvl, SW sand some gvl @30'	coarse sand and/or gravel
121792355000	30	44	sand	sand
121792354900	0	3	(ML) silt, some clay, little sand	clay, sand
121792354900	3	6	(SP) sand, little gravel	coarse sand and/or gravel
121792354900	6	14	(SW) sand, little gravel	coarse sand and/or gravel
121792354900	14	30	(SP) sand, little gravel	coarse sand and/or gravel
121792354900	30	30	(SW) sand, some gravel at 30'	coarse sand and/or gravel
121792354900	30	44	sand	sand
121792378900	0	3	black cinder and gravel fill	FILL
121792378900	3	4.5	black silty sand	sand
121792378900	4.5	6.5	brown clayey sand	clay, sand
121792378900	6.5	35	brown fine to coarse sand, little fine to medium gravel, wet at 29'	coarse sand and/or gravel
121792378800	0	1	black to brown gravel, fill	FILL
121792378800	1	3	brown silty sand fill	FILL
121792378800	3	5.5	black silty sand , trace clay, topsoil	topsoil
121792378800	5.5	7.5	brown silty fine to coarse sand	sand
121792378800	7.5	50	brown fine to coarse sand, little fine to medium gravel, more sandy below 36'	sand
121792378700	0	1.5	black silty sand fill	FILL
121792378700	1.5	4	black grading brown silty sand	sand
121792378700	4	5.5	tan fine sand, clean	sand
121792378700	5.5	8.5	brown silty sand, cobbles at 8.5'	sand
121792378700	8.5	17.5	brown fine to coarse sand, little fine to medium gravel, dry, clay seam at 10.5' to 11.5'	coarse sand and/or gravel
121792378700	17.5	30	brown fine to coarse sand, trace of gravel, dry	coarse sand and/or gravel
121792379400	0	5.5	brown, stiff silt clay loam	loam

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792379400	5.5	14	brown, loose sandy loam	loam
121792379400	14	16.5	brown, medium silt clay loam	loam
121792379400	16.5	24	brown, loose, sand	sand
121792379400	24	61	brown, medium, sand and gravel	coarse sand and/or gravel
121792379400	61	65.5	light gray, hard, shale	shale
121792379300	0	4	brown stiff silt loam	loam
121792379300	4	14	brown and gray stiff, silt clay loam	loam
121792379300	14	14.5	brown and gray sand	sand
121792379300	14.5	19	dark gray, medium, wet silt clay loam	loam
121792379300	19	31.5	gray, loose, sand	sand
121792379300	31.5	58	brown, medium sand and gravel	coarse sand and/or gravel
121792379200	0	1.5	black grading brown clayey sand	clay, sand
121792379200	1.5	15	brown fine to coarse sand, little fine to medium gravel, dry	coarse sand and/or gravel
121792379100	0	1.5	black silty sand, fill, some gravel	clay, sand
121792379100	1.5	6	black grading down to brown silty sand	sand
121792379100	6	40	brown fine to coarse sand, little fine to medium gravel, water in 27.5'	coarse sand and/or gravel
121792379000	0	6.5	black silty sand disturbed, fill and topsoil, few sand seams 5'-6.5'	topsoil
121792379000	6.5	35	brown fine to coarse sand little fine to medium gravel, wet at 28'	coarse sand and/or gravel
121792361700	0	5	loam	loam
121792361700	5	14	sand & gravel	coarse sand and/or gravel
121792361700	14	34	sand & gravel - coarse	coarse sand and/or gravel
121792361700	34	39	gravel & rocks	coarse sand and/or gravel
121792361700	39	40	shale gray	shale
121792553800	0	8	cinders old burnt coal	FILL
121792553800	8	79	sand & gravel	coarse sand and/or gravel
121792552000	0	6	topsoil	topsoil
121792552000	6	32	sand & gravel-medium	coarse sand and/or gravel
121792552000	32	141	sand & gravel-coarse	coarse sand and/or gravel
121792552000	141	141	shale below	shale
121792538600	0	10	silty clay	silt and clay
121792538600	10	14	organic silt	silt and clay
121792538600	14	17	organic clay	clay
121792538600	17	21	silty clay	silt and clay
121792538600	21	29	sand & gravel	coarse sand and/or gravel
121792378600	0	1.5	black clayey silt topsoil	topsoil
121792378600	1.5	5.5	dark brown to brown clayey silt, more sandy with depth	clay, sand
121792378600	5.5	10	brown fine to coarse sand, trace of fine to medium gravel	coarse sand and/or gravel
121792356100	0	10	fill	FILL
121792356100	10	23	loam - soft	loam
121792356100	23	55	sand & gravel	coarse sand and/or gravel
121792356100	55	64	sand coarse fine gravel	coarse sand and/or gravel
121792356100	64	84	sand & gravel	coarse sand and/or gravel
121792365600	0	3	loam sandy	loam
121792365600	3	5	clay yellow sandy	clay, sand
121792365600	5	56	sand & gravel	coarse sand and/or gravel
121792365600	56	67	sand medium	coarse sand and/or gravel
121792365600	67	83	sand & gravel fine	coarse sand and/or gravel
121792538100	0	19	sand, gravel fill material	FILL
121792538100	19	31	coarse sand and fine gravel	coarse sand and/or gravel
121792373700	0	82	sand and gravel, red sand at bottom	coarse sand and/or gravel
121792373400	0	98	sand and gravel	coarse sand and/or gravel
121792333600	0	2	black dirt	topsoil
121792333600	2	9	brown sand	sand
121792333600	9	42	light to coarse gravel	coarse sand and/or gravel
121792538500	0	10	cinders, gravel, clay	FILL
121792538500	10	19	cinders	cinders
121792538500	19	26	silt and sand	sand
121792538500	26	29	clayey silt	silt and clay
121792538400	0	10	gravel, crushed rock, cinders	FILL
121792538400	10	17	cinders, sand, brick	Cinders
121792538400	17	19	clayey silt	silt and clay
121792538400	19	32	sand	sand
121792538300	0	1	topsoil	topsoil
121792538300	1	34	sand	sand
121792538200	0	2	topsoil	topsoil
121792538200	2	24	sand	sand
121792538200	24	34	gravel	coarse sand and/or gravel

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792439900	0	2	silty topsoil, little sand, trace clay & roots-medium dark brown	topsoil
121792439900	2	4	clayey silty fine sand, trace medium sand, rust brown-medium dense-moist	sand
121792439900	4	6	fine sand, trace gravel,medium coarse sand & silt-light brown-medium dense moist	sand
121792439900	6	8	fine to coarse sand, trace gravel & silt brown & slightly dark gray-medium densemoist	sand
121792439900	8	26.5	fine to coarse sand-moist @8' & saturated @19'-little gravel, trace silt-light brown & slightly gray	sand
121792439200	0	2	clayey, sandy. silty topsoil, trace roots, dark brown-loose-moist	topsoil
121792439200	2	4.4	sandy, silty & gravelly clay-brown-loosemoist	clay, sand
121792439200	4.4	6	clayey silty fine & coarse sand,trace gravel-brown & slightly gray-loose-moist to wet	sand
121792439200	6	13.5	gravelly, fine & coarse sand, trace siltbrown & slightly gray & dark gray-medium dense-moist	coarse sand and/or gravel
121792439200	13.5	19	fine & medium sand, trace gravel-brown & slightly gray-loose-moist	sand
121792439200	19	26.5	fine & medium sand, trace gravel-brown, light gray & dark gray-dense-wet	sand
121792438000	0	2	silty sandy topsoil-dark brown	topsoil
121792438000	2	6	gravelly, fine to medium sand, trace coarse sand & silt-light gray & slight gray-medium dense to d	coarse sand and/or gravel
121792438000	6	9	fine sand, trace silt & clay-dark brown loose, moist to wet	sand
121792438000	9	18	gravelly fine to coarse sand, trace silt, light brown & slight gray-medium dense to dense-saturated	coarse sand and/or gravel
121792438000	18	23	coarse sand, trace fine to medium sand & fine gravel-brown to light gray & dark gray-dense-satur	coarse sand and/or gravel
121792438000	23	45.5	gravelly fine to coarse sand, trace siltbrown & slight gray-medium dense to densesaturated	coarse sand and/or gravel
121792438000	45.5	50.25	clayey shale, gray & rust brown-extremely dense	shale
121792430400	0	2	topsoil	topsoil
121792430400	2	9	sandy soil	topsoil
121792430400	9	17	sand	sand
121792430400	17	68	sand & gravel	coarse sand and/or gravel
121792437700	0	2.5	clay, silty, brown, some organic material	silt and clay
121792437700	2.5	4.5	sand, light yellow brown, very fine grained, silty, poorly graded, subangular	sand
121792437700	4.5	6.5	sand, brown, fine to medium grained, silty, some clay, sand grains subangular	sand
121792437700	6.5	15	sand & gravel, brown,well graded, sand, fine to medium grained, silty some coarse gravel,subang	coarse sand and/or gravel
121792437700	15	31.5	sand, light yellow brown very fine grained to fine grained, subrounded silty in upper portion trace	sand
121792440300	0	2	sandy, silty topsoil, trace clay & rootsdark brown	topsoil
121792440300	2	4	clayey silty fine to medium sand, little gravel, trace coarse sand, rust brown & slightly gray-medium	clay, sand
121792440300	4	6	fine to coarse sand, trace gravel & silt brown & slightly gray-loose to medium moist	sand
121792440300	6	9	fine to medium sand & gravel-trace siltbrown & slightly gray-medium dense to dense-moist	sand
121792440300	9	13	gravelly fine to coarse sand trace silt & shale-light brown, slight gray & dark gray-very dense-mois	coarse sand and/or gravel
121792440300	13	18	fine to medium sand & gravel medium dense	coarse sand and/or gravel
121792440300	18	28	fine to coarse sand, trace gravel-brown & light gray-medium dense to dense-wetsaturated @25'	coarse sand and/or gravel
121792440300	28	36.5	Fine to medium sand, trace gravel & siltbrown & slight gray	sand
121792440300	36.5	43	fine sand, trace silt-brown-extremely dense-wet	sand
121792440300	43	54	fine to medium sand, gravelly @45'-trace silt-reddish brown & slightly gray-densesaturated	coarse sand and/or gravel
121792440300	54	60	clayey shale-gray-weathered	shale
121792440300	60	70	clayey shale;medium dark gray	shale
121792440000	0	2	clayey sandy silty topsoil, trade rootsdark brown	topsoil
121792440000	2	4	silty sand, little clay & gravel-medium dark brown to light gray-medium densedesiccated	sand
121792440000	4	6	silty clay, trace gravel & sand-brown & slightly gray-hard	silt and clay
121792440000	6	8	silty clay, atrace sand-brown ato medium dark gray-very stiff	silt and clay
121792440000	8	13	silty fine to medium sand & gravel-brown & dark gray-dense to very dense moist	coarse sand and/or gravel
121792440000	13	18	gravelly fine to coarse sand, trace siltbrown & slightly gray-loose to medium dense-moist	coarse sand and/or gravel
121792440000	18	28	fine to medium sand, trace gravel & siltbrown & slightly gray-medium dense to dense-wet-satura	sand
121792440000	28	35	fine sand, trace gravel & silt-brown & slightly gray - very dense to extremely dense-wet	sand
121792440000	35	48.1	clayey shale-gray weathered-very dense	shale
121792343700	0	4	topsoil	topsoil
121792343700	4	37	sand	sand
121792343700	37	85	sand & gravel	coarse sand and/or gravel
121792341200	3	8	gravel brown	coarse sand and/or gravel
121792341200	8	40	gravel & big rocks	coarse sand and/or gravel
121792341200	40	42	gray clay & gravel	clay, sand, gravel
121792336400	0	2	topsoil	topsoil
121792336400	2	60	sand	sand
121792336400	60	70	sand & gravel	coarse sand and/or gravel
121792336600	0	4	black sandy topsoil	topsoil
121792336600	4	7	brown sandy clay	clay, sand
121792336600	7	35	brown sand - light gravel	coarse sand and/or gravel
121792336600	35	40	coarse brown sand light 3" gravel	coarse sand and/or gravel
121792336600	40	68	medium brown sand - light gravel	coarse sand and/or gravel
121792336600	68	110	medium brown sand - light coarse gravel	coarse sand and/or gravel
121792336600	110	112	gray clay	clay
121792347100	0	4	fill	Fill
121792347100	4	22	brown clay	clay
121792347100	22	44	sand & gravel	coarse sand and/or gravel

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792347100	44	47	gray clay	clay
121792347100	47	77	sand & gravel	coarse sand and/or gravel
121792517900	0	12	black sand, gravel & cement fill	Fill
121792517900	12	25	brown sand & small gravel	coarse sand and/or gravel
121792517900	25	27	gray clay with gravel	clay, sand, gravel
121792517900	27	104	coarse sand & gravel	coarse sand and/or gravel
121792516200	0	10	fine sand	sand
121792516200	10	25	medium gravel	coarse sand and/or gravel
121792516200	25	35	medium sand, light gravel	coarse sand and/or gravel
121792516200	35	50	fine sand, light gravel	coarse sand and/or gravel
121792516200	50	60	fine coarse sand	coarse sand and/or gravel
121792516200	60	65	fine sand, medium light gravel	coarse sand and/or gravel
121792516200	65	80	medium sand, light gravel	coarse sand and/or gravel
121792516200	80	95	medium fine sand, light gravel	coarse sand and/or gravel
121792516200	95	121	coarse sand medium gravel	coarse sand and/or gravel
121792515900	0	2	gravel	coarse sand and/or gravel
121792515900	2	4	loam	loam
121792515900	4	15	sand black, clay mix	clay, sand
121792515900	15	19	sand black, wood	sand
121792515900	19	26	clay black, gray mix	clay
121792515900	26	28	sand med to coarse loose	coarse sand and/or gravel
121792515900	28	35	sand fine to med	coarse sand and/or gravel
121792515900	35	40	sand med to coarse, some gravel	coarse sand and/or gravel
121792515900	40	48	sand fine to med, trace coarse	sand
121792515900	48	54	sand med to coarse	coarse sand and/or gravel
121792515900	54	59	sand coarse, fine gravel	coarse sand and/or gravel
121792515900	59	63	sand med to coarse	coarse sand and/or gravel
121792515900	63	66	sand med to crs, tr gry cl (backfilled)	coarse sand and/or gravel
121792515900	66	72	sand fine to med (backfilled)	sand
121792515900	72	72	gray shale at	shale
121792515800	0	9	fill	fill
121792515800	9	15	light brown clay	clay
121792515800	15	19	gray clay with gravel embedded	silt and clay
121792515800	19	21	coarse sand to coarse gravel	coarse sand and/or gravel
121792515800	21	32	sty brn med s to crs gvl (strk cl 22-23)	coarse sand and/or gravel
121792515800	32	52	med sand to coarse gvl (sty)	coarse sand and/or gravel
121792515800	52	93	fine sand to fine gravel	coarse sand and/or gravel
121792515800	93	100	soft and hard shale	shale
121792336500	0	4	topsoil	topsoil
121792336500	4	28	fine sand	sand
121792336500	28	54	medium sand	coarse sand and/or gravel
121792336500	54	103	medium gravel	coarse sand and/or gravel
121792336500	103	103	fine sand at	sand
121792520800	0	10	fine sand	sand
121792520800	10	15	light gravel with medium gravel	coarse sand and/or gravel
121792520800	15	20	medium gravel	coarse sand and/or gravel
121792520800	20	30	medium sand - light gravel	coarse sand and/or gravel
121792520800	30	35	light gravel	coarse sand and/or gravel
121792520800	35	38	medium sand - light gravel	coarse sand and/or gravel
121792520000	0	15	sandy black topsoil	topsoil
121792520000	15	50	sand & gravel	coarse sand and/or gravel
121792520000	50	68	gray clay	clay
121792519900	0	14	coarse sand & gravel	coarse sand and/or gravel
121792519900	14	56	coarse sand & gravel w/boulders	coarse sand and/or gravel
121792519900	56	58	shale	shale
121792577600	0	2	topsoil	topsoil
121792577600	2	42	fine to coarse gravel	coarse sand and/or gravel
121792312100	0	2	topsoil	topsoil
121792312100	2	8	fine sand	sand
121792312100	8	12	brown clay	clay
121792312100	12	25	fine sand	sand
121792312100	25	68	coarse sand	coarse sand and/or gravel
121792312100	68	73	fine gravel	coarse sand and/or gravel
121792312100	73	77	fine sand	sand
121792312100	77	103	fine gravel & medium gravel	coarse sand and/or gravel
121792312100	103	103	shale at	shale
121792200900	0	2	topsoil	topsoil

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792200900	2	20	coarse gravel	coarse sand and/or gravel
121792200900	20	47	medium to coarse gravel	coarse sand and/or gravel
121792200900	47	47	shale at	shale
121792104600	0	68	yellow sand	sand
121792104600	68	88	gray sand	sand
121792180900	0	5	top soil	topsoil
121792180900	5	43	sand	sand
121792180900	43	115	gravel	coarse sand and/or gravel
121792312000	0	2	topsoil	topsoil
121792312000	2	10	brown clay	clay
121792312000	10	25	fine sand	sand
121792312000	25	45	fine gravel	coarse sand and/or gravel
121792312000	45	83	medium gravel	coarse sand and/or gravel
121792312000	83	86	fine sand	sand
121792312000	86	108	medium to coarse gravel	coarse sand and/or gravel
121792311900	0	4	topsoil	topsoil
121792311900	4	28	fine sand	sand
121792311900	28	48	medium sand	coarse sand and/or gravel
121792311900	48	78	medium sand to coarse gravel	coarse sand and/or gravel
121792311900	78	106	medium gravel	coarse sand and/or gravel
121792311900	106	106	shale at	shale
121792311800	0	2	topsoil	topsoil
121792311800	2	12	brown clay	clay
121792311800	12	24	sand & gravel lenses	coarse sand and/or gravel
121792311800	24	55	sand & gravel	coarse sand and/or gravel
121792311800	55	60	gravel	coarse sand and/or gravel
121792307200	0	7	topsoil	topsoil
121792307200	7	87	sand	sand
121792307200	87	100	pea gravel	coarse sand and/or gravel
121792180200	0	2	top soil	topsoil
121792180200	2	13	fine sand	sand
121792180200	13	39	coarse gravel	coarse sand and/or gravel
121792180200	39	48	medium sand	coarse sand and/or gravel
121792180200	48	104	coarse gravel	coarse sand and/or gravel
121792180200	104	104	rocks	shale
121792179800	0	2	top soil	topsoil
121792179800	2	20	yellow fine sand	sand
121792179800	20	25	sand & gravel	coarse sand and/or gravel
121792179800	25	40	fine/medium sand	sand
121792179800	40	50	sand & gravel	coarse sand and/or gravel
121792179800	50	60	all fine sand	sand
121792179800	60	72	sand, pea gravel	coarse sand and/or gravel
121792179800	72	78	sand, stones	coarse sand and/or gravel
121792179800	78	79	shale	shale
121792179700	0	25	sand & gravel	coarse sand and/or gravel
121792179700	25	48	clay	clay
121792179700	48	67	rock	shale
121792261600	0	37	sand	sand
121792180800	0	4	top soil	topsoil
121792180800	4	40	sand	sand
121792180800	40	108	gravel	coarse sand and/or gravel
121792180700	0	10	sandy loam	loam
121792180700	10	48	sand & crs gvl	coarse sand and/or gravel
121792180700	48	50	coarse	coarse sand and/or gravel
121792180600	0	3	top soil	topsoil
121792180600	3	13	sand & gravel	coarse sand and/or gravel
121792180600	13	18	fine brown sand	sand
121792180600	18	28	brown sand & rocks	coarse sand and/or gravel
121792180600	28	31	fine/med brown sand	sand
121792180500	0	3	top soil	topsoil
121792180500	3	88	med sand to/crs gvl	coarse sand and/or gravel
121792180500	88	88	shale	shale
121792256700	0	10	dirty brown sand	sand
121792256700	10	16	brown sand, fine & clean	sand
121792256700	16	30	brown sand, fine-very coarse some gravel	coarse sand and/or gravel
121792256700	30	42	medium sand, coarse gravel	coarse sand and/or gravel
121792256700	42	53	fine red sand tr. med sand & few pebbles	sand

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792256700	53	56	red fine sand med-coarse sand w/pebbles	sand
121792256700	56	57	fine brown sand fine gravel w/rocks	sand
121792256700	57	61	fine brn sand, coarse sand w/fine gravel	coarse sand and/or gravel
121792091900	0	3	fill	fill
121792091900	3	9	fine to crs sand, some gravel	coarse sand and/or gravel
121792091900	9	22	fine sand to crs gravel	coarse sand and/or gravel
121792091900	22	28	fine sand to med gravel	coarse sand and/or gravel
121792091900	28	73	fine to crs sand with gvl seams	coarse sand and/or gravel
121792091900	73	81	fine sand to med gravel	coarse sand and/or gravel
121792091900	81	100	f to crs sand w/gravel seams	coarse sand and/or gravel
121792091900	100	105	fine sand to coarse gravel	coarse sand and/or gravel
121792090700	105	107	shale	shale
121792090700	0	6	sandy clay	clay, sand
121792090700	6	16	clay (yellow)	clay
121792090700	16	20	clay (blue-gravelly)	clay
121792090700	20	22	gravel & sand	coarse sand and/or gravel
121792090700	22	70	sand (brown-coarse)	coarse sand and/or gravel
121792088600	0	11	fine brown sand--dirty	sand
121792088600	11	29	fine to coarse brown sand-some rocks	sand
121792088600	29	32	coarse brown sand & gravel	coarse sand and/or gravel
121792088600	32	38	coarse brown water sand & gravel	coarse sand and/or gravel
121792088600	38	48	fine to coarse brown sand-some pebbles	coarse sand and/or gravel
121792088600	48	53	fine to med. sand-some pebbles	coarse sand and/or gravel
121792088600	53	54	brown & gray sand-some coal	sand
121792088600	54	54	cap rock & gray shale at	shale
121792261500	0	4	brown silt	silt and clay
121792261500	4	42	sand	sand
121792260000	0	4	silt & loam	loam
121792260000	4	40	sand	sand
121792259900	0	37	Sand	sand
121792259800	0	3	silt	silt and clay
121792259800	3	37	sand	sand
121792238000	0	2	top soil	topsoil
121792238000	2	25	fine sand	sand
121792238000	25	45	medium sand	coarse sand and/or gravel
121792238000	45	105	medium gravel	coarse sand and/or gravel
121792238000	105	105	rocks at	shale
121792237900	0	2	black & brown sandy topsoil	topsoil
121792237900	2	4	bricks & fill	fill
121792237900	4	7	black clayey sand	clay, sand
121792237900	7	16	sand & gravel	coarse sand and/or gravel
121792237900	16	23	coarse sand to small gravel	coarse sand and/or gravel
121792237900	23	45	coarse sand & gravel with boulders	coarse sand and/or gravel
121792237900	45	59	fine sand to coarse gravel with boulders	coarse sand and/or gravel
121792237900	59	95	f to crs s w/med to crs g layers & bldrs	coarse sand and/or gravel
121792237900	95	100	firm gray shale	shale
121792237800	0	16	fill	fill
121792237800	16	26	black & gray peaty clay with sand	clay, sand
121792237800	26	50	yellow & brown coarse sand & gravel	coarse sand and/or gravel
121792237800	50	61	fine sand & gravel	coarse sand and/or gravel
121792237800	61	83	fine sand, coarse gravel & boulders	coarse sand and/or gravel
121792237800	83	85	gray clay	clay
121792237700	0	4	parking lot gravel & fill	fill
121792237700	4	17	coarse s & g w/buff colored clay layers	dirty coarse sand and/or grav
121792237700	17	47	yellow brown coarse s & g w/boulders	coarse sand and/or gravel
121792237700	47	81	f to med sd w/coarse gravel & sand	coarse sand and/or gravel
121792237700	81	85	firm gray shale	shale
121792246300	0	19	fine brown sand	sand
121792246300	19	52	brown sand & rock	coarse sand and/or gravel
121792246300	52	81	brown medium sand, not on shale	coarse sand and/or gravel
121792157500	0	7	top soil	topsoil
121792157500	7	42	fine/coarse gravel	coarse sand and/or gravel
121792157500	42	42	shale	shale
121792156800	0	105	sand & gravel	coarse sand and/or gravel
121792156800	105	108	black shale	shale
121792238100	0	4	top soil (black)	topsoil
121792238100	4	25	sand (brown) fine	sand

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792238100	25	39	sand (brown) medium	coarse sand and/or gravel
121792219300	0	3	top soil	topsoil
121792219300	3	5	clay	clay
121792219300	5	43	coarse sand & gravel	coarse sand and/or gravel
121792219300	43	49	blue clay	clay
121792219300	49	53	fine sand	sand
121792219300	53	80	coarse sand & gravel	coarse sand and/or gravel
121792219300	80	105	medium gravel	coarse sand and/or gravel
121792219300	105	136	fine to coarse sand	coarse sand and/or gravel
121792219300	136	136	shale at	shale
121792138700	0	3	sand and dirt	sand
121792138700	3	53	sand and gravel and rocks	coarse sand and/or gravel
121792138700	53	74	sand (brown) fine	sand
121792138700	74	84	sand (medium)	coarse sand and/or gravel
121792138700	84	88	sand, gravel and rocks	coarse sand and/or gravel
121792138600	0	5	topsoil	topsoil
121792138600	5	25	yellow fine sand	sand
121792138600	25	75	coarse gray sand	coarse sand and/or gravel
121792138000	0	3	topsoil	topsoil
121792138000	3	50	coarse gravel and rocks	coarse sand and/or gravel
121792138000	50	80	sand gravel and rocks	coarse sand and/or gravel
121792138000	80	108	rocks	shale
121792237600	0	1	top soil	topsoil
121792237600	1	10	brown sand	sand
121792237600	10	20	sand & gravel	coarse sand and/or gravel
121792237600	20	55	coarse gravel	coarse sand and/or gravel
121792237600	55	90	medium gravel & sand	coarse sand and/or gravel
121792237600	90	117	brown fine sand, some small gravel	sand
121792237600	117	118	coarse gravel	coarse sand and/or gravel
121792237600	118	120	gray shale	shale
121792154000	0	2	top soil	topsoil
121792154000	2	11	fine sand	sand
121792154000	11	99	medium/coarse gravel	coarse sand and/or gravel
121790072100	0	66	yellow sand	sand
121790072100	66	86	blue sand	sand
121790071600	0	4	black sandy loam	loam
121790071600	4	75	dirty yellow sand	sand
121790071600	75	112	sand trace gravel	coarse sand and/or gravel
121792285300	0	2	top soil	topsoil
121792285300	2	54	fine to coarse gravel	coarse sand and/or gravel
121792285300	54	60	clay	clay
121792285300	60	92	coarse sand to coarse gravel	coarse sand and/or gravel
121792285300	92	133	coarse sand to medium gravel	coarse sand and/or gravel
121792285300	133	133	shale at	shale
121792282400	0	2	top soil	topsoil
121792282400	2	13	fine sand	sand
121792282400	13	21	blue clay	clay
121792282400	21	62	fine to medium sand	sand
121792282400	62	107	fine to coarse sand & gravel	coarse sand and/or gravel
121792282400	107	107	fine sand at	sand
121792204800	0	13	misc. fill, gravel, cinders, bricks etc	fill
121792204800	13	17	black clayey gravel & sand	clay, sand, gravel
121792204800	17	25	black sand w/clay & other misc.	clay, sand, gravel
121792204800	25	50	loos crs sand to crs gravel & boulders	clay, sand, gravel
121792204800	50	60	med brn sand-crs gvl w/clay pckts & lyrs	coarse sand and/or gravel
121792204800	60	66	coarse sand to coarse gravel	coarse sand and/or gravel
121792204800	66	95	loose med s-sml gvl, occ bldrs & crs gvl	coarse sand and/or gravel
121792204800	95	96	dark gray lime	limestone
121792204800	96	100	dark gray shale	shale
121792197300	0	2	top soil	topsoil
121792197300	2	17	fine sand	sand
121792197300	17	42	coarse gravel	coarse sand and/or gravel
121792197300	42	61	medium sand	coarse sand and/or gravel
121792197300	61	85	coarse gravel	coarse sand and/or gravel
121792885900	0	16	sand (brown) fine	sand
121792885900	16	18	sand (brown) fine with rocks	sand
121792885900	18	26	sand (brown) medium	coarse sand and/or gravel

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
121792885900	26	30	sand (brown) medium with rocks	coarse sand and/or gravel
121792885900	30	40	sand (brown) medium	coarse sand and/or gravel
121792885900	40	71	sand (brown) medium with rocks	coarse sand and/or gravel
121792293000	0	4	topsoil	topsoil
121792293000	4	28	sand w/clay streaks	clay, sand
121792293000	28	58	medium sand	coarse sand and/or gravel
121792293000	58	105	big gravel	coarse sand and/or gravel
121790067100	0	6	fill	fill
121790067100	6	22	sand	sand
121790067100	22	25	silty clay	silt and clay
121790067100	25	100	sand & gravel	coarse sand and/or gravel
121790067100	100	100	hardpan at	shale
121792124200	0	4	brown sandy clay	clay, sand
121792124200	4	38	brown fine sand to crs gravel boulders	coarse sand and/or gravel
121792124200	38	62	brown fine sand to coarse gravel	coarse sand and/or gravel
121792124200	62	68	brown fine to coarse sand	coarse sand and/or gravel
121792124200	68	113	multi-colored medium to coarse sand	coarse sand and/or gravel
MW-01	0	10	FILL: Brown coarse to fine sand, dry	fill
MW-01	10	18.5	FILL: Trace coarse gravel	coarse sand and/or gravel
MW-01	18.5	28	SW: Brown coarse to medium sand, trace fine gravel, medium dense, saturated	coarse sand and/or gravel
MW-01	28	32.5	GP: Coarse to fine gravel, some coarse sand, medium dense, saturated	coarse sand and/or gravel
MW-02	0	1.5	FILL: Dark brown topsoil, silty clay, dry	topsoil
MW-02	1.5	14	FILL: Light brown coarse to fine sand, loose, dry	sand
MW-02	14	20	FILL: Some fine gravel	coarse sand and/or gravel
MW-02	20	23.5	FILL: Light brown fine to medium sand, well graded, medium dense	coarse sand and/or gravel
MW-02	23.5	35	GP: Gray coarse to fine gravel, coarse sand, trace fine sand and silt, poorly graded, medium dense	coarse sand and/or gravel
MW-03	0	0.5	Dark brown silty clay topsoil	topsoil
MW-03	0.5	9.5	FILL: Light brown coarse to medium sand, trace fine gravel, trace fine sand, very loose to loose	fill
MW-03	9.5	12	FILL: Some fine sand	sand
MW-03	12	19	FILL: Light brown medium to fine sand, loose	sand
MW-03	19	34	SW: Brown coarse sand, trace fine gravel, well graded, very loose	coarse sand and/or gravel
MW-04	0	8	FILL: Light Brown sand, medium to brown silty clay, fine gravel	fill
MW-04	8	15	FILL: Brown clayey silt	silt and clay
MW-04	15	16	FILL: Black clayey silt to silty clay	silt and clay
MW-04	16	20	SP: Light brown coarse to fine sand, fine gravel, loose	coarse sand and/or gravel
MW-04	20	32	GP: Brown coarse to fine gravel, trace coarse to medium sand, loose to medium dense, poorly graded	coarse sand and/or gravel
MW-04	32	34	GP: Coarse to fine gravel, trace silt	coarse sand and/or gravel
MW-05	0	6	FILL: Dark brown silty clay, black coal cinders, topsoil	topsoil
MW-05	6	7	FILL: Coarse gravel, red coal cinders	fill
MW-05	8	12	FILL: Gray Silty clay with coarse sand and fine gravel, medium stiff	clay, sand, gravel
MW-05	12	14	FILL: Trace black coal cinders, Trace coarse sand	Cinders
MW-05	14	17	FILL: Gray Clayey silt	silt and clay
MW-05	17	20	GP: Gray coarse to fine gravel, coarse to fine sand, poorly graded, medium dense	coarse sand and/or gravel
MW-05	20	25.5	GP: Coarse to fine gravel, trace coarse to fine sand, poorly graded, medium dense	coarse sand and/or gravel
MW-05	25.5	31	GP: Loose	coarse sand and/or gravel
MW-06	0	10	FILL: Gravel, Clay, coal cinders	fill
MW-06	10	14	FILL: Dary gray clayey silt, organics, very soft	silt and clay
MW-06	14	18	FILL: Black coal cinders, loose	Cinders
MW-06	18	27.5	OL: Olive gray and gray organic silt, trace clay, trace peat	silt and clay
MW-06	27.5	30	OL: Dark gray organic clay, trace fine sand	clay, sand
MW-07	0	10	FILL: Sand, gravel, black cinder, dry	FILL
MW-07	10	13.5	FILL: Sand, gravel, clay, black coal cinders	FILL
MW-07	13.5	20	OH: Dark gray organic clay, soft	clay
MW-07	20	26	OH: Dark gray organic clay, molted black, medium stiff	clay
MW-07	26	31	OL: Gray organic silt, trace shells, fibers, very soft	silt and clay
MW-07	31	33.5	OH: Dary gray organic clay, trace fine gravel	clay, sand, gravel
MW-07	33.5	36	GC: Gray clayey gravel, coarse sand, clay, silt	clay, sand, gravel
MW-07	36	40	GC: Medium dense	clay, sand, gravel
MW-07	40	45	GP: Coarse to fine gravel, coarse sand, poorly graded, medium dense	coarse sand and/or gravel
MW-08	0	10	FILL: Fine gravel, sand, clay, black cinders	FILL
MW-08	10	24.5	FILL: Black Cinders	cinders
MW-08	24.5	27.5	OH: Dark gray organic clay, soft	clay
MW-08	27.5	30	OL: Dark gray organic silt, medium to soft, low plasticity	silt and clay
MW-09	0	10	FILL: Black cinders, fine gravel, crushed rock	FILL
MW-09	10	17	FILL: Black cinderws, coarse to fine sand, brick, fine gravel	cinders
MW-09	17	19	CL: Brown clayey silt, trace fine sand, moist	silt and clay
MW-09	19	32.5	SW: Light brown fine to medium sand, loose, well graded	sand

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
MW-10	0	10	CL: Black and brown silty clay topsoil	Topsoil
MW-10	10	13.5	OL: Brown organic silt, some clay, trace peat, soft	silt and clay
MW-10	13.5	16	OL: Black organic clay, medium plasticity, medium stiff	clay
MW-10	16	21	CL: Brown and gray silty clay, trace to little coarse to fine sand, medium stiff	clay
MW-10	21	24.5	SP: Gray coarse to fine sand, trace fine gravel, silt, poorly graded, loose	sand
MW-10	24.5	30	GP: Brown and gray coarse to fine gravel, poorly graded, loose	coarse sand and/or gravel
MW-11	0	10	Cinders, gravel, sand, silt	Fill
MW-11	10	16	Black and brown clay, fine gravel, cinders, bricks, silt, coarse sand	Fill
MW-11	16	18.5	Brown and gray silty clay, trace fine gravel, trace fine sand, stiff	silt and clay
MW-11	18.5	26	Gray clayey silt, organics, very soft	silt and clay
MW-11	26	32.5	Dark gray silty clay, some organics	silt and clay
MW-11	32.5	36.5	Brown and gray coarse to fine gravel, coarse to fine sand	coarse sand and/or gravel
MW-11	36.5	40	Light brown fine sand, well graded	sand
MW-12	0	10	Black cinders, fine gravel, silty clay	fill
MW-12	10	18.5	Black cinders, fine gravel, silty clay	fill
MW-12	18.5	26	Gray silt, little to some coarse to fine sand, trace clay	silt and clay
MW-12	26	32.5	Gray mottled black clayey silt with some organics, trace peat	silt and clay
MW-12	32.5	35	Dark brown and gray silty clay, trace coarse sand, trace organics	silt and clay
MW-13	0	10	Black cinders, sand, rock	fill
MW-13	10	17.5	Black cinders, medium sand	fill
MW-13	17.5	20	Gray/olive gray organic silt	silt and clay
MW-13	20	22.5	Dark gray and black organic clay	clay
MW-13	22.5	26	Dark gray and black organic silt	silt and clay
MW-13	26	30.5	Dark gray and black organic clay	clay
MW-13	30.5	34	Gray silty clay, some coarse to fine sand, trace fine gravel	clay with sand
MW-13	34	40	Brown coarse to fine gravel, trace coarse to medium sand, silt, medium dense	coarse sand and/or gravel
MW-14	0	10	Cinders, gravel, sand, silt	fill
MW-14	10	19.5	Brown fine gravel, some silty clay and coarse sand, black cinders	fill
MW-14	19.5	25	Gray organic silt, some fine sand	silt and clay
MW-14	25	29	Gray and mottled black organic silt, trace fine sand	silt and clay
MW-14	29	30	Gray and black organic clay	clay
MW-15	0	10	Black cinders, fine gravel, sand, silt	fill
MW-15	10	19.5	Black cinders, fine gravel, coarse sand, silt	fill
MW-15	19.5	23.5	Gray fine sand, trace medium sand	sand
MW-15	23.5	28	Gray silt, mottled black, some organics	silt and clay
MW-15	28	30	Gray silty clay, some organics	silt and clay
MW-16	0	8.5	Fill	Fill
MW-16	8.5	35	Sand	Sand
MW-17	1	18	Silty Sand	Sand
MW-17	18	21	Silt, gray, laminated with Silty Sand	Silt and clay
MW-17	21	25	Silt, gray, laminated with light brown silt, organics	Silt and clay
MW-17	25	26.5	Silty Sand, Black and dark gray, fine to medium	Sand
MW-17	26.5	30	Silt and Sand, gray and black	Sand
MW-18	0	2	Silty Clay	Silt and clay
MW-18	2	29	Silty Sand	Sand
MW-18	29	31.5	Clay	Silt and clay
MW-18	31.5	36	Clay	Silt and clay
MW-18	36	39	Clay	Silt and clay
MW-18	39	40	Silty Sand	sand
MW-18A	0	6	Sand, trace silt	sand
MW-18A	6	13.5	Gravel, trace sand	gravel
MW-18A	13.5	18	Gravel, trace silt and clay	gravel
MW-18A	18	28	Gravel	gravel
MW-18A	28	35	Silt and clay	silt and clay
MW-19	0	28.5	Silty Sand	sand
MW-19	28.5	29	Sand	Sand
MW-19	29	41	Sand	Sand
MW-20	0	5	Clay with sand and gravel	clay
MW-20	5	12	Sand and gravel	sand and gravel
MW-20	12	19	clay with some sand and gravel, cinders	clay
MW-20	19	21	Silty clay with sand and gravel	Silt and clay
MW-20	21	27.5	Clayey silt with trace sand and gravel	Silt and clay
MW-20	27.5	30	Silt with trace sand	Silt and clay
MW-21	0	2	Clay, cinders	clay
MW-21	2	6	Sand and gravel	sand and gravel
MW-21	6	10	Clay with sand and gravel	clay
MW-21	10	13	Sand and gravel	sand and gravel

Well Name/Identifier	From ¹	To ¹	Description	Lithology Group
	ft, bgs	ft, bgs		
MW-21	13	17	Silty sand and trace gravel	silt and clay
MW-21	17	18	Clay	clay
MW-21	18	35	Silt with trace sand	silt and clay
MW-21D	35	45	Silty Sand	silt and clay
MW-22	0	8.5	FILL	fill
MW-22	8.5	10	Organic peat	organic
MW-22	10	19	Banded silt with trace clay and sand	silt and clay
MW-22	19	25	Sand and silty sand	sand
MW-23	0	7.5	Clay, top soil, sand and gravel	topsoil
MW-23	7.5	10	Silty sand	sand
MW-23	10	29	Gravel with trace medium-coarse sand and silt	gravel
MW-23	29	30	Clay with trace silt and sand	clay
MW-23	30	43	Sand with trace silt and gravel	sand
MW-24	0	12	Sand with some gravel and slag (fine to coarse)	Sand
MW-24	12	28.5	Clay with trace fine to medium gravel and trace organics	clay
MW-24	28.5	30	Silty sand	silt and clay
MW-24	30	32.5	Lean clay with trace gravel	clay
MW-24	32.5	37	Clayey sand with trace silt	sand with clay
MW-24	37	45	Sand with some gravel	sand and gravel
P-1	0	8.5	Sand, coarse to medium	sand
P-1	8.5	10	Silt, trace clay	silt and clay
P-1	10	19	Gravel with trace silt	gravel
P-1	19	20	Clay, silty	clay
P-2	0	4	Sand and Gravel	sand and gravel
P-2	4	12.5	Sand and silt with trace gravel	silt and clay
P-2	12.5	20	Sandy silt	silt and clay

Notes:

ft, bgs

feet below ground surface

Table 3: Hydraulic Conductivity Data for Site Wells

Well Name	Screened Depth	Screened Geology	Test Name	Hydraulic Conductivity Estimate	
				ft/s	ft/d
MW-02	23.5-33.5	Gravel with Sand	D3	4.82E-03	420
MW-05	21-31	Gravel	D1	3.21E-04	30
MW-08	20-30	Fill/Clay/Silt	U1	1.62E-03	140
			D1	1.36E-03	120
MW-09	22-32	Sand	D2	1.52E-03	130
MW-10	19-29	Clay/Sand/Gravel	U2	1.01E-03	90
			D1	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	MW-10	MW-11	MW-12
Groundwater Elevation:												
Minimum (ft)	434.3	429.6	428.4	427.8	429.6	443.1	430.5	445.1	439.0	435.0	436.6	447.8
Maximum (ft)	448.2	449.9	448.9	449.5	449.3	450.7	449.3	448.5	449.3	447.8	449.2	452.8
1st Quartile (ft)	436.7	432.4	432.1	431.2	432.1	447.2	432.8	446.2	441.2	437.5	438.8	449.5
3rd Quartile (ft)	443.0	440.6	440.5	438.4	439.2	448.7	438.6	447.3	445.3	442.8	443.7	451.2
IQR (ft)	6.4	8.1	8.4	7.3	7.1	1.5	5.9	1.1	4.1	5.2	4.8	1.7
Lower Bound (ft)	427.1	420.3	419.6	420.3	421.5	444.9	423.9	444.6	435.0	429.7	431.6	446.9
Upper Bound (ft)	452.6	452.7	453.1	449.3	449.7	450.9	447.5	448.9	451.4	450.6	450.9	453.7
Average (ft) ¹	440.2	436.8	436.6	435.2	435.9	447.9	436.2	446.8	443.5	440.4	441.4	450.2
Measurement Date ²												

Notes:

ft = feet

IQR = Interquartile range

¹The calculated average water level was used as the calibration head target in the numerical groundwater flow model²The water levels for the site wells span the period 2011 - 2026, depending on the well. The regional wells had one water level with the well drilling log.

	Site Wells											
	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18	MW-18A	MW-19	MW-20	MW-21	MW-21D	MW-22
Groundwater Elevation:												
Minimum (ft)	436.8	438.1	443.5	440.4	439.5	436.0	433.9	436.9	436.1	435.3	434.7	434.1
Maximum (ft)	449.9	450.1	449.4	451.2	449.0	446.8	441.6	446.7	445.0	444.5	445.9	445.5
1st Quartile (ft)	437.9	444.9	446.2	442.3	443.9	440.4	437.6	438.7	436.8	435.9	435.6	435.3
3rd Quartile (ft)	443.7	446.8	447.4	446.0	448.1	443.6	439.6	443.3	442.1	440.5	438.8	438.9
IQR (ft)	5.8	1.9	1.2	3.8	4.2	3.3	2.0	4.6	5.3	4.6	3.1	3.6
Lower Bound (ft)	429.2	442.0	444.3	436.6	437.6	435.5	434.7	431.8	428.9	429.0	430.9	429.9
Upper Bound (ft)	452.5	449.7	449.3	451.7	454.5	448.6	442.5	450.2	450.0	447.4	443.4	444.3
Average (ft) ¹	441.2	444.9	446.8	444.4	445.9	441.8	438.5	441.1	439.6	438.3	437.5	437.3
Measurement Date ²												

Notes:

ft = feet

IQR = Interquartile range

¹The calculated average water level was used as the calibration head target in the numerical groundwater flow model²The water levels for the site wells span the period 2011 - 2026, depending on the well. The regional wells had one water level with the well drilling log.

	Site Wells		Regional Wells											
	MW-23	MW-24	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:														
Minimum (ft)	437.5	429.2												
Maximum (ft)	446.4	443.3												
1st Quartile (ft)	438.3	430.4												
3rd Quartile (ft)	441.6	435.0												
IQR (ft)	3.3	4.7												
Lower Bound (ft)	433.5	423.4												
Upper Bound (ft)	446.5	442.0												
Average (ft) ¹	440.2	432.8	438.0	442.0	460.5	443.9	452.0	451.5	454.0	440.3	445.3	441.3	425.0	443.0
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

IQR = Interquartile range

¹The calculated average water level was used as the calibration head target in the numerical groundwater flow model²The water levels for the site wells span the period 2011 - 2026, depending on the well. The regional wells had one water level with the well drilling log.

Table 5: Calculation of Average River Stage

Date	Water Level in MW-04	Average Daily Stage ^{1,2}	Difference ³
	ft, amsl	ft, amsl	ft
6/20/2017	438.42	439.1	-0.68
8/28/2017	432.08	431.03	1.05
11/7/2017	434.95	434.06	0.89
5/17/2018	436.44	437.1	-0.66
8/7/2018	431.34	429.3	2.04
10/30/2018	433.99	431.38	2.61
2/25/2019	445.12	443.91	1.21
4/29/2019	444.69	441.21	3.48
8/26/2019	433.22	430.78	2.44
2/24/2020	440.76	440.01	0.75
4/27/2020	440.81	439.81	1
12/7/2020	432.07	430.14	1.93
2/22/2021	434.13	433.38	0.75
4/7/2021	438.67	437.4	1.27
5/10/2021	436.65	437.88	-1.23
6/2/2021	439.16	437.87	1.29
6/28/2021	438.17	439.28	-1.11
7/19/2021	443.35	442.23	1.12
8/23/2021	432.76	430.66	2.1
9/30/2021	430.56	429.66	0.9
10/27/2021	438.28	440.25	-1.97
11/29/2021	434.74	432.34	2.4
12/30/2021	434.78	433.85	0.93
1/6/2022	435.27	433.62	1.65
2/7/2022	432.62	431.57	1.05
3/1/2022	443.94	443.21	0.73
5/24/2022	439.68	438.59	1.09
6/6/2022	437.68	429.59	8.09
7/25/2022	431.39	432.53	-1.14
8/29/2022	430.86	429.72	1.14
9/28/2022	429.15	429.54	-0.39
10/26/2022	428.19	431.53	-3.34
11/14/2022	427.77	430.37	-2.6
1/24/2023	432.78	434.46	-1.68
2/20/2023	434.11	434.77	-0.66
3/28/2023	443.08	442.07	1.01
4/25/2023	438.56	436.57	1.99
5/15/2023	436.28	435.95	0.33
6/26/2023	430.44	429.59	0.85
7/25/2023	430.69	430.84	-0.15
8/28/2023	429.97	430.43	-0.46
9/27/2023	429.67	430.52	-0.85
10/27/2023	431.85	431.15	0.7
11/6/2023	430.58	430.82	-0.24
12/21/2023	430.55	433.29	-2.74
1/24/2024	439.5	440.09	-0.59
2/19/2024	442.18	439.91	2.27
3/26/2024	438.04	437.27	0.77
4/12/2024	445.13	443.96	1.17
5/15/2024	444.75	443.07	1.68
6/17/2024	434.89	439.2	-4.31
7/25/2024	437.27	439.8	-2.53
8/21/2024	431.17	438.93	-7.76
9/9/2024	429.38	438.99	-9.61
10/29/2024	430.68	429.33	1.35
11/18/2024	430.59	431.31	-0.72
12/10/2024	430.06	429.97	0.09
AVERAGE			0.15

Notes:

ft, amsl = feet above mean sea level

ft = feet

¹Gage data from USGS Gage 5568500, Illinois River at Kingston Mines, IL²Gage elevation = 427.17 ft, amsl (corrected for vertical datum)³Difference between the water level measured in monitor well MW-04 and the average daily stage for that date

Table 6: Calibrated Water Budget

Component	Conceptual Flux	Modeled Flux	
	af/yr	af/yr	cfd
INFLOWS			
Recharge	100	84	9,990
Lateral and canal flow	0	263	31,361
Inflow from Ponds and FAB	0	282	33,669
Total Inflows		629	75,020
OUTFLOWS			
Lateral and canal flow	0	284	33,933
Discharge to Illinois River	1,966	344	41,073
Total Outflows		628	75,006

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	440.2	1	439.2	1.0
MW-02	2433847.08	1413749	436.8	1	437.2	-0.4
MW-03	2433616.58	1414290.06	436.6	1	436.4	0.3
MW-04	2433012.49	1414198.68	435.2	1	436.2	-1.0
MW-05	2432767.38	1413950.38	435.9	1	436.3	-0.4
MW-07	2432329.58	1413466.26	436.2	1	436.6	-0.3
MW-09	2432948.62	1411493.04	443.5	1	443.0	0.5
MW-10	2433292.14	1412489.79	440.4	1	440.0	0.5
MW-11	2432975.81	1412173.14	441.4	1	440.3	1.2
MW-13	2432491.87	1412182.91	441.2	1	439.4	1.7
MW-16	2432376.86	1410843.75	444.4	1	444.8	-0.4
MW-19	2432813.27	1411759.49	441.1	1	441.2	-0.1
MW-21D	2432352.12	1412219.23	437.5	1	439.0	-1.5
MW-23	2432993.95	1411947.96	440.2	1	441.0	-0.8
MW-24	2432107.37	1413698.31	432.8	1	436.3	-3.5
MW-22	2433012.15	1412616.45	437.3	1	439.2	-1.9
MW-21	2432352.12	1412219.23	438.3	1	440.8	-2.5
MW-06	2432559.16	1413578.06	447.9	1	448.0	-0.1
MW-08	2432586.83	1412982.06	446.8	1	446.4	0.3
MW-12	2432791.46	1412104.65	450.2	1	449.9	0.3
MW-14	2432357.75	1412545.44	444.9	1	444.0	0.9
MW-15	2432550.11	1412637.58	446.8	1	446.6	0.2
MW-17	2432588.25	1412428.59	445.9	1	445.7	0.2
MW-18	2432962.62	1413181.32	441.8	1	439.9	1.9
MW-18A	2432952.55	1413185.17	438.5	1	440.0	-1.5
MW-20	2432390.14	1412415.84	439.6	1	438.5	1.1
121792564300	2433669.16	1415617.07	425.0	0.1	435.4	-1.0
121790025600	2435796.86	1415284.43	438.0	0.1	437.6	0.0
121792378900	2432781.30	1410872.41	440.3	0.1	446.2	-0.6
121792237800	2435040.77	1416653.97	441.3	0.1	435.5	0.6
121790013100	2431499.62	1410489.72	442.0	0.1	445.1	-0.3
121792515900	2434760.01	1415047.22	443.0	0.1	436.2	0.7
121790012600	2434919.57	1416219.75	443.9	0.1	435.6	0.8
121792237700	2435040.77	1416653.97	445.3	0.1	435.5	1.0
121792379100	2432781.30	1410872.41	451.5	0.1	446.2	0.5
121792379000	2432781.30	1410872.41	452.0	0.1	446.2	0.6
121792378800	2432781.30	1410872.41	454.0	0.1	446.2	0.8
121790012800	2435381.38	1414262.36	460.5	0.1	439.1	2.1

Notes:

RMS = root mean squared

ft = feet

¹The 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 logs²The 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)	0.02	-0.17	-0.33	0.08
Minimum Residual (ft)	-3.48	-3.48	-3.48	-2.49
Maximum Residual (ft)	2.14	1.94	1.72	1.94
Sum of Squared Residuals (ft ²)	60	50	26	24
RMS Error (ft)	1.26	1.39	1.28	1.56
%RMS ⁴	4%	8%	11%	13%

Notes:

RMS = root mean squared

¹Regional (non-site specific) wells were given a weight of 0.1

²MW-01 through MW-05, MW-07, MW-09 through -11, MW-13, MW-16, MW-19, MW-21D, MW-23, and MW-24

³MW-06, MW-08, MW-12, MW-14, MW-15, MW-17, MW-18, MW-18A, and MW-20

⁴Calculated by dividing the RMS error by the range in measured values

Table 9: Initial Concentrations used for the Preferred Groundwater Remedy Model Scenario

Parameter	MW-07	MW-14	MW-18A	MW-24	GWPS
	mg/l	mg/l	mg/l	mg/l	mg/l
Sulfate	n/a	1300	n/a	n/a	400
TDS	n/a	3100	1600	n/a	1200
Arsenic	0.12	n/a	n/a	0.023	0.010
Cobalt	0.008	n/a	n/a	n/a	0.006
Thallium	n/a	0.0021	n/a	n/a	0.002

Notes:

GWPS = groundwater protection standard

mg/l = milligrams per liter

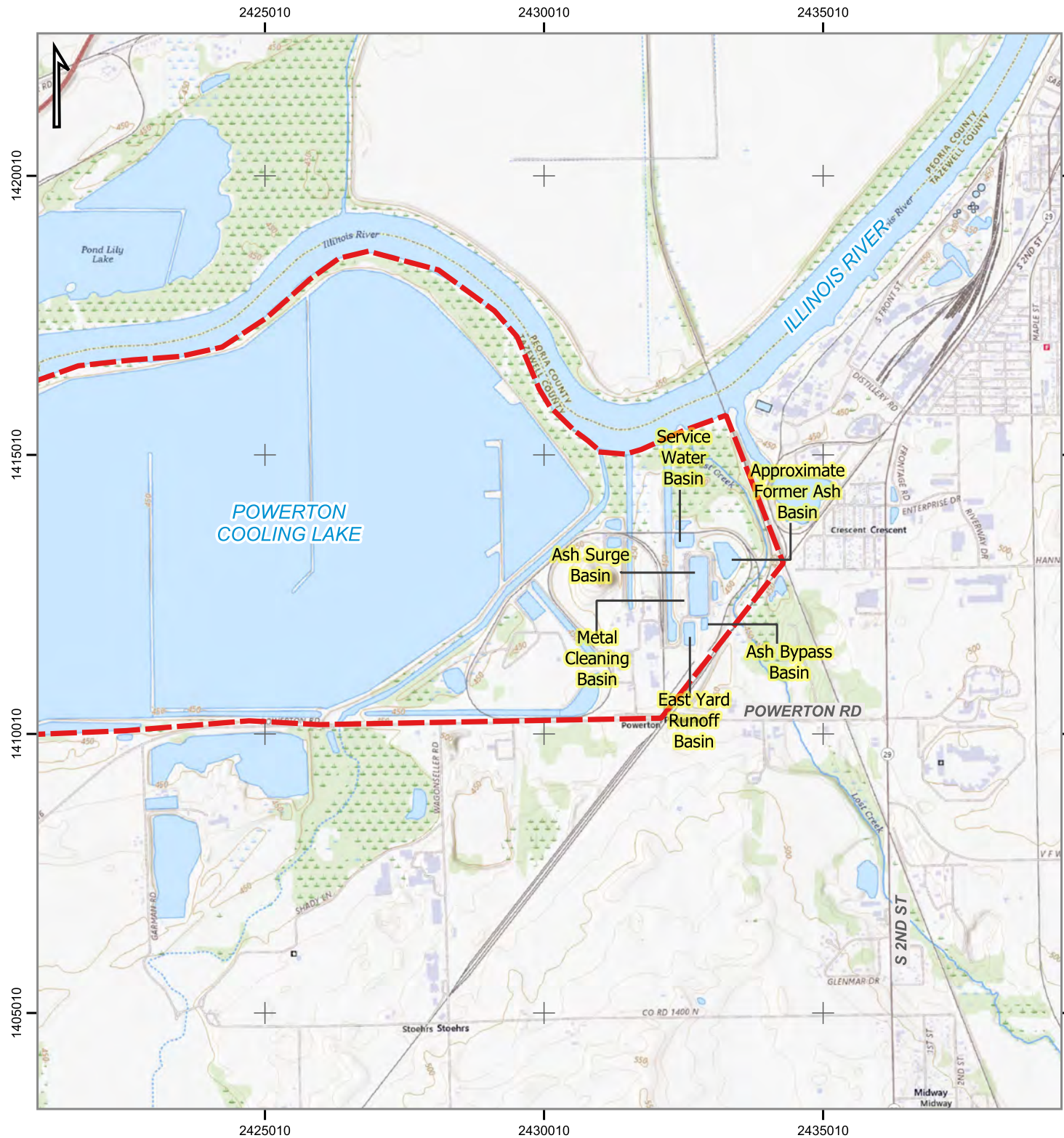
n/a = not applicable

TDS = total dissolved solids

Concentrations are from the November 2025 sampling event



FIGURES



LEGEND

 APPROXIMATE SITE BOUNDARY

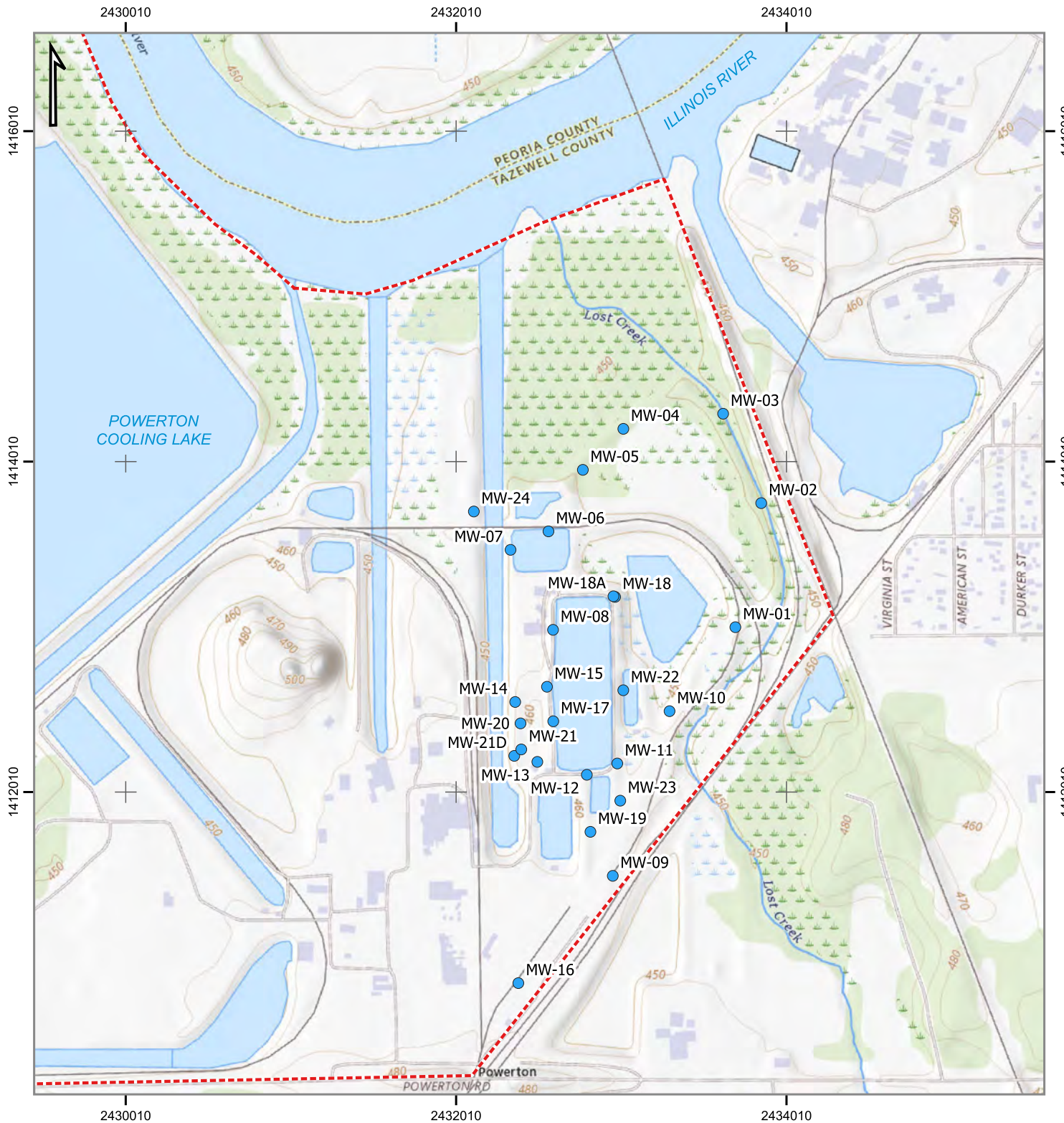


0 0.5 mi
FEET

Coordinate System:
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Project File: Figure1_LocationMap.qgz

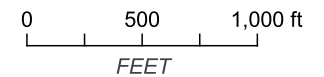


CLIENT	MIDWEST GENERATION		
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554		
TITLE	LOCATION MAP		
SCALE AT ANSI A 1:30,000	DRAWN DZF	07/11/2026	
	CHECKED BAS	07/11/2026	
BAS PROJECT No. 25211402	FIGURE:		1



LEGEND

- APPROXIMATE SITE BOUNDARY
- SITE MONITORING WELL

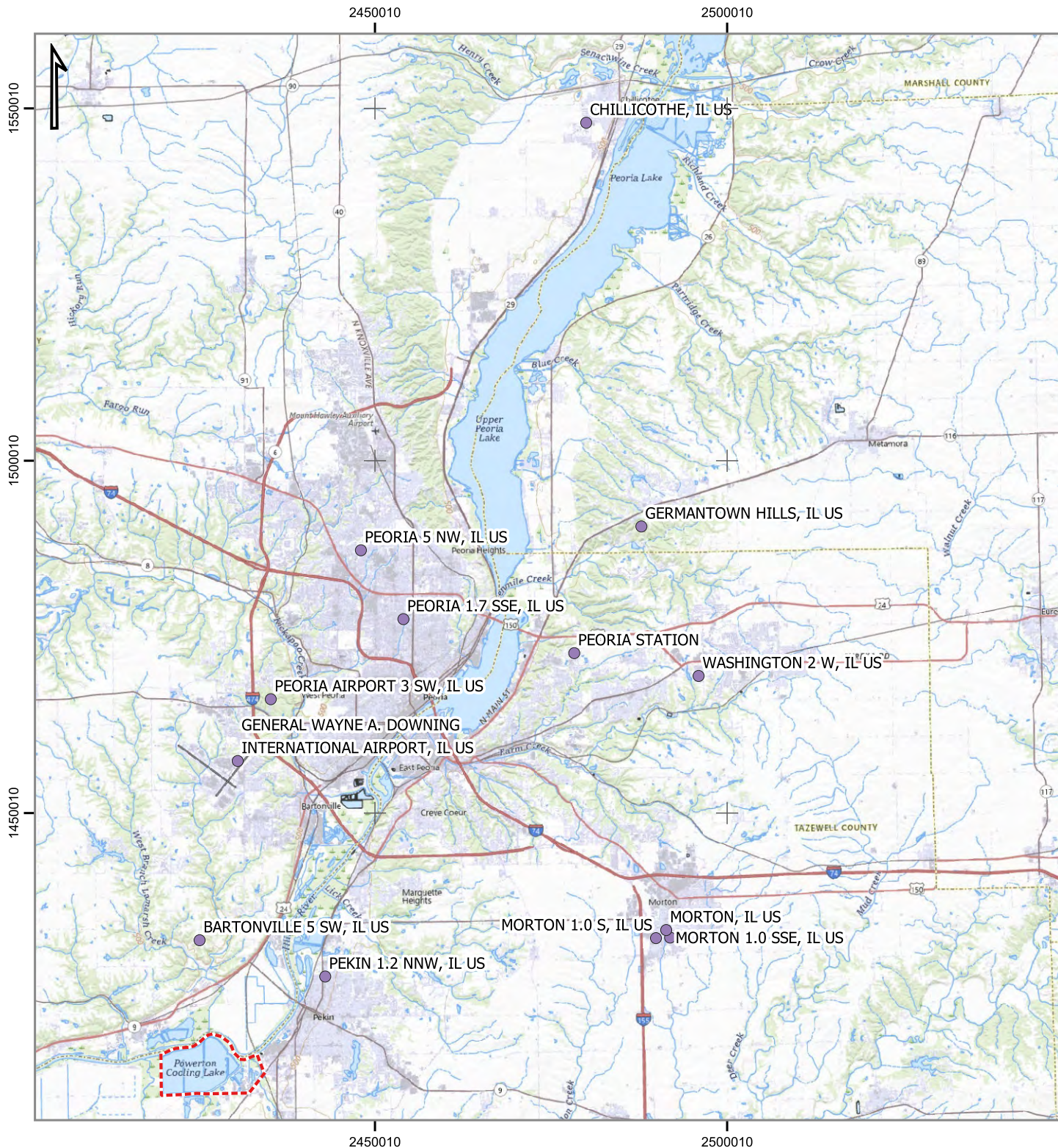


Coordinate System:
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Project File: Figure2_SiteWells.gxz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	POWERTON STATION SITE MONITORING WELLS

SCALE AT ANSI A 1:10,000	DRAWN DZF 07/11/2026 CHECKED BAS 07/11/2026
BAS PROJECT No. 25211402	FIGURE: 2



LEGEND

- CLIMATE STATION
- APPROXIMATE SITE BOUNDARY

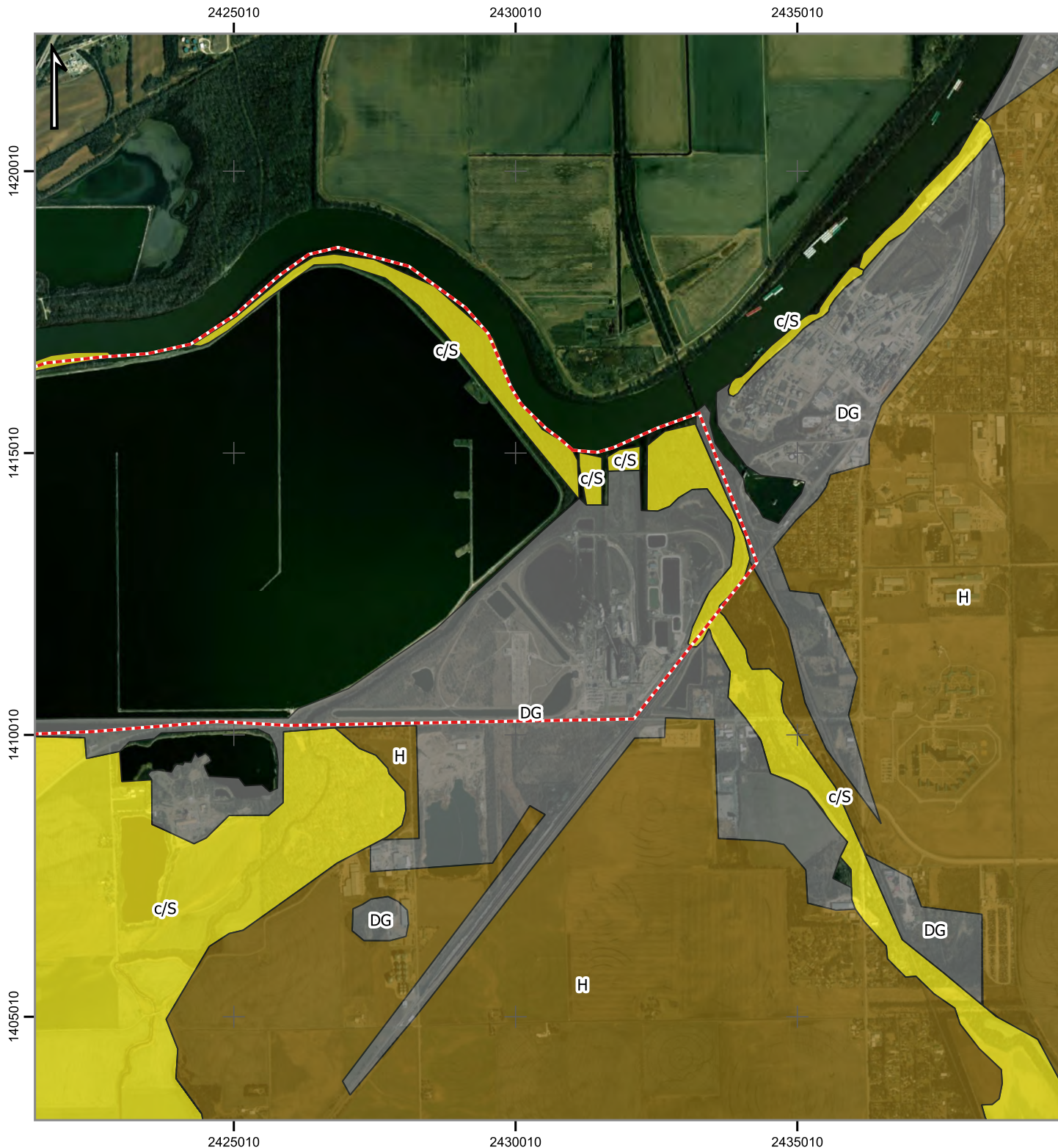


Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure3_ClimateStations.qgz



CLIENT	MIDWEST GENERATION
SITE	POWERON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	CLIMATE STATIONS NEAR POWERON STATION

SCALE AT ANSI A 1:240,000	DRAWN DZF 07/11/2026 CHECKED BAS 07/11/2026
BAS PROJECT No. 25211402	FIGURE: 3



LEGEND

 APPROXIMATE SITE BOUNDARY

SURFACE GEOLOGY

CAHOKIA FORMATION

DISTURBED GROUND

HENRY FORMATION

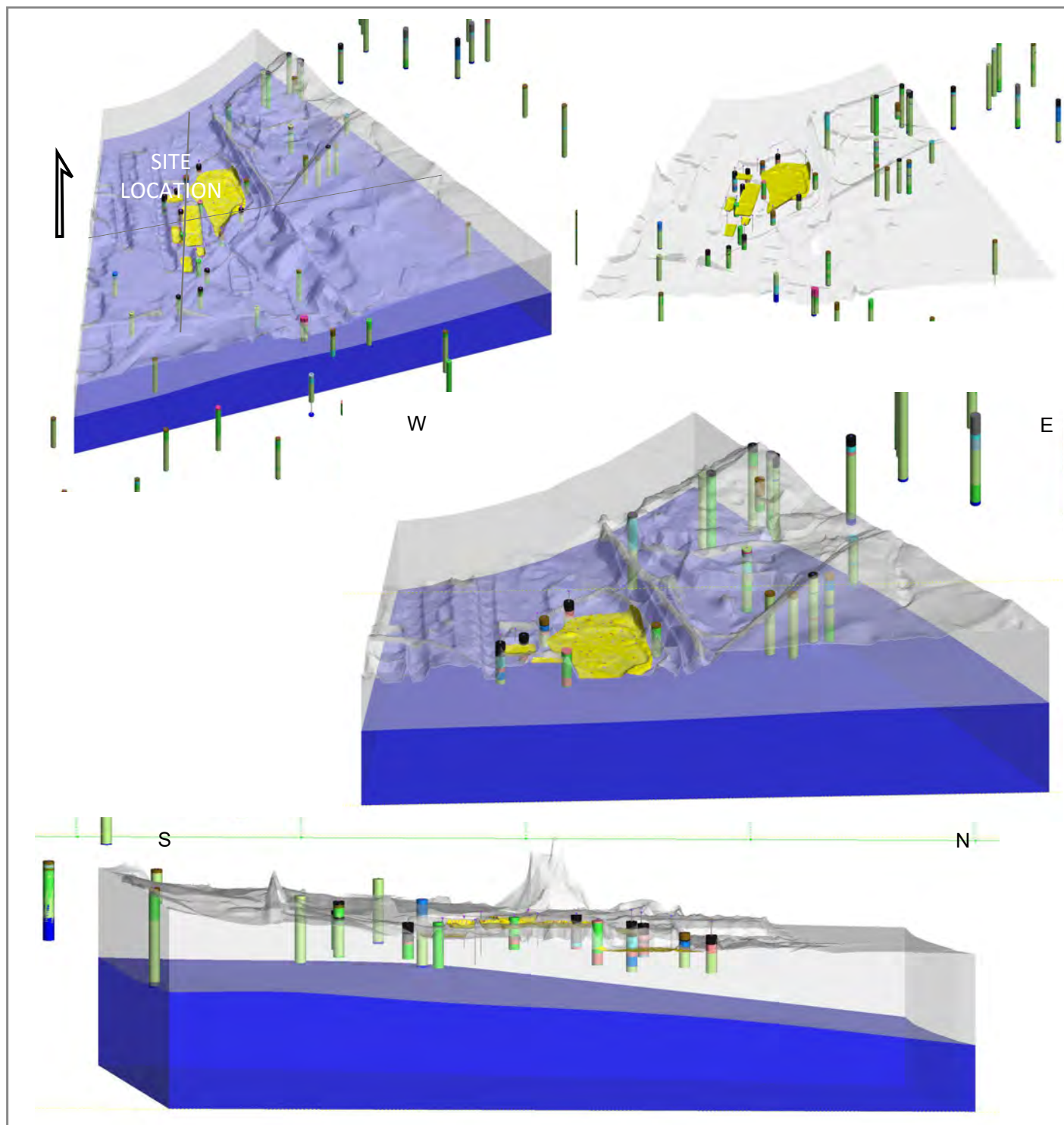
0 1,000 2,000 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure4_Geology.qgz



CLIENT	MIDWEST GENERATION
SITE	WAUKEGAN 401 E GREENWOOD AVE, WAUKEGAN, IL
TITLE	SURFACE GEOLOGY

SCALE AT ANSI A 1:30,000	DRAWN DZF 07/11/2026
	CHECKED BAS 07/11/2026
BAS PROJECT No. 25211402	FIGURE: 4



LEGEND

Leapfrog_Geology

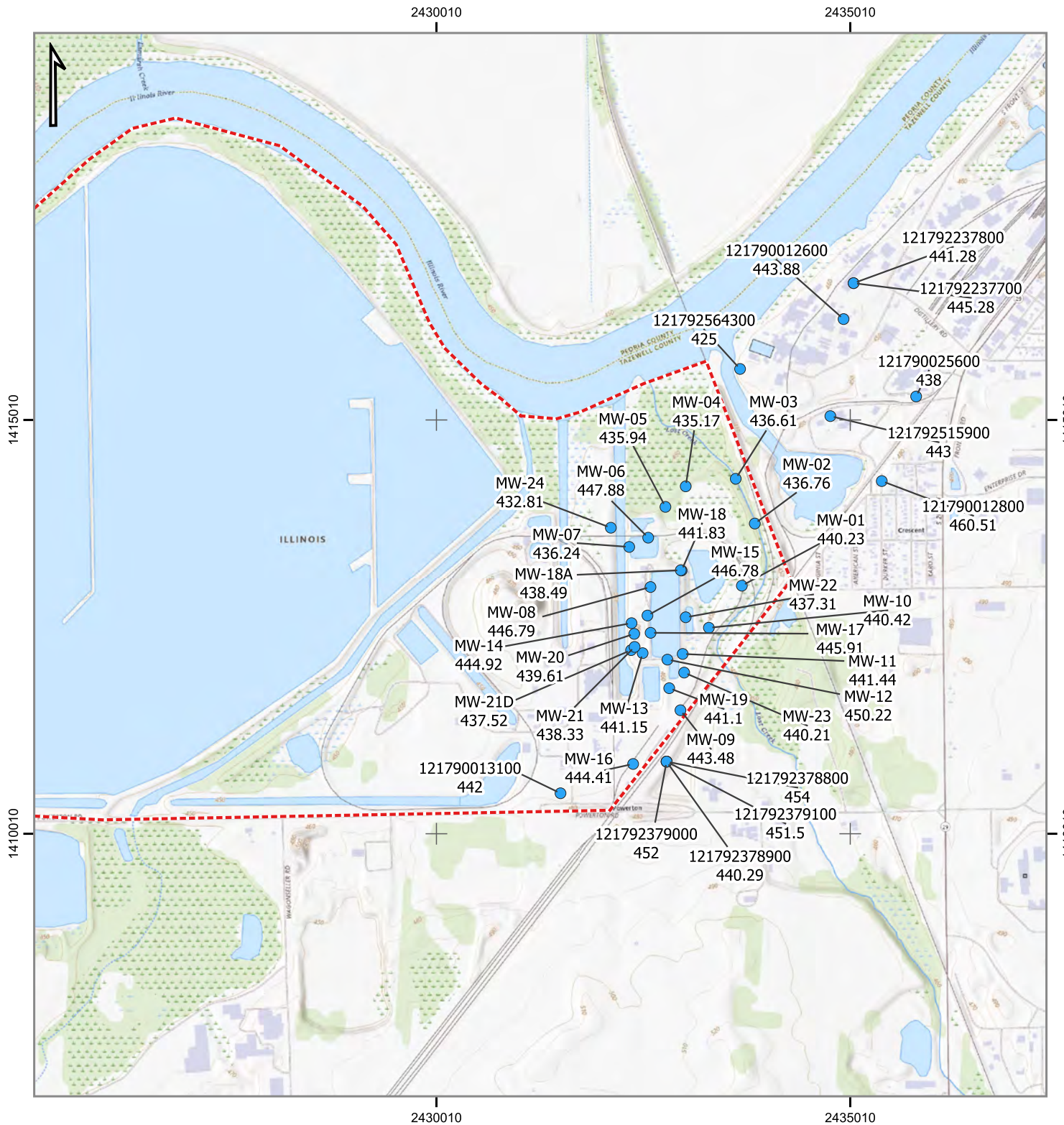
- FILL
- Topsoil
- cinders
- Organic
- clay
- loam
- clay, sand
- sand
- clay, sand, gravel
- silt and clay
- coal
- coarse sand and/or gravel
- dirty coarse sand and/or gravel
- hardpan
- limestone
- shale

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure6_LeapfrogGeology.qgz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	BOREHOLE LITHOLOGY DATA

SCALE AT ANSIA	DRAWN DZF	10/27/2022
	CHECKED BAS	10/27/2022
BAS PROJECT No. 25211402		FIGURE: 6



LEGEND

- AVERAGE WATER LEVEL ELEVATION (FT, AMSL)
- APPROXIMATE SITE BOUNDARY

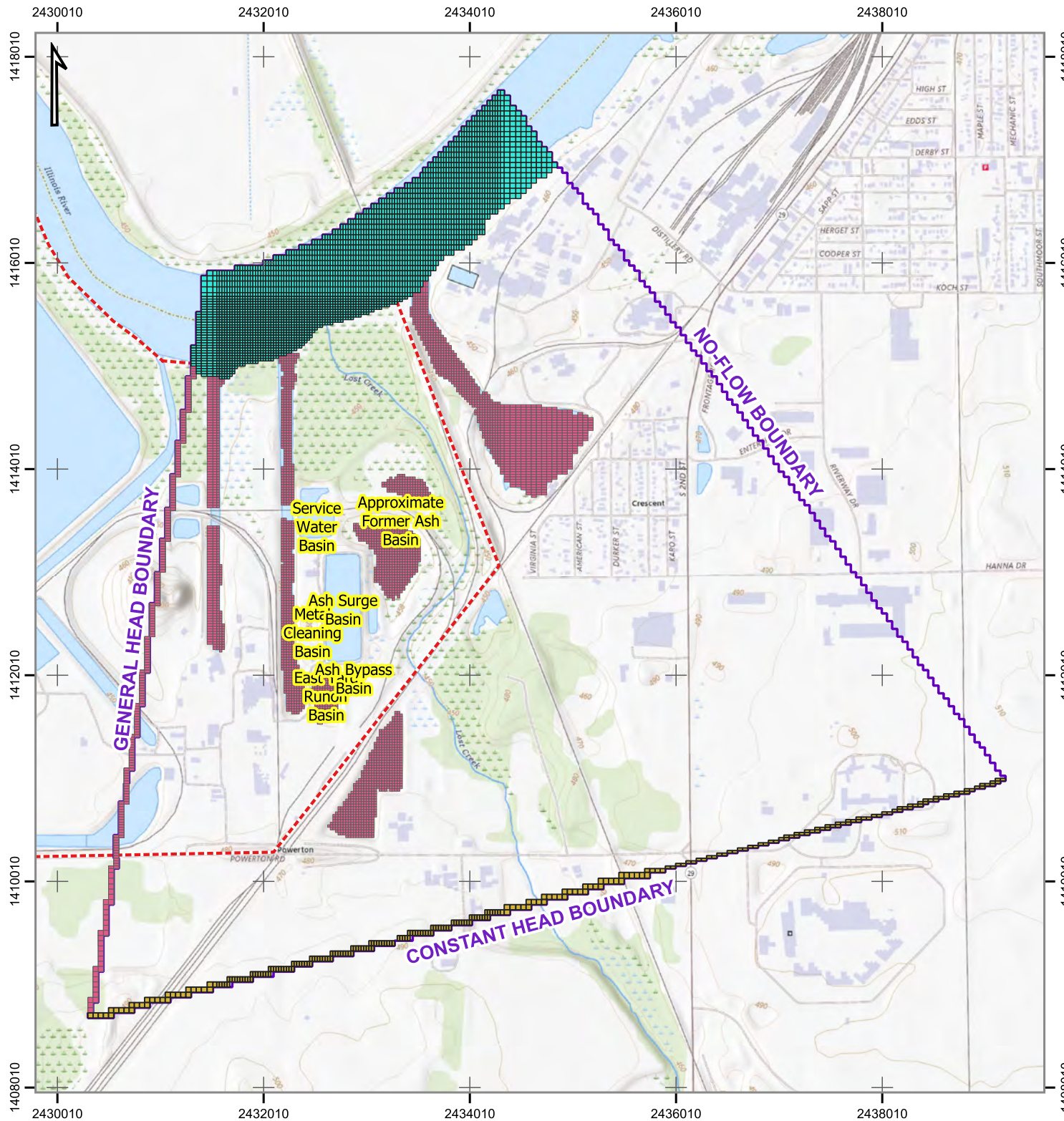
0 1,000 2,000 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure7_WellsWWaterLevelData.gxz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	WELLS WITH WATER LEVEL DATA

SCALE AT ANSI A 1:20,000	DRAWN DZF 07/13/2026 CHECKED BAS 07/13/2026
BAS PROJECT No. 25211402	FIGURE: 7



LEGEND

- GENERAL HEAD BOUNDARY
- CONSTANT HEAD BOUNDARY
- RIVER BOUNDARY
- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

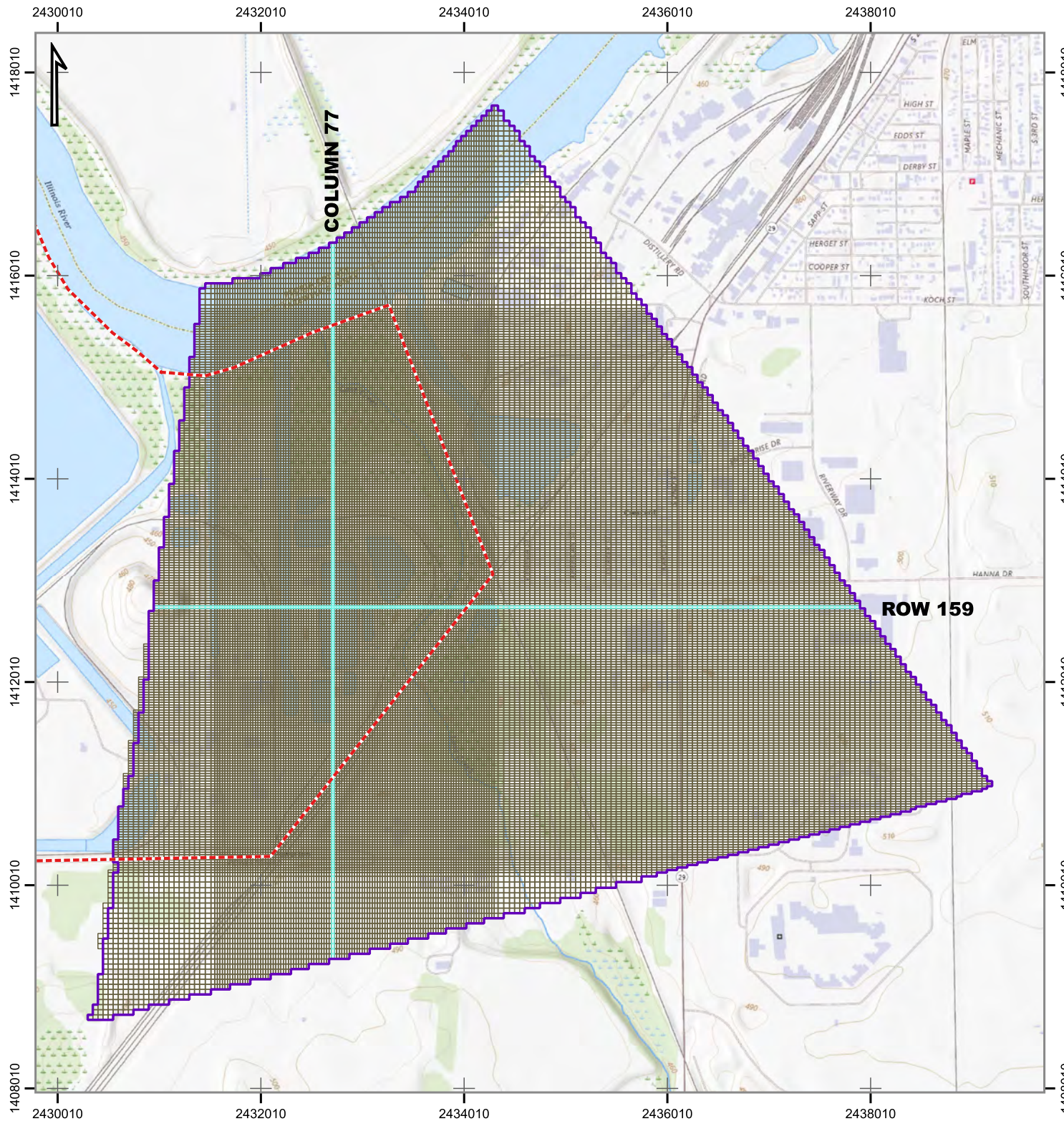
0 800 1,600 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure8_ModelBoundary.gqz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	MODEL BOUNDARY CONDITIONS

SCALE AT ANSI A 1:16,000	DRAWN DZF 07/12/2026 CHECKED BAS 07/12/2026
BAS PROJECT No. 25211402	FIGURE: 8



LEGEND

- MODEL GRID
- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

HIGHLIGHTED SECTIONS SHOWN
ON FIGURE 10

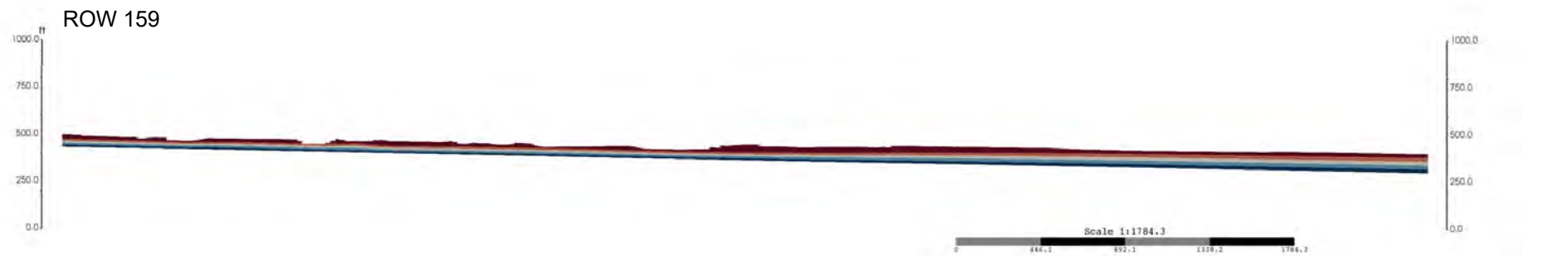
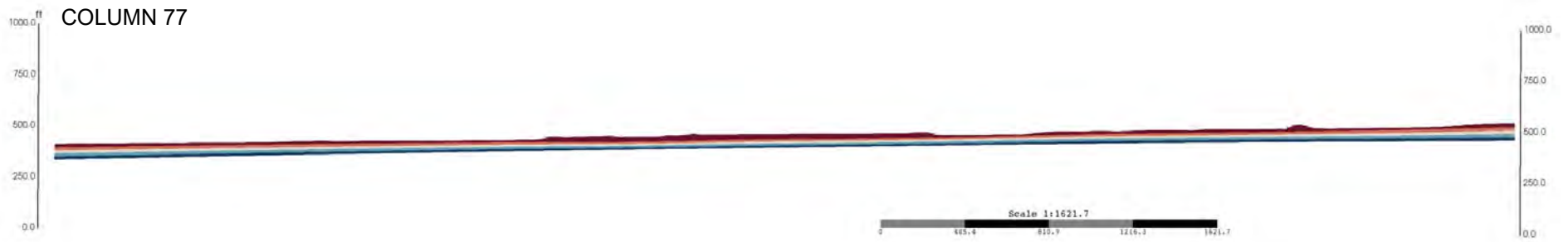
0 800 1,600 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure9_ModelGrid.qgz



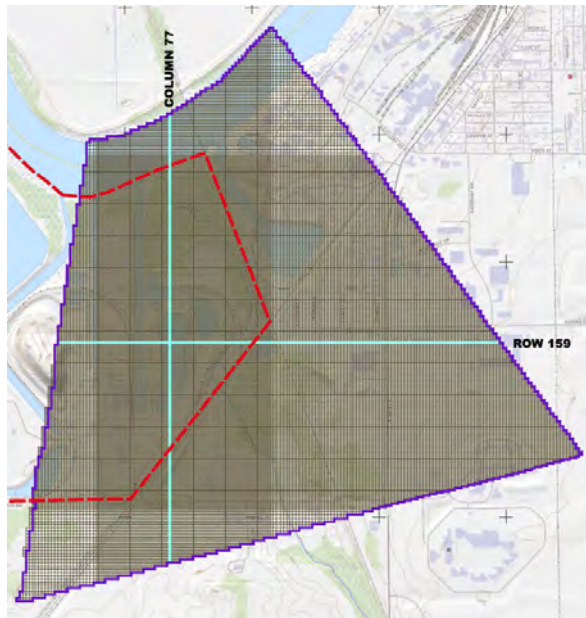
CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	MODEL GRID

SCALE AT ANSI A 1:16,234	DRAWN DZF 07/12/2026 CHECKED BAS 07/12/2026
BAS PROJECT No. 25211402	FIGURE: 9



LEGEND

- LAYER 1
- LAYER 2
- LAYER 3
- LAYER 5
- LAYER 6

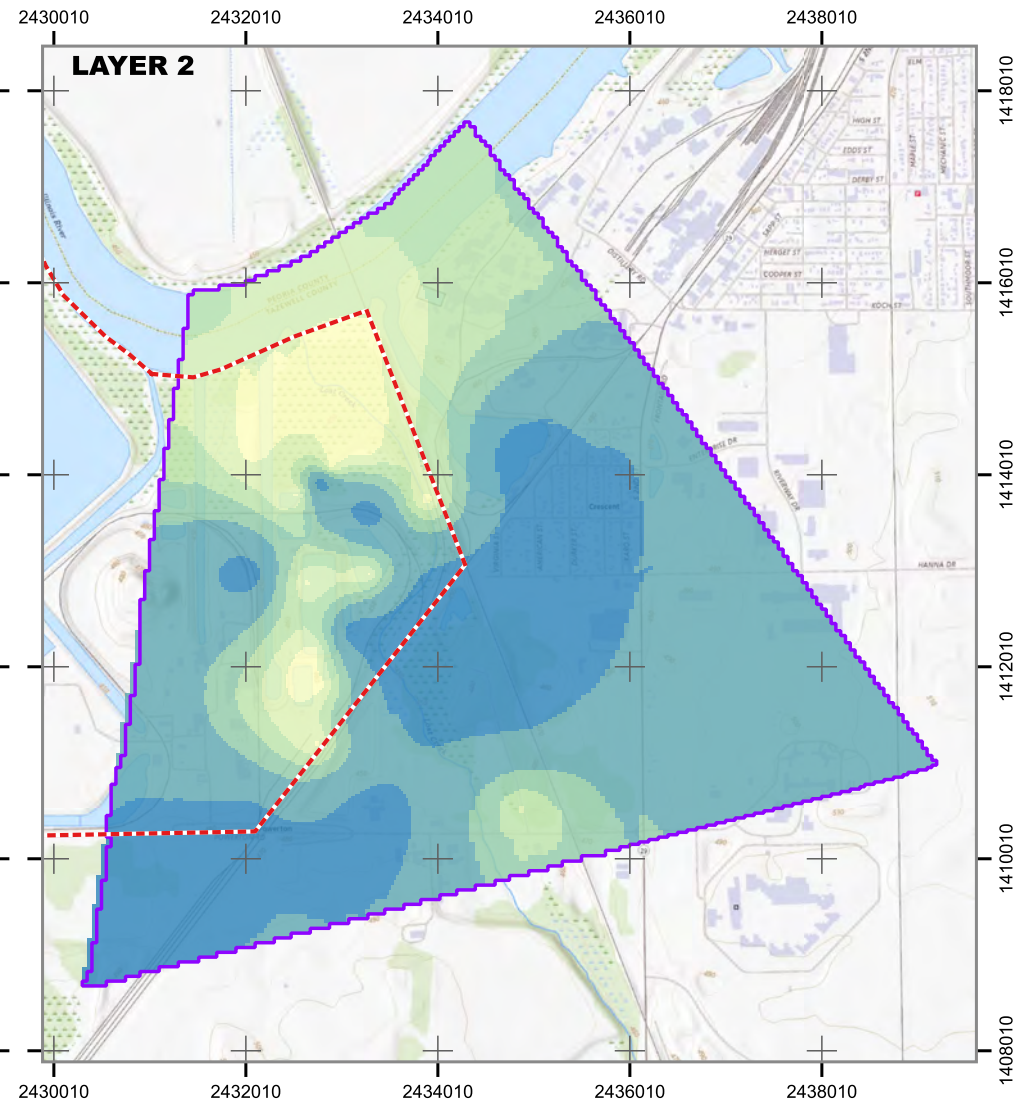
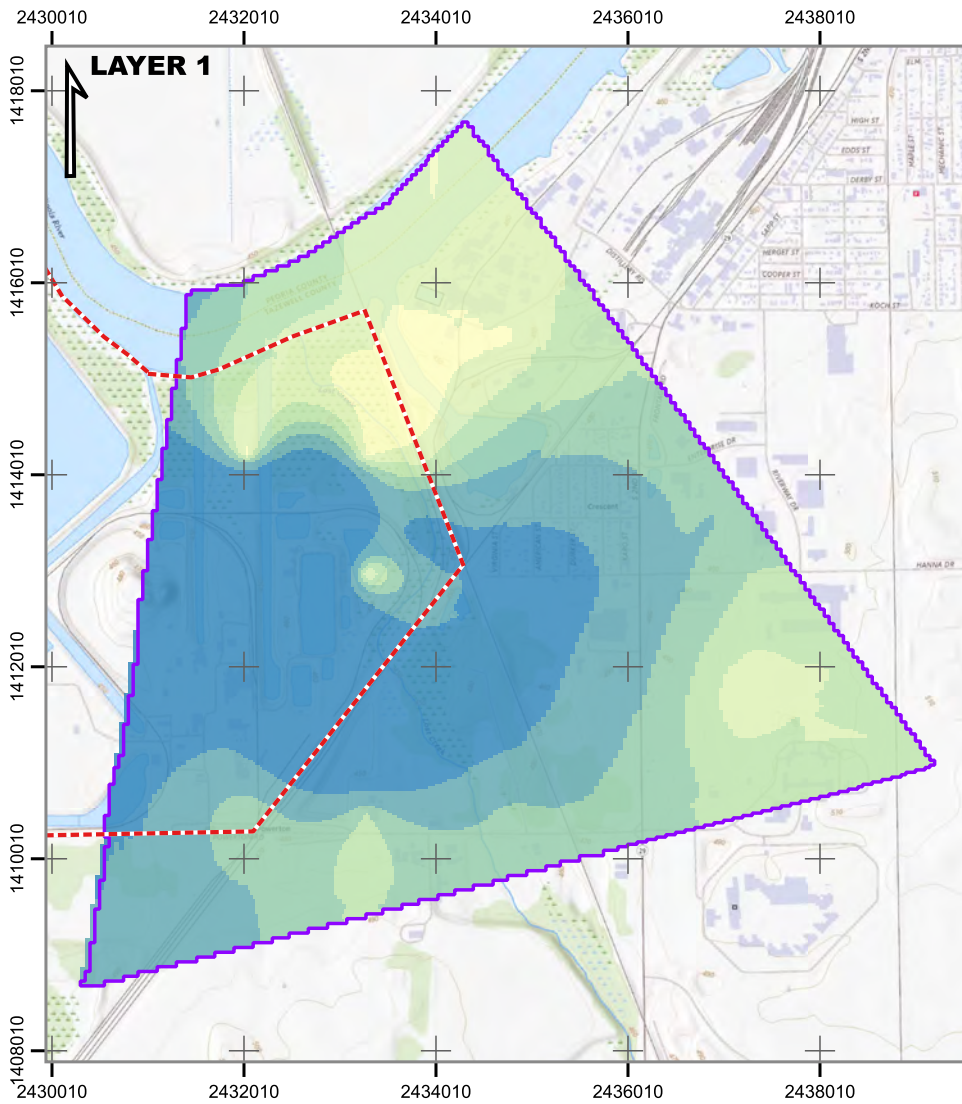


Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure10_ModelLayering.qgz



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. 25211402			FIGURE: 10



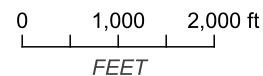
LEGEND

 MODEL BOUNDARY

 APPROXIMATE SITE BOUNDARY

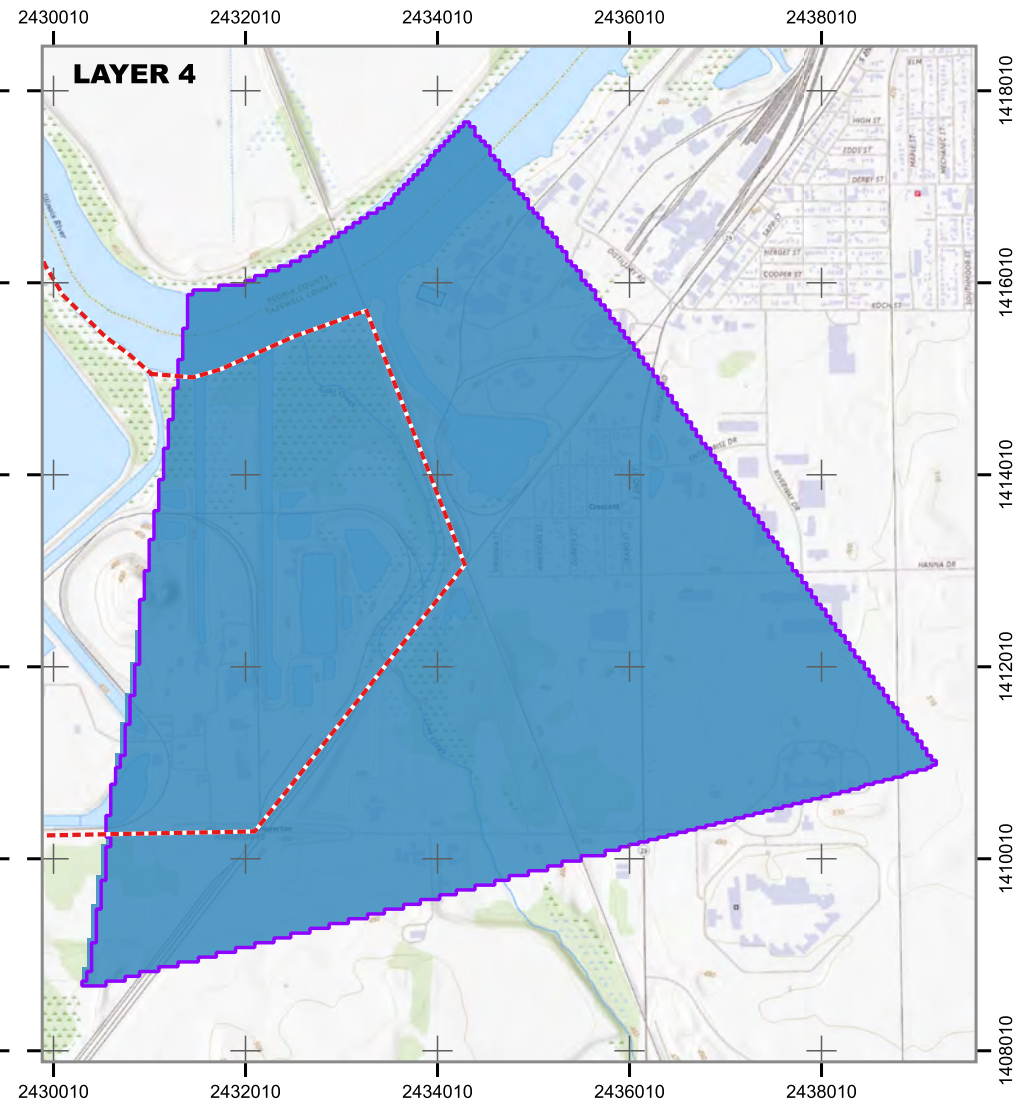
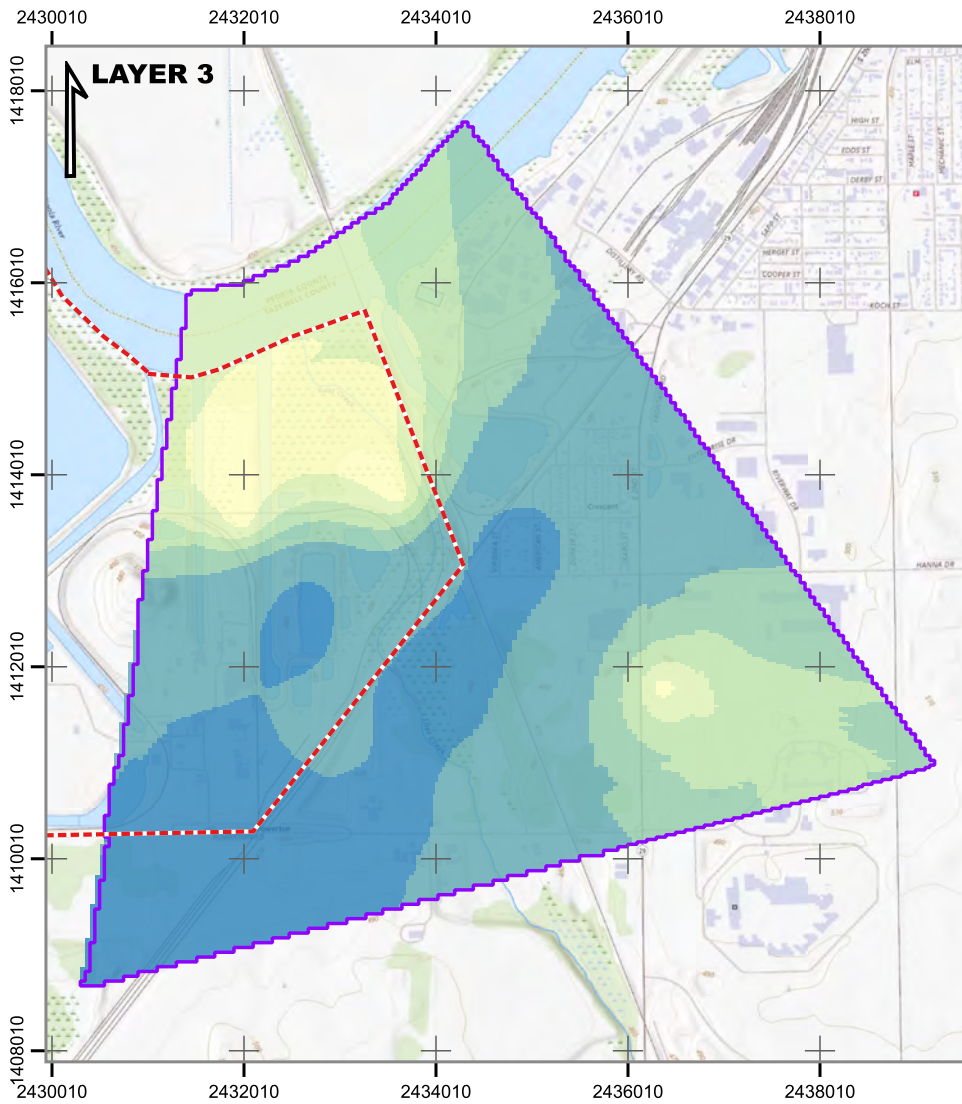
CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

 0 - 23	 290 - 456	 1017 - 1196
 23 - 84	 456 - 648	 1196 - 1371
 84 - 167	 648 - 832	 1371 - 1677
 167 - 290	 832 - 1017	



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure11_CalibratedKsLayers1_2.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		CALIBRATION HYDRAULIC CONDUCTIVITY DISTRIBUTION, MODEL LAYERS 1 & 2	
SCALE AT ANSI A	DRAWN	DZF	07/11/2026
1:24,000	CHECKED	BAS	07/11/2026
BAS PROJECT No.		FIGURE:	
25211402		11	



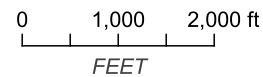
LEGEND

MODEL BOUNDARY

APPROXIMATE SITE BOUNDARY

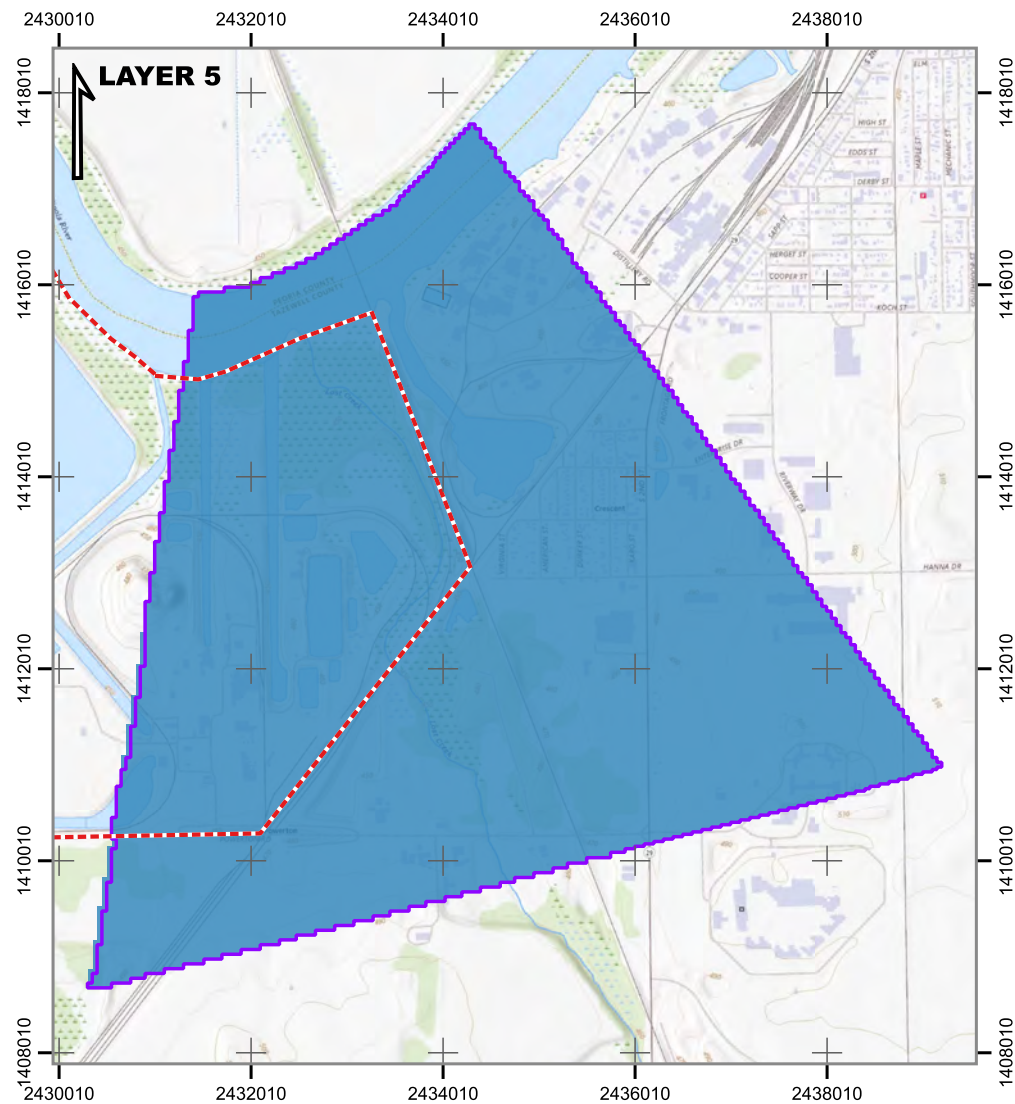
CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

0 - 26	303 - 428	911 - 1083
26 - 118	428 - 569	1083 - 1237
118 - 202	569 - 727	1237 - 1388
202 - 303	727 - 911	



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure12_CalibratedKsLayers3_4.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		CALIBRATION HYDRAULIC CONDUCTIVITY DISTRIBUTION, MODEL LAYERS 3 & 4	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/11/2026
	CHECKED	BAS	07/11/2026
BAS PROJECT No. 25211402		FIGURE: 12	



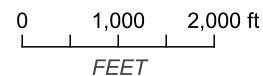
LEGEND

MODEL BOUNDARY

APPROXIMATE SITE BOUNDARY

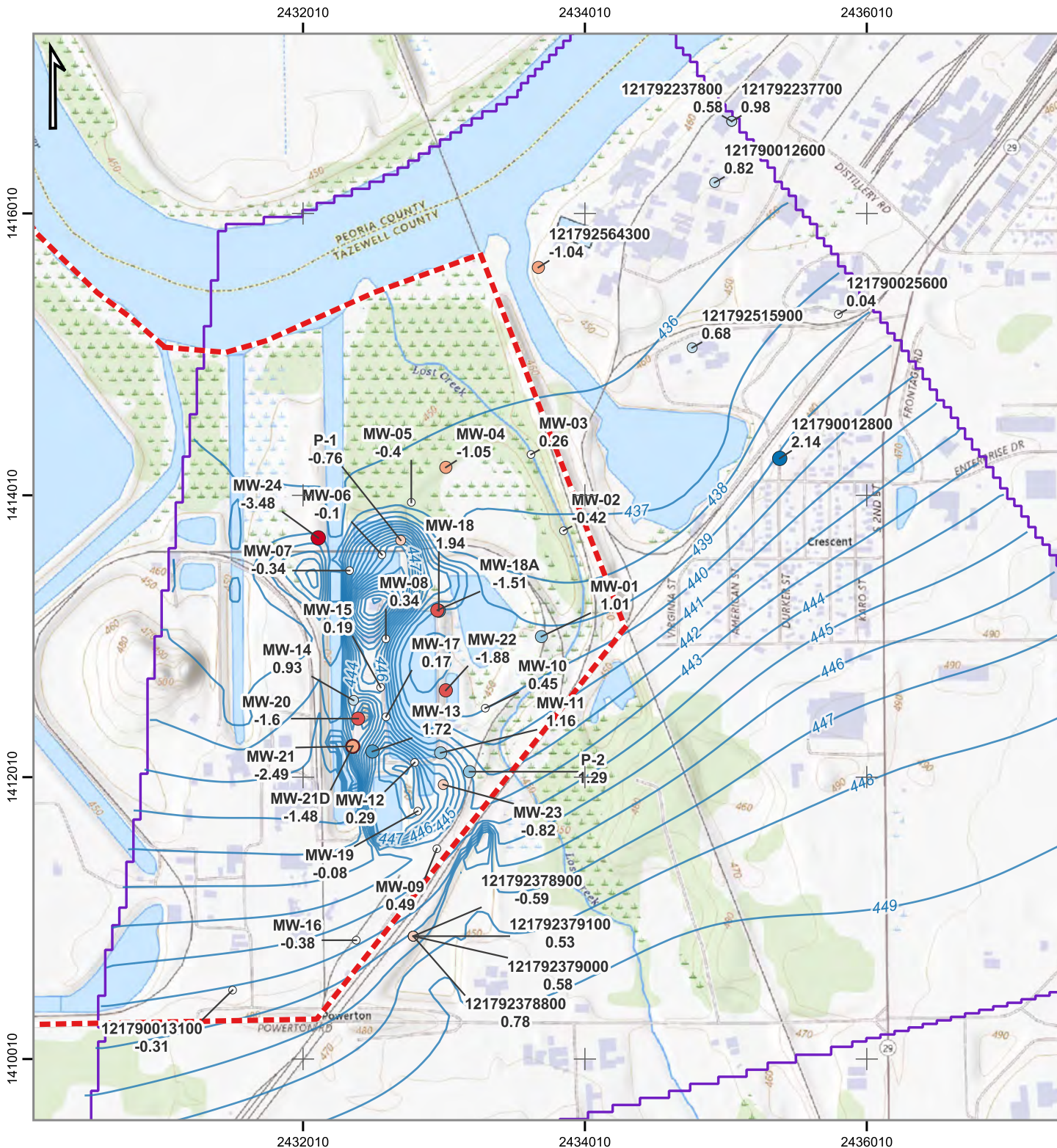
CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

0 - 23	290 - 456	1017 - 1196
23 - 84	456 - 648	1196 - 1371
84 - 167	648 - 832	1371 - 1677
167 - 290	832 - 1017	



Coordinate System:
Project File: Figure13_CalibratedKsLayers5.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		CALIBRATION HYDRAULIC CONDUCTIVITY DISTRIBUTION, MODEL LAYER 5	
SCALE AT ANSI A	DRAWN	DZF	07/11/2026
1:24,000	CHECKED	BAS	07/11/2026
BAS PROJECT No.		FIGURE:	
25211402		13	

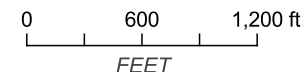


LEGEND

- APPROXIMATE SITE BOUNDARY
- MODEL BOUNDARY
- MODELED WATER LEVEL ELEVATION CONTOUR (FT, AMSL)

RESIDUAL (FT.)

- 3.5 - -1.5
- 1.5 - -1.0
- 1.0 - -0.5
- 0.5 - -0.2
- 0.2 - 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 3.5

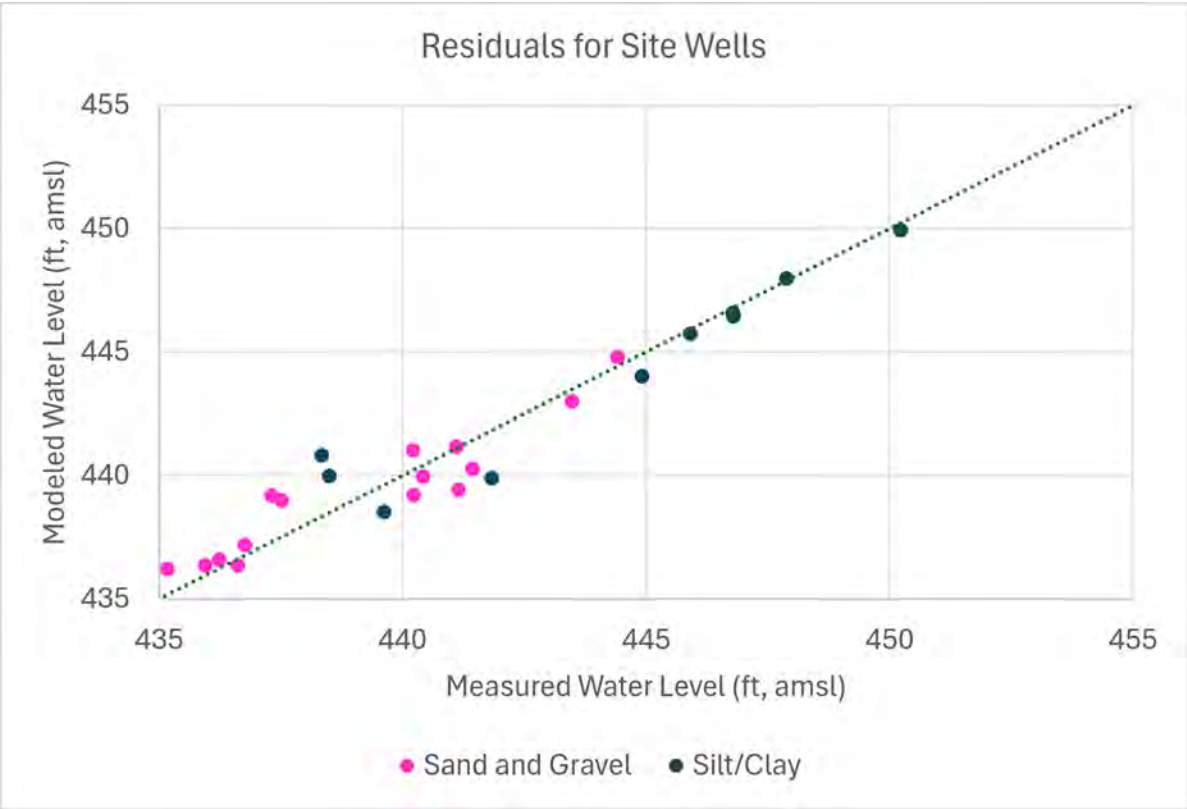


Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure14_Calibrated_WL_Residuals.gxz



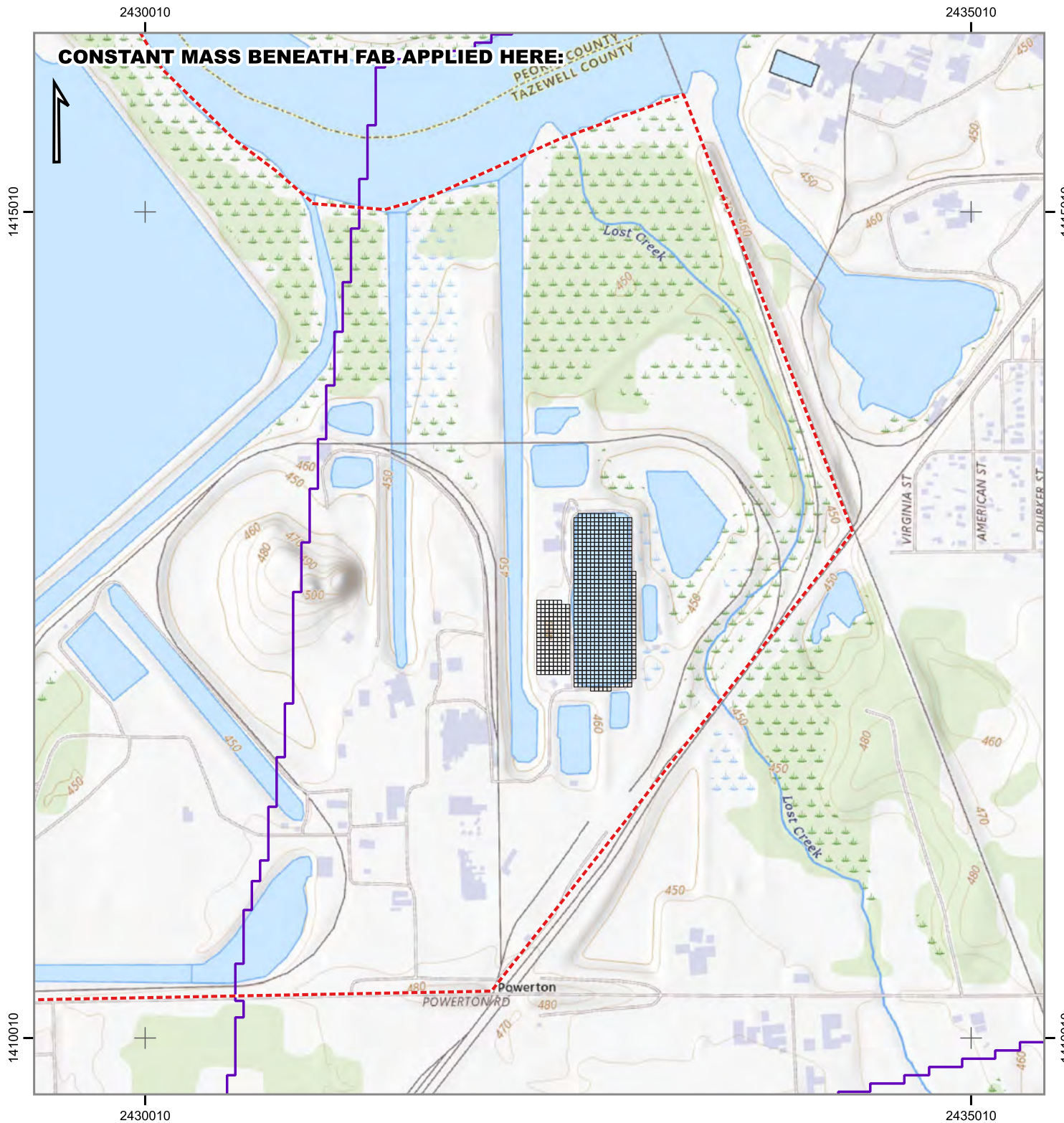
CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	CALIBRATED WATER LEVEL ELEVATIONS AND RESIDUALS

SCALE AT ANSI A 1:12,000	DRAWN DZF 07/14/2026 CHECKED BAS 07/14/2026
BAS PROJECT No. 25211402	FIGURE: 14



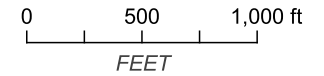
SCALE AT ANSI A	DRAWN	DZF	07/11/2026
	CHECKED	BAS	07/11/2026
BAS PROJECT No.		FIGURE:	
25211402		15	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	CALIBRATION SCATTER PLOT



LEGEND

- APPROXIMATE SITE BOUNDARY
- MODEL BOUNDARY
- AREA OF MASS DEFINITION BENEATH FAB



Coordinate System:
Project File: Figure16_AreaOfMassDefinitionBeneathFAB.ggz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	AREA OF HYPOTHETICAL MASS DEFINITION BENEATH MCB AND ASB

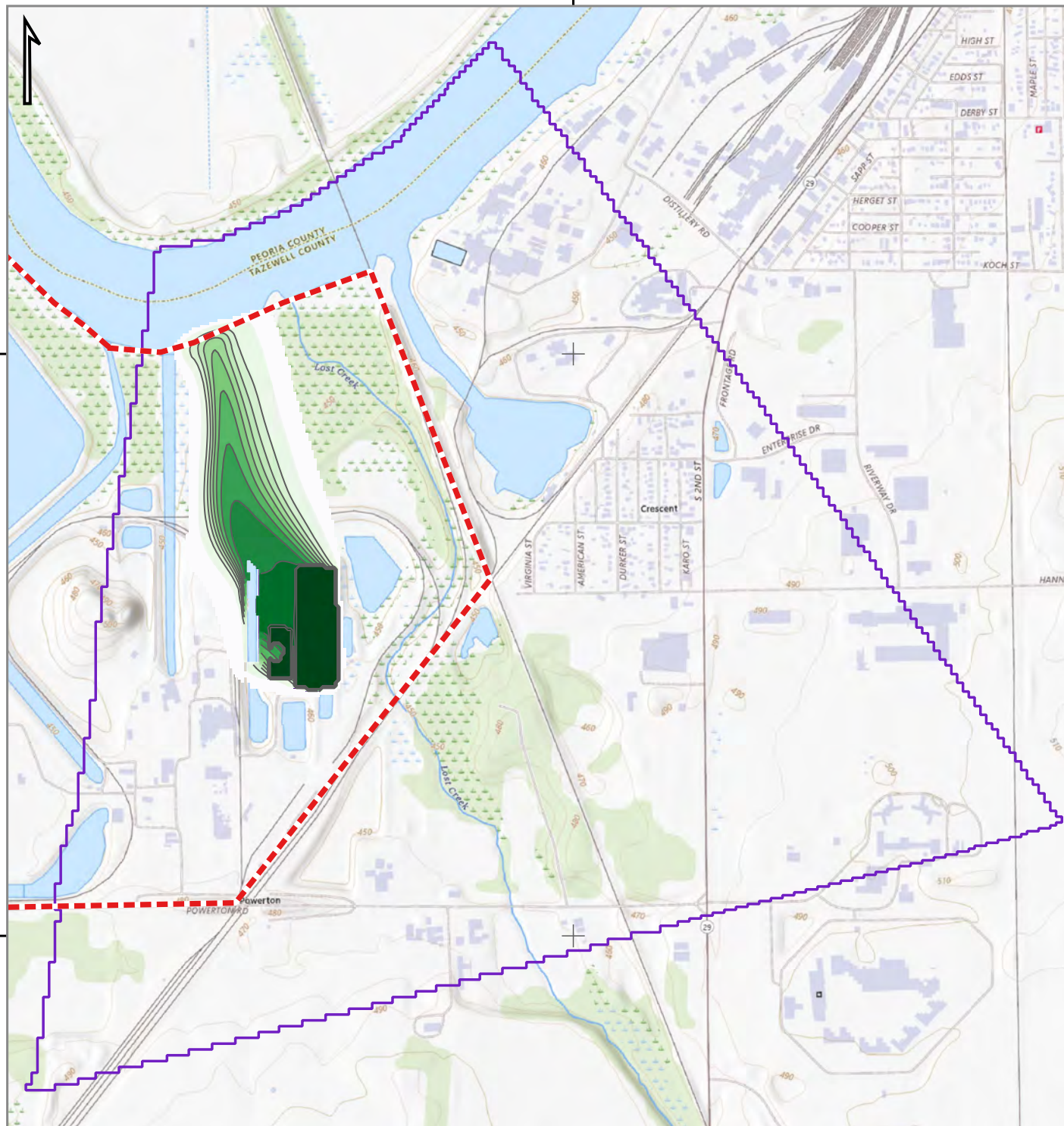
SCALE AT ANSI A 1:	DRAWN DZF 07/11/2026
	CHECKED BAS 07/11/2026
BAS PROJECT No. 25211402	FIGURE: 16

2435010

1415010

1410010

2435010

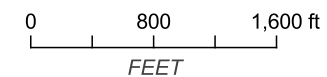
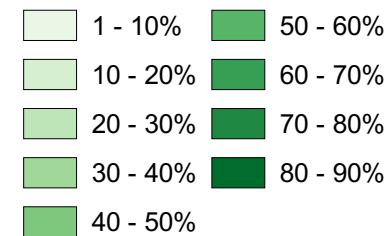


LEGEND

 APPROXIMATE SITE BOUNDARY

 MODEL BOUNDARY

PLUME CONCENTRATION

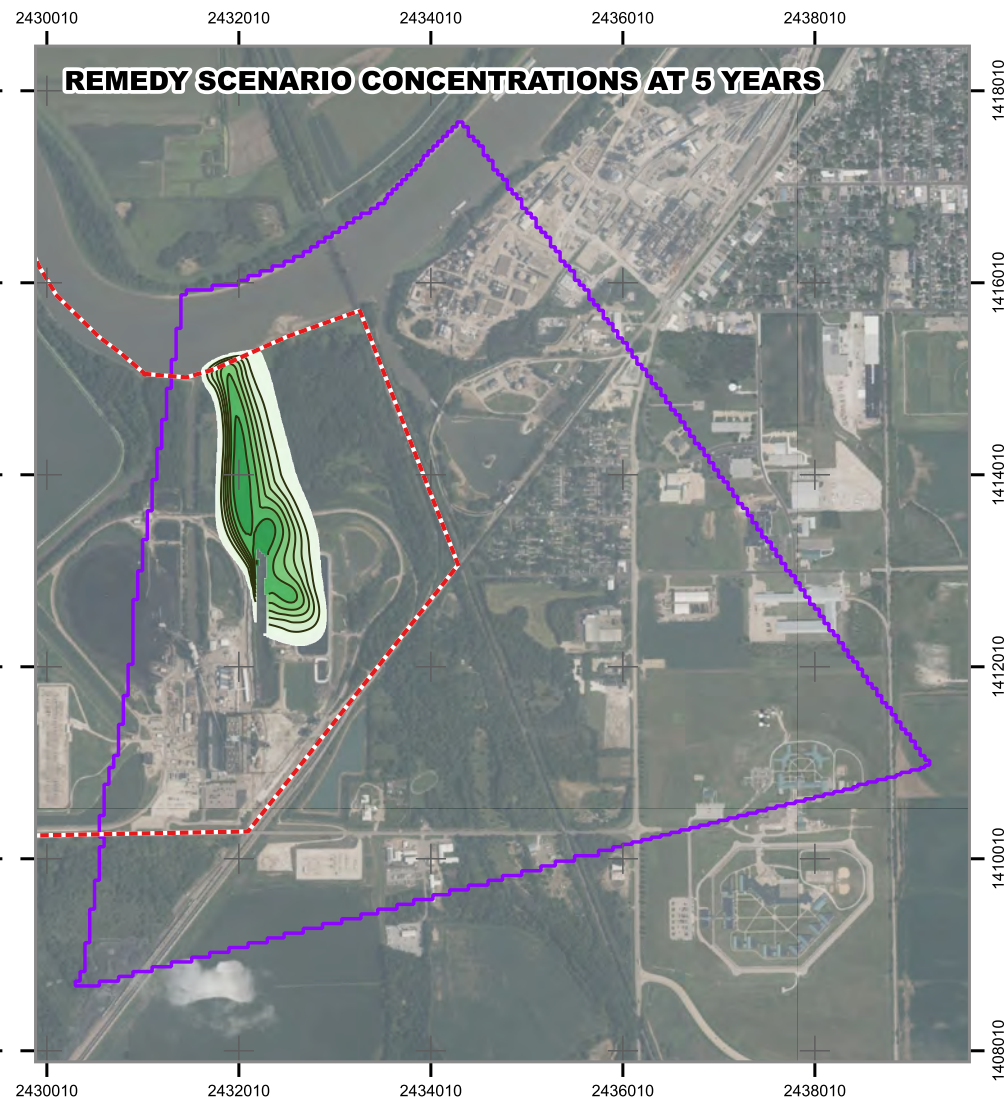
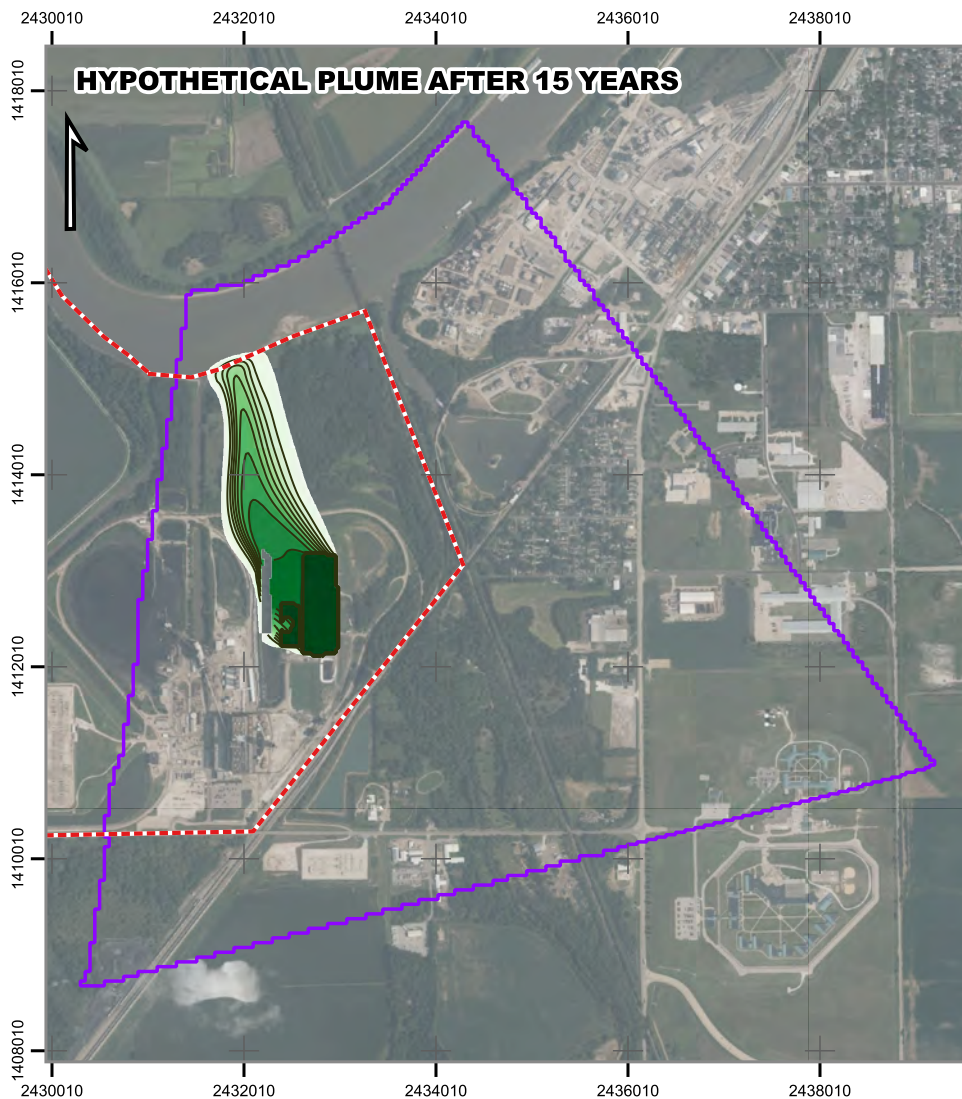


Coordinate System:
Project File: Figure17_HypotheticalPlumeAfter15Years.qgz



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	HYPOTHETICAL PLUME AFTER 15 YEARS

SCALE AT ANSI A 1:	DRAWN DZF 07/14/2026 CHECKED BAS 07/14/2026
BAS PROJECT No. 25211402	FIGURE: 17

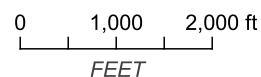


LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

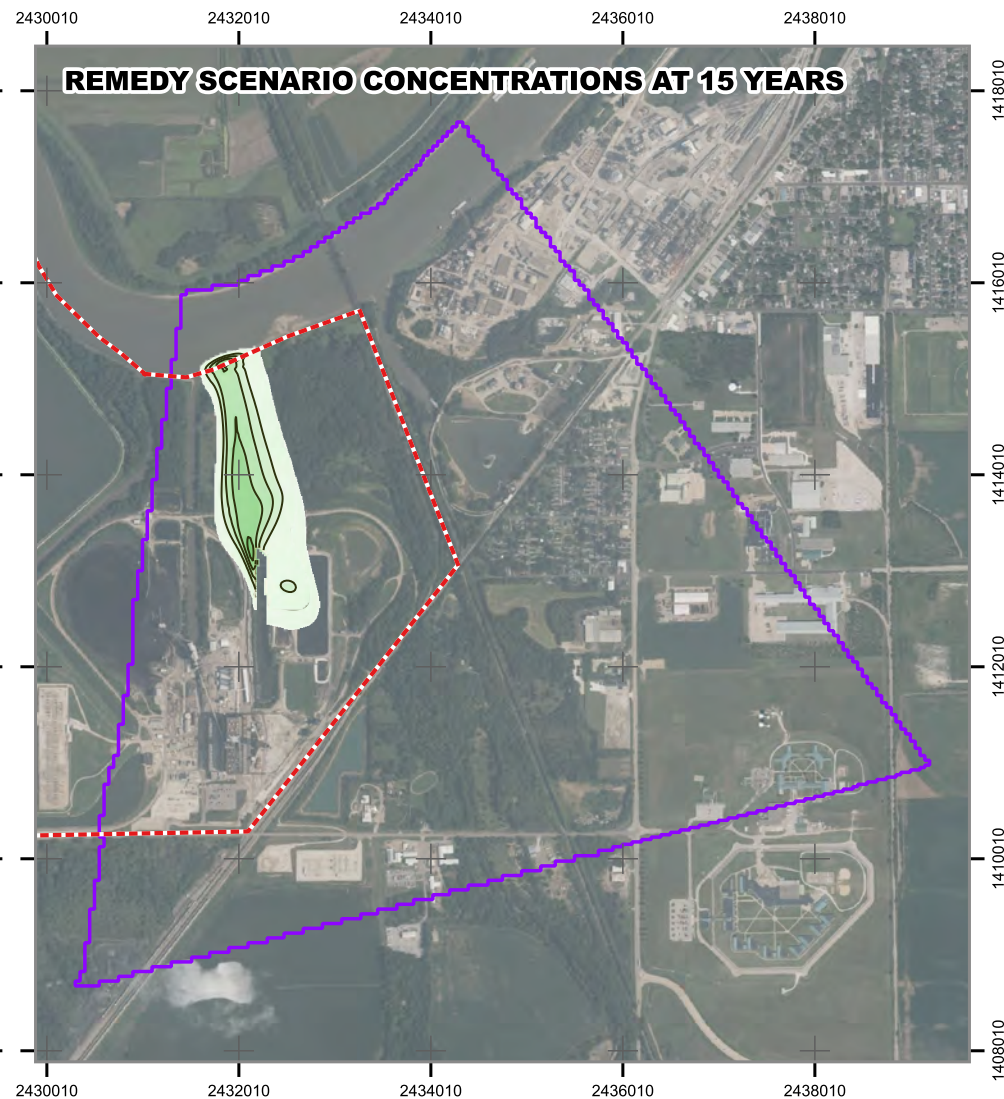
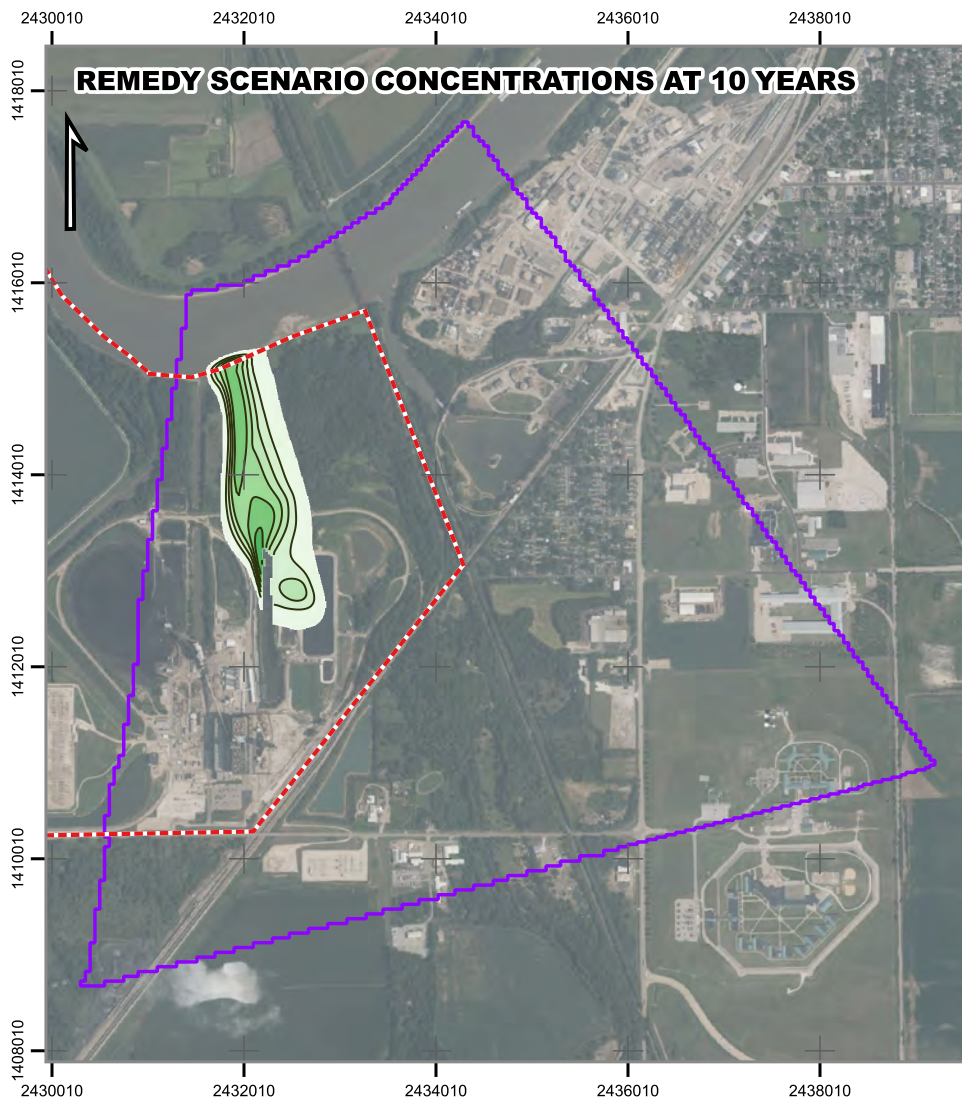
PLUME CONCENTRATION

- | | | | |
|--|--|--|--|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure18_Remedey_Scenario_Concentrations_5_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 5 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No. 25211402		FIGURE: 18	

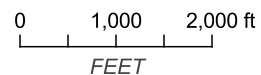


LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

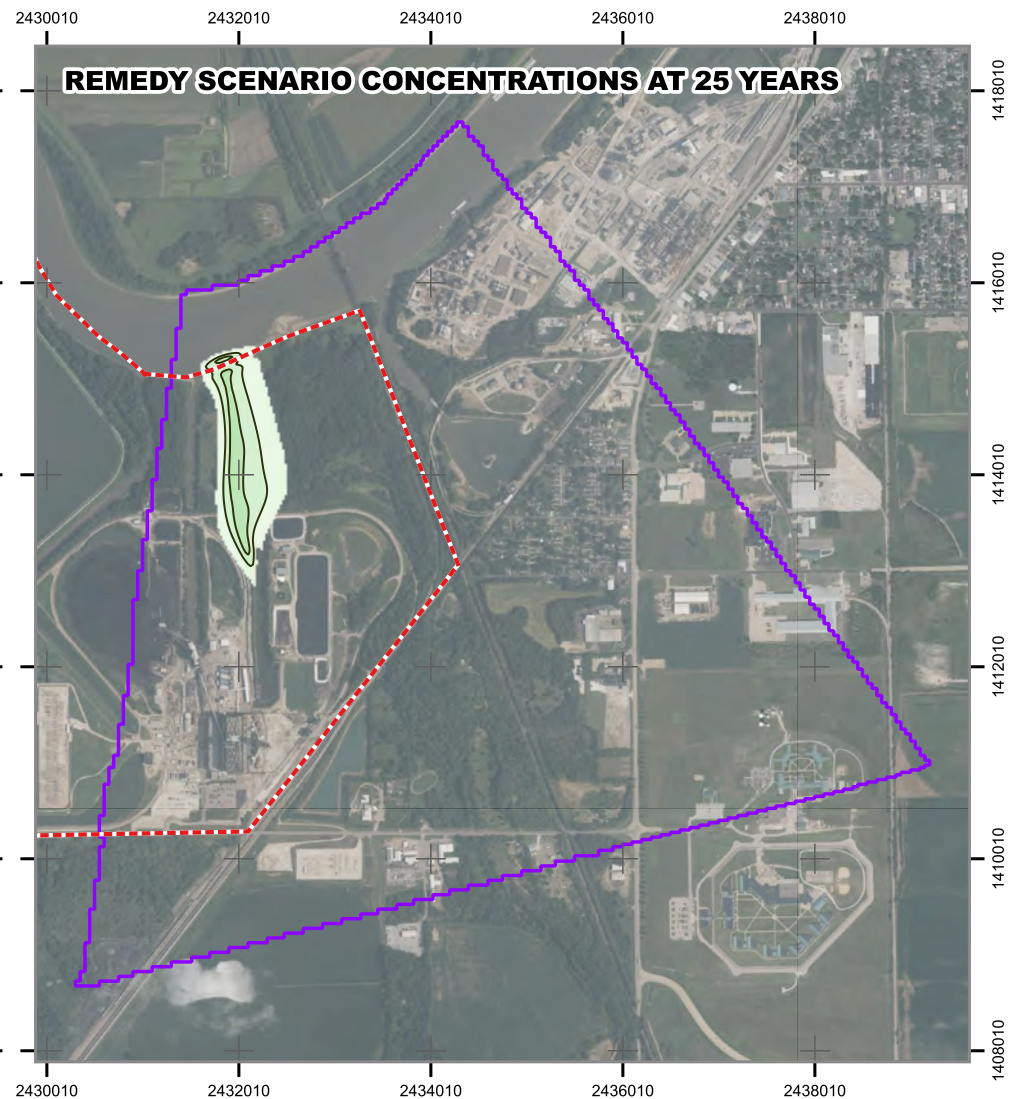
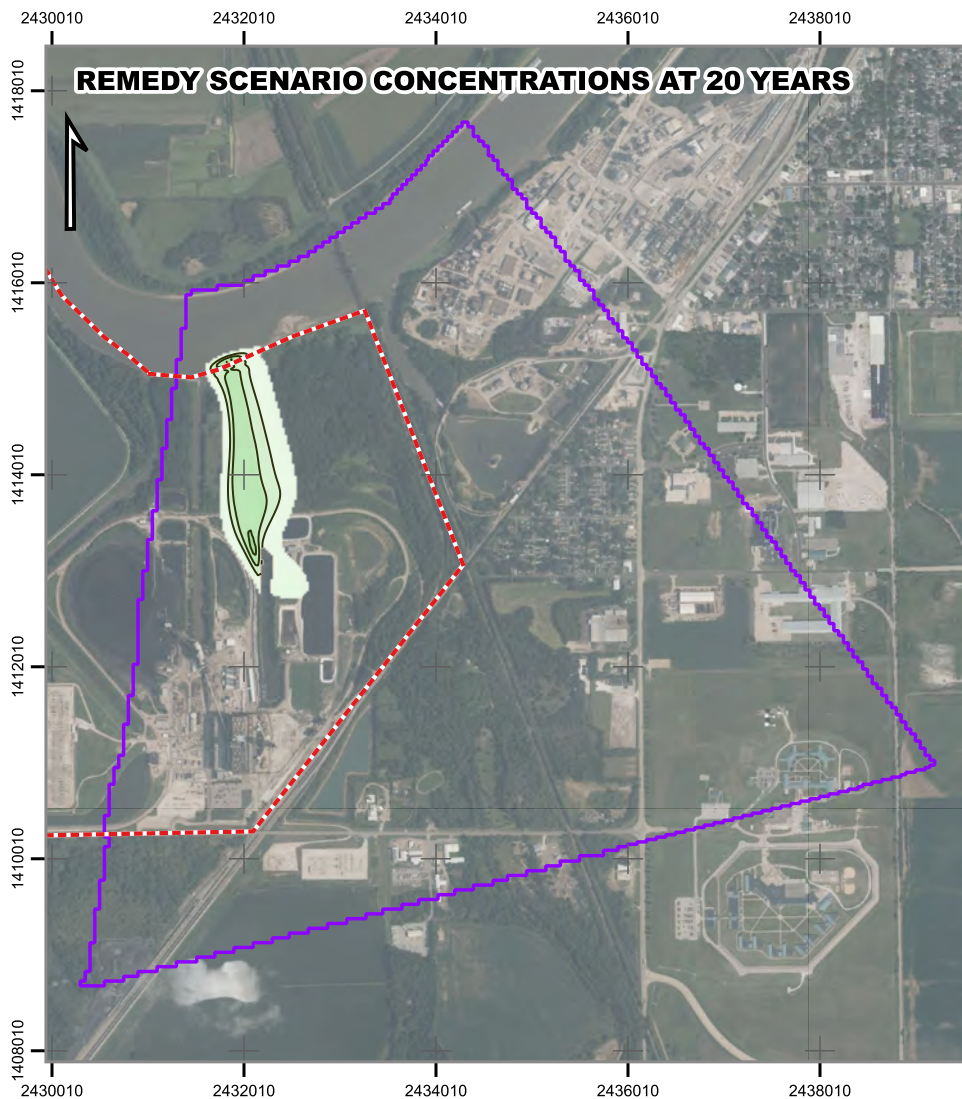
PLUME CONCENTRATION

- | | | | |
|----------|----------|----------|----------|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure19_Remeday_Scenario_Concentrations_10_15_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 10 AND 15 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No.		25211402	FIGURE: 19

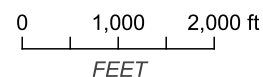


LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

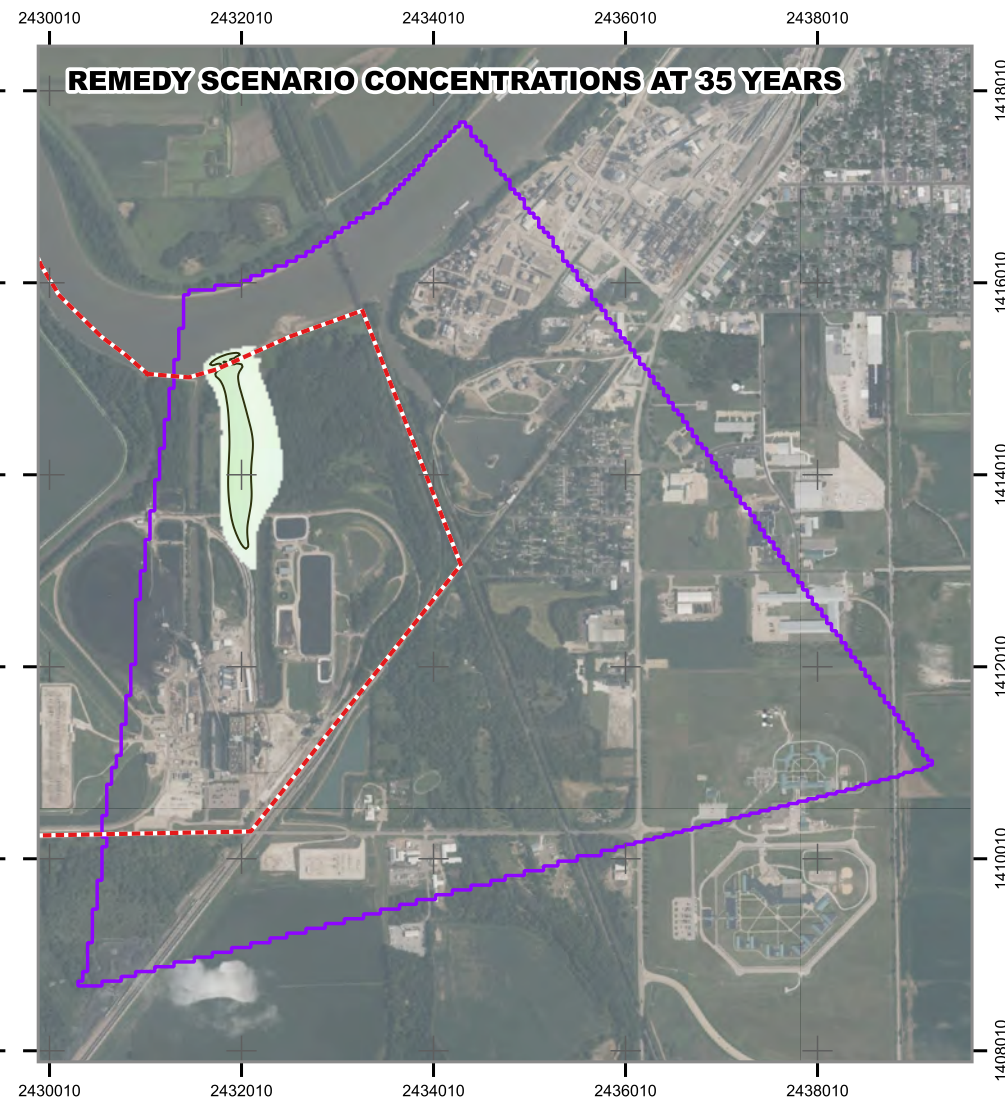
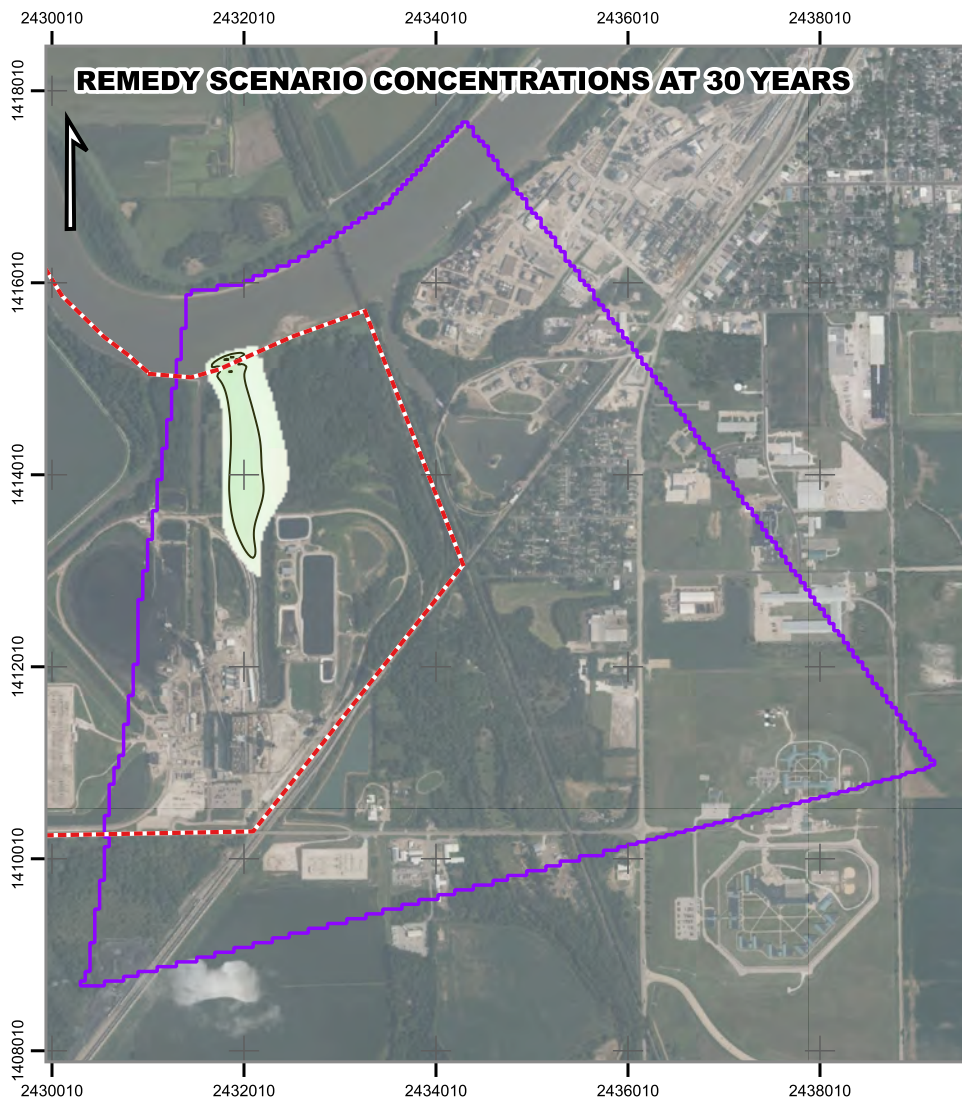
PLUME CONCENTRATION

- | | | | |
|--|--|--|--|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure20_Remeday_Scenario_Concentrations_20_25_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 20 AND 25 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No.		25211402	FIGURE: 20

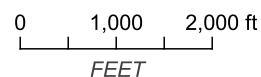


LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

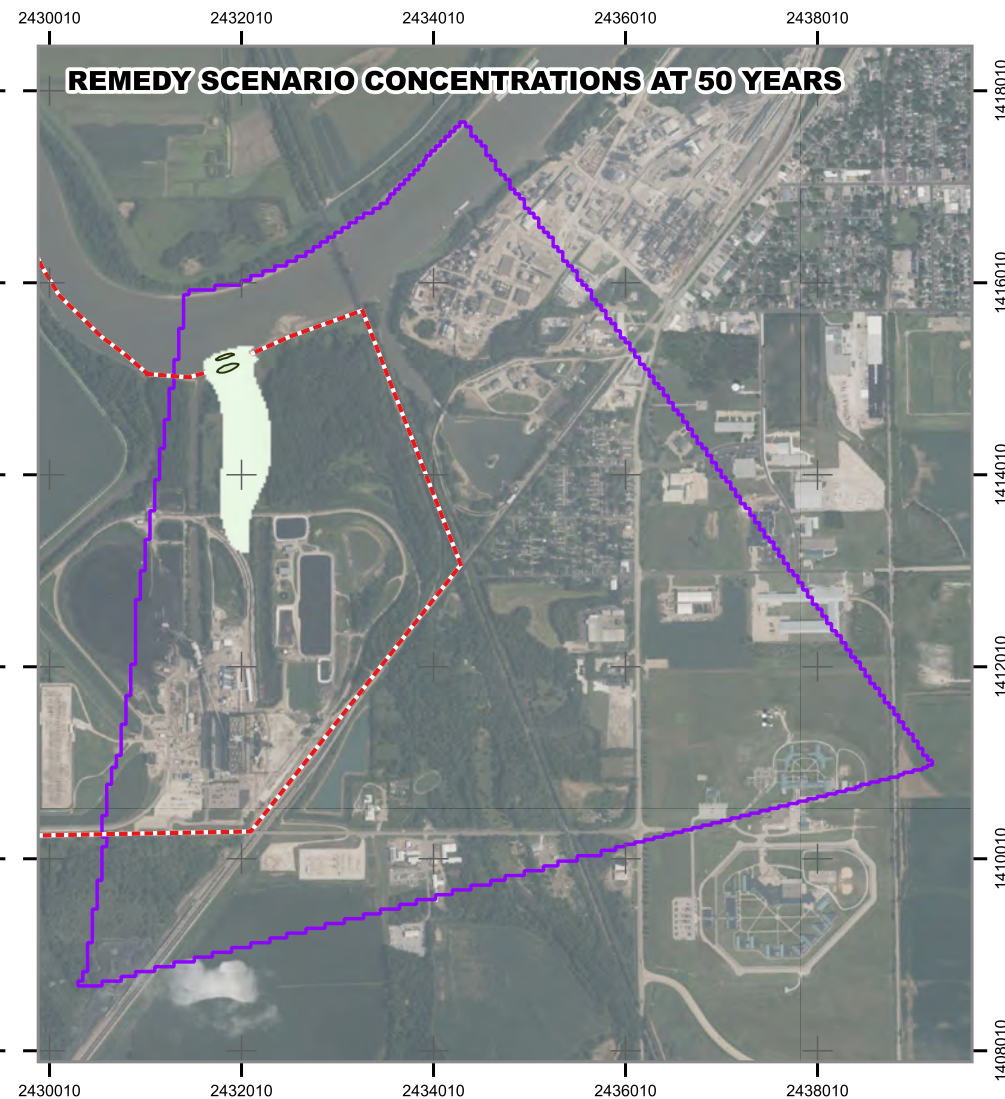
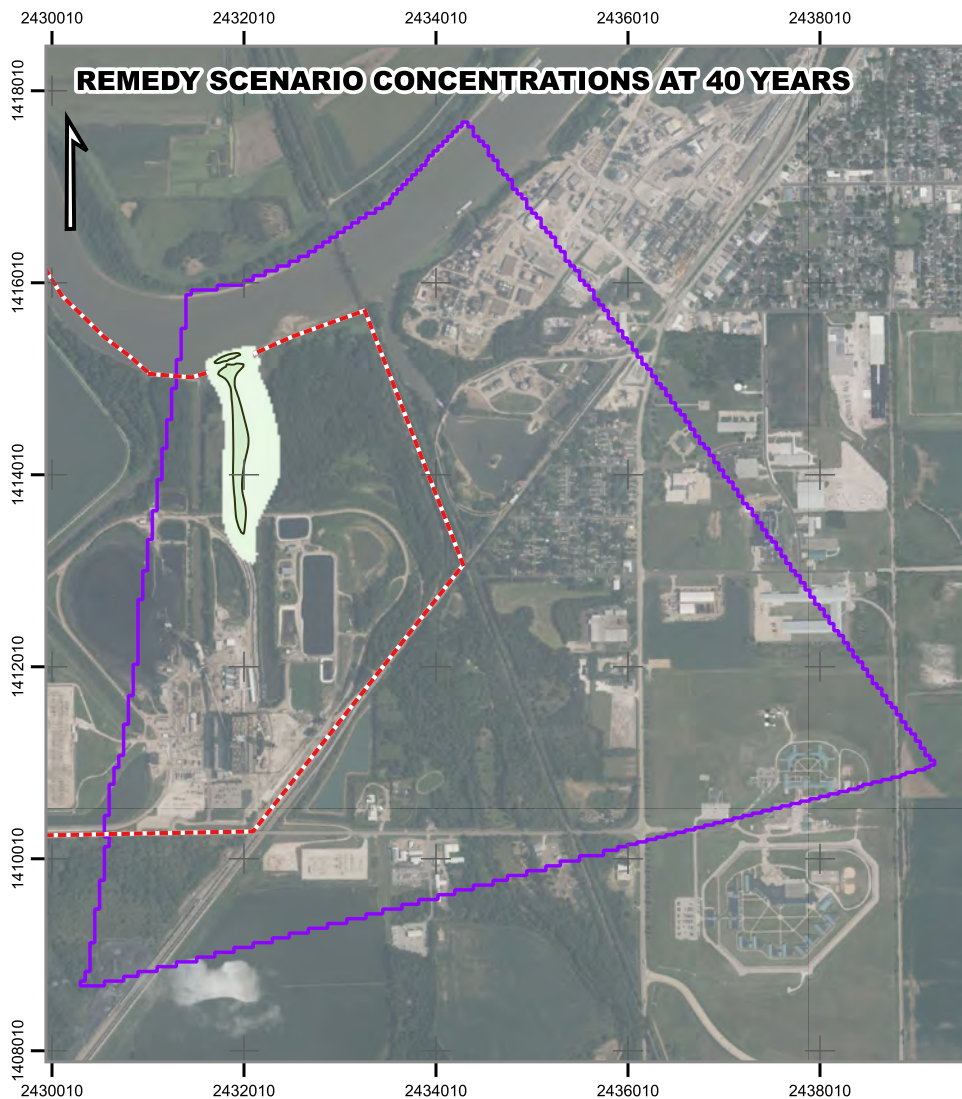
PLUME CONCENTRATION

- | | | | |
|----------|----------|----------|----------|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure21_Remeday_Scenario_Concentrations_30_35_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 30 AND 35 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No. 25211402		FIGURE: 21	

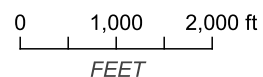


LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

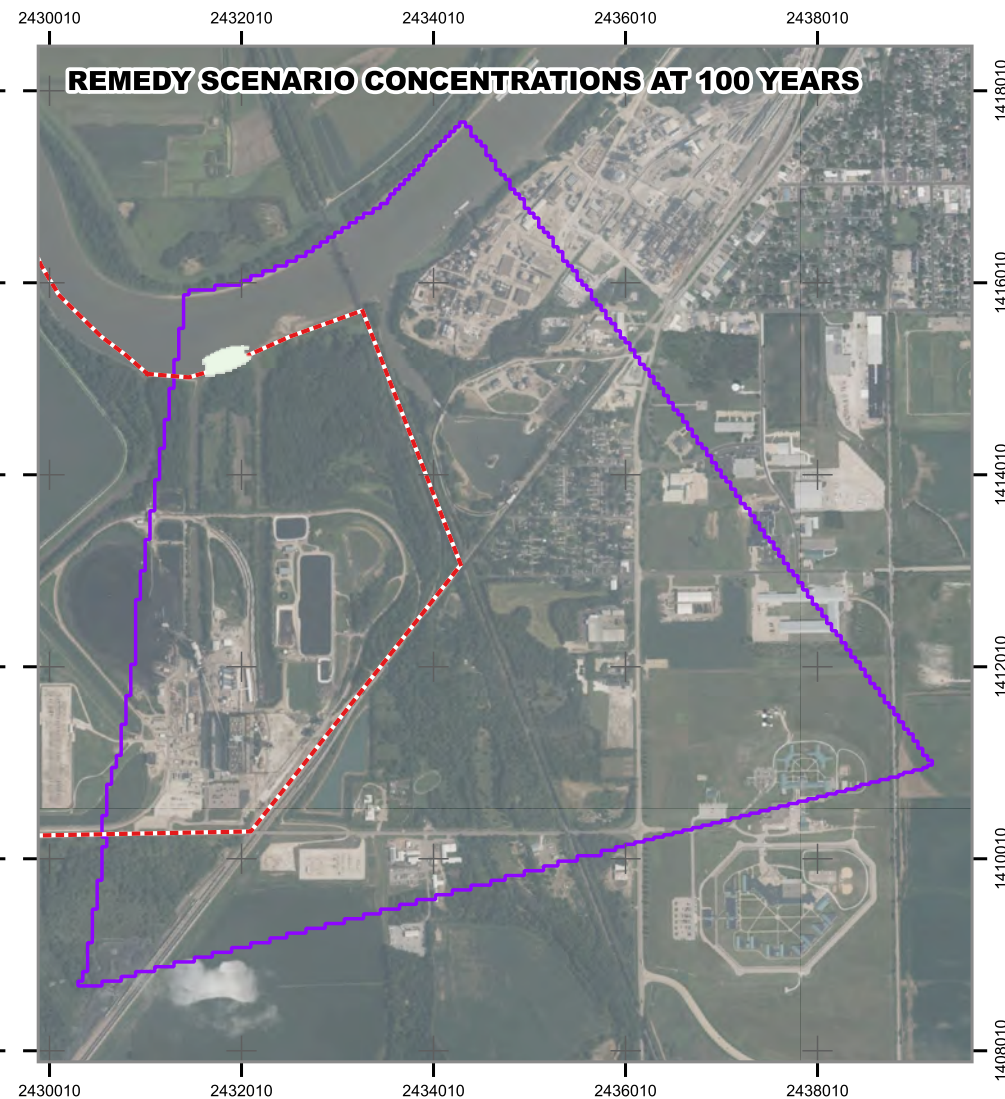
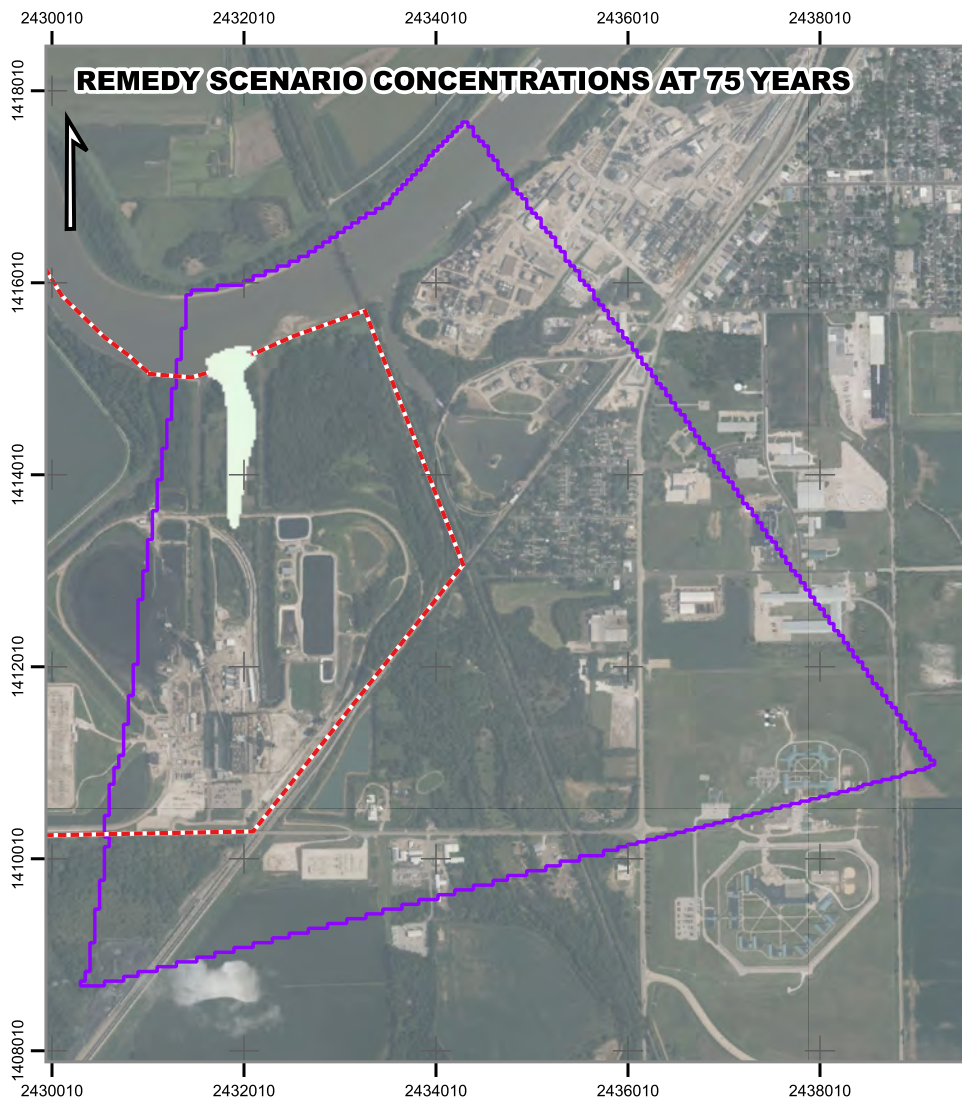
PLUME CONCENTRATION

- | | | | |
|----------|----------|----------|----------|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure22_Remeday_Scenario_Concentrations_40_50_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 40 AND 50 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No. 25211402		FIGURE: 22	



LEGEND

- MODEL BOUNDARY
- APPROXIMATE SITE BOUNDARY

PLUME CONCENTRATION

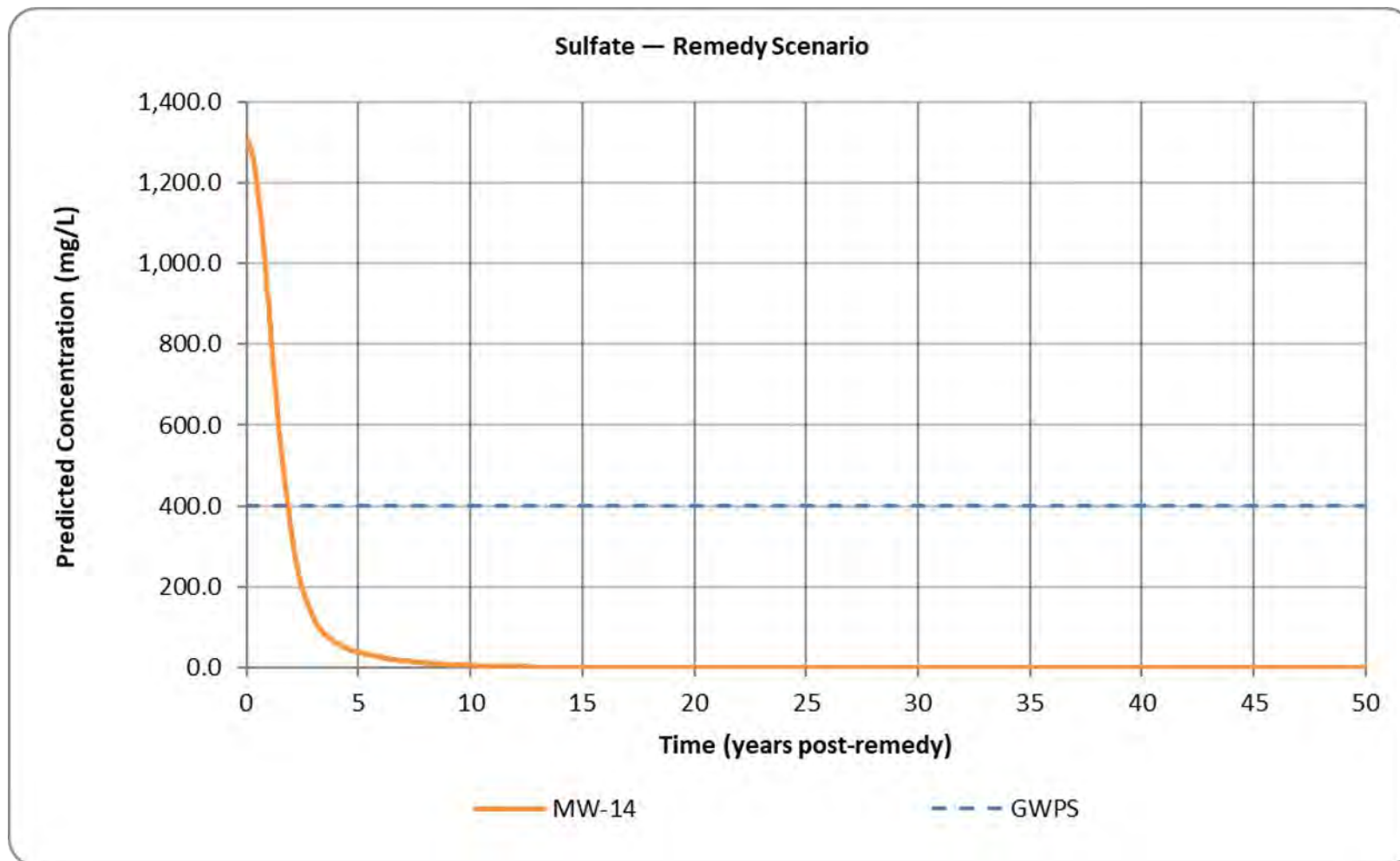
- | | | | |
|--|--|--|--|
| 1 - 10% | 30 - 40% | 60 - 70% | 80 - 90% |
| 10 - 20% | 40 - 50% | 70 - 80% | |
| 20 - 30% | 50 - 60% | | |



0 1,000 2,000 ft
FEET

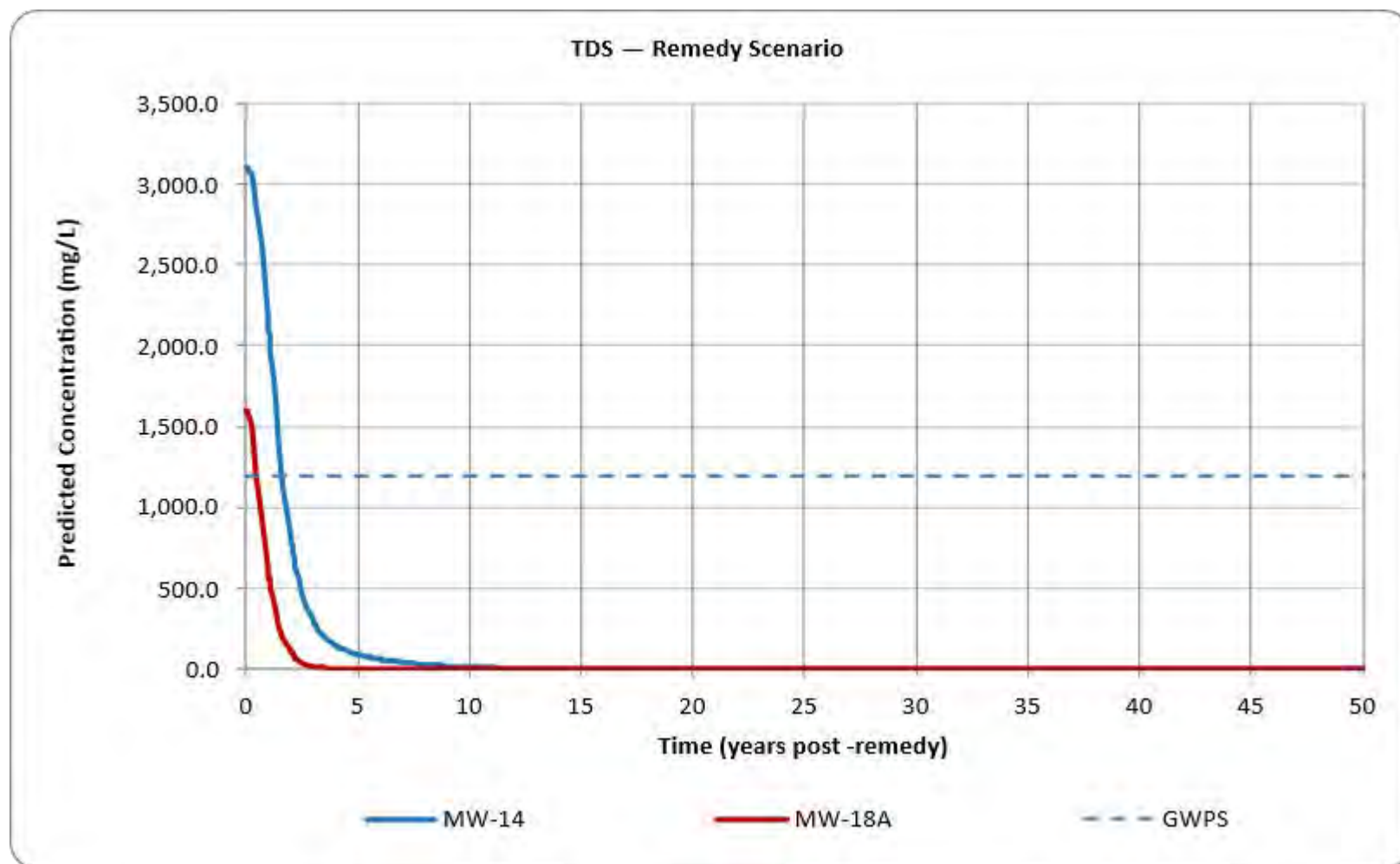
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure23_Remeday_Scenario_Concentrations_75_100_Years.qgz

CLIENT		MIDWEST GENERATION	
SITE		POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554	
TITLE		REMEDY SCENARIO CONCENTRATIONS AT 75 AND 100 YEARS	
SCALE AT ANSI A 1:24,000	DRAWN	DZF	07/14/2026
	CHECKED	BAS	07/14/2026
BAS PROJECT No.		25211402	FIGURE: 23



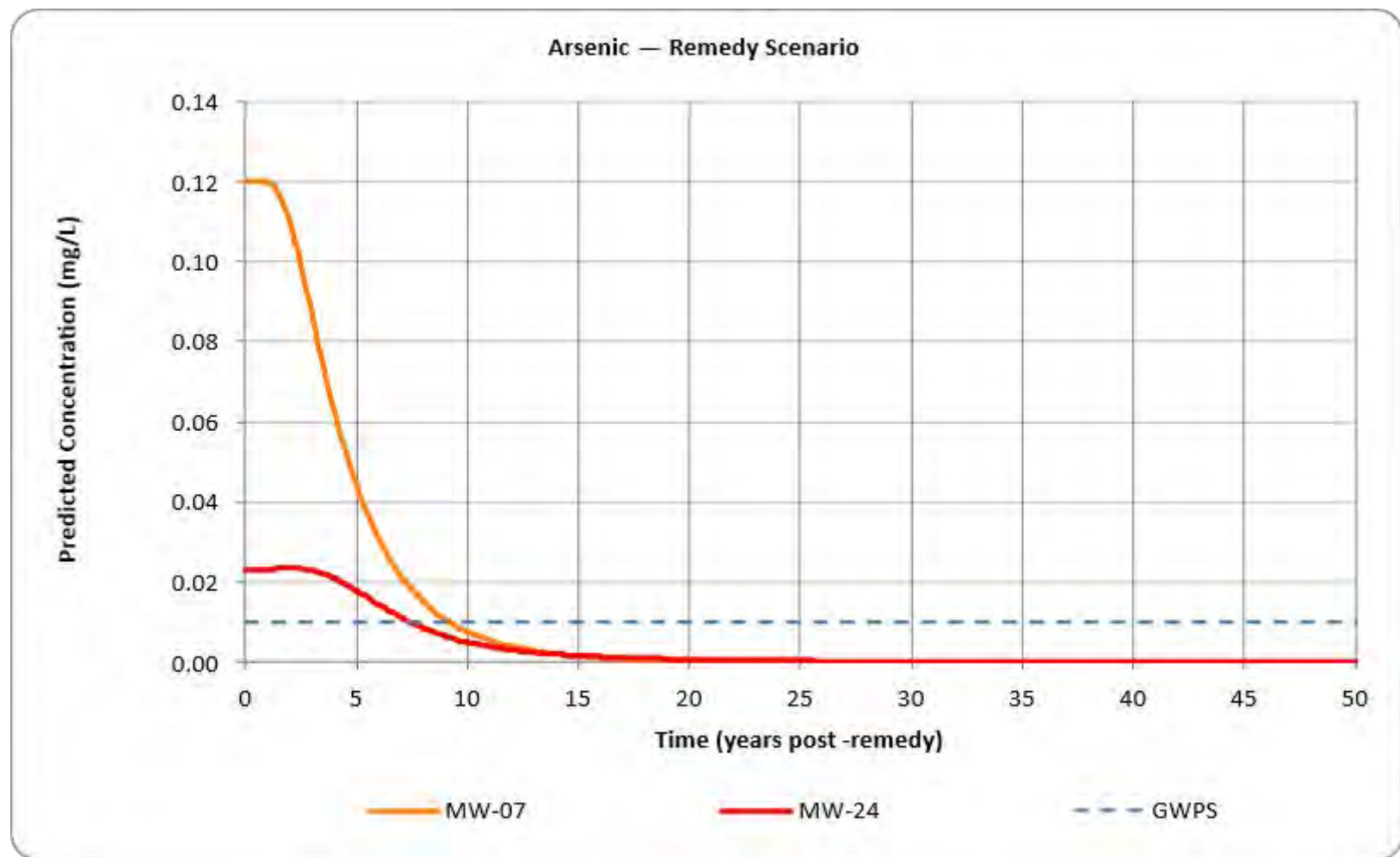
SCALE AT ANSI A	DRAWN	DZF	07/12/2026
	CHECKED	BAS	07/12/2026
BAS PROJECT No.		FIGURE:	
25211402		24	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	REMEDY SCENARIO - SULFATE DECAY



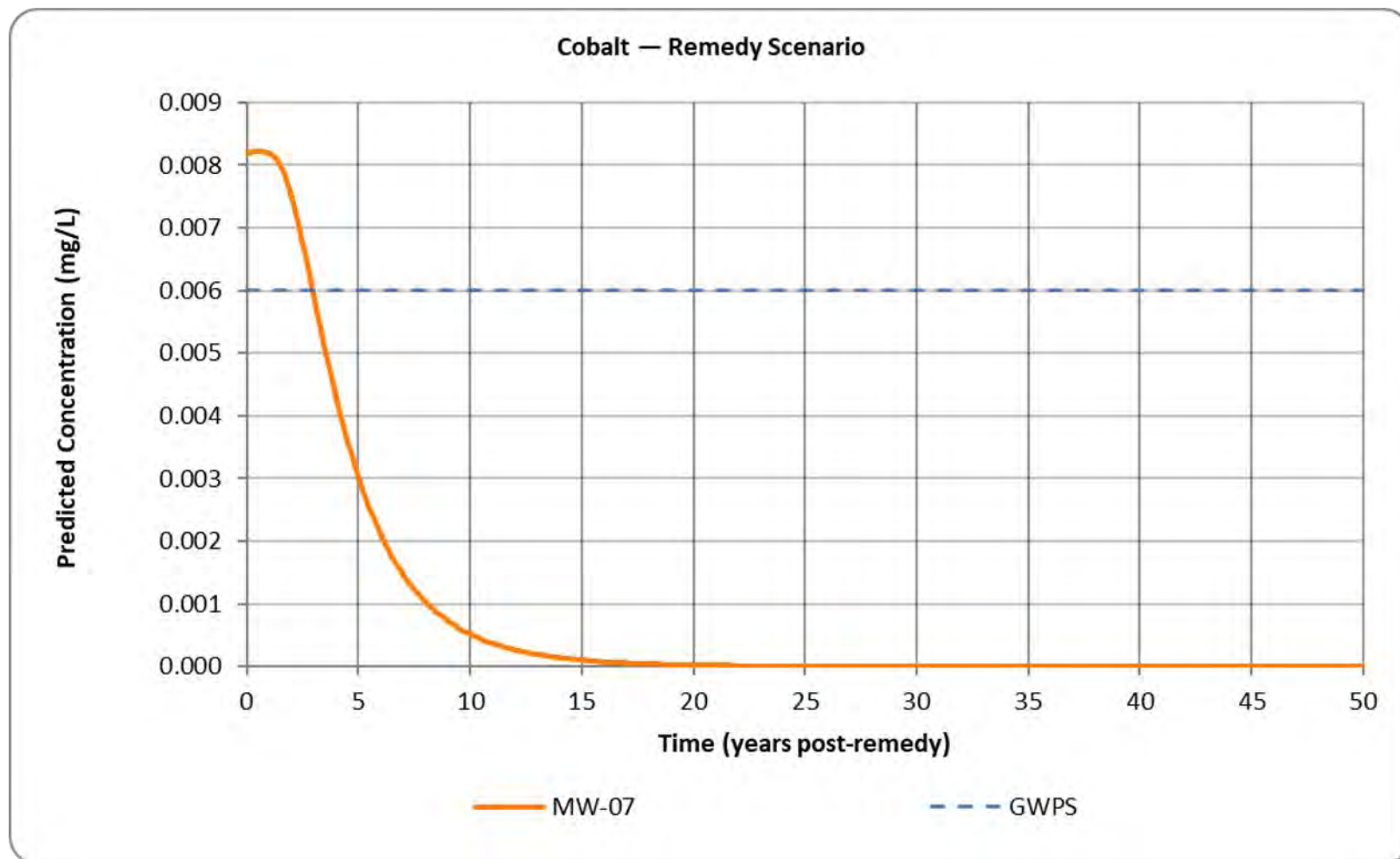
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	CHECKED	BAS	07/12/2026
BAS PROJECT No.		FIGURE:	
25211402		25	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	REMEDY SCENARIO - TDS DECAY



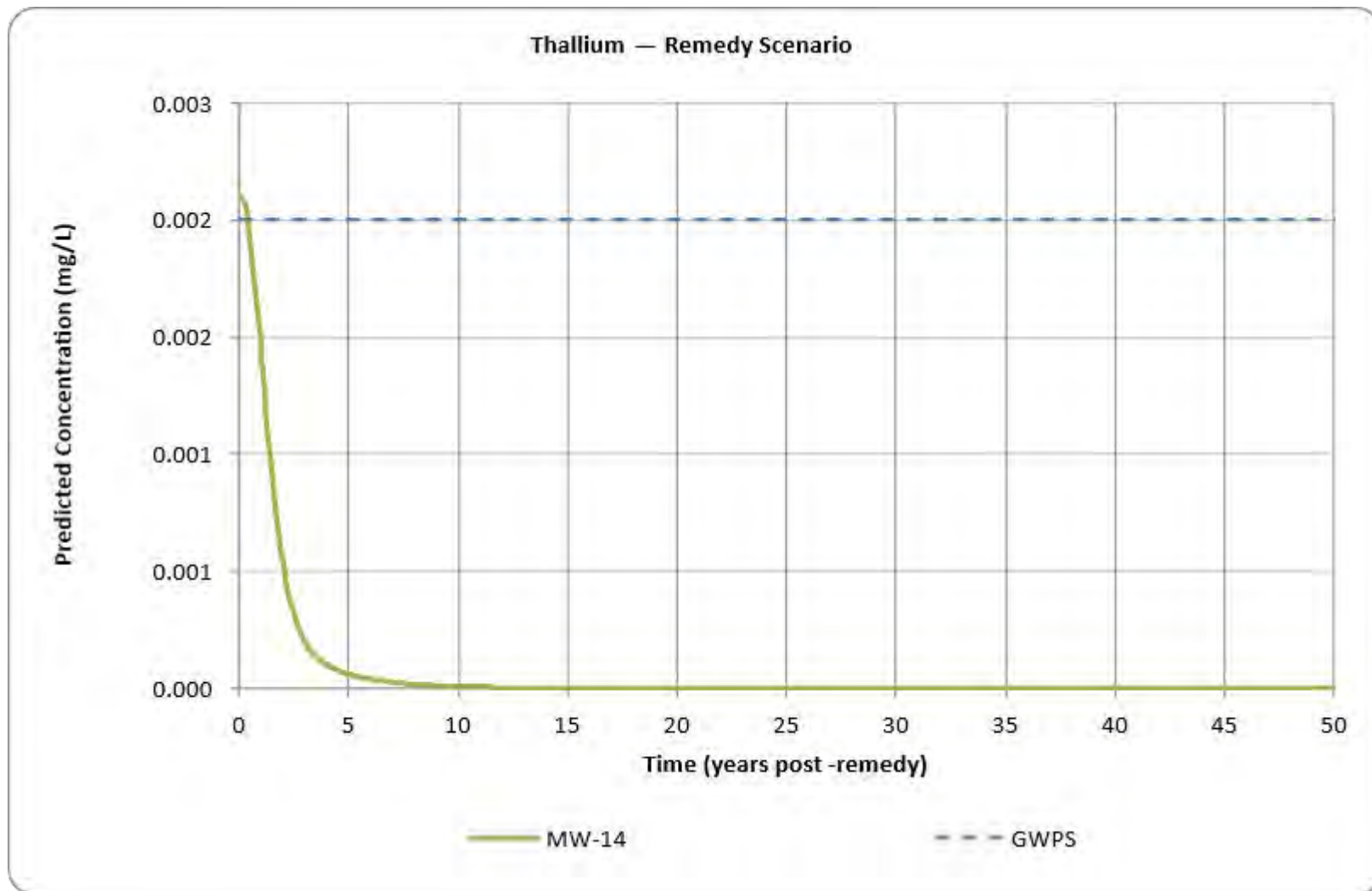
SCALE AT ANSI A	DRAWN	DZF	07/12/2026
	CHECKED	BAS	07/12/2026
BAS PROJECT No.		FIGURE:	
25211402		26	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	REMEDY SCENARIO - ARSENIC DECAY



SCALE AT ANSI A	DRAWN	DZF	07/12/2026
	CHECKED	BAS	07/12/2026
BAS PROJECT No.		FIGURE:	
25211402		27	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	REMEDY SCENARIO - COBALT DECAY



SCALE AT ANSI A	DRAWN	DZF	07/12/2026
	CHECKED	BAS	07/12/2026
BAS PROJECT No.		FIGURE:	
25211402		28	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	REMEDY SCENARIO - THALLIUM DECAY



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Appendix B
Geomembrane Liner Seepage Calculations

Powerton Station - CCR Units
Seepage Analysis



Powerton Station - Ash Surge and Metal Cleaning Basins
Revised Giroud Bonaparte Equation (Giroud, 1997) - Seepage through Retrofit Composite Liner System

$$q = 0.21 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_s^{0.74})$$

$$q = 1.15 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_s^{0.74})$$

Depth of Liquid (d_L)	2 ft	
Depth of Liquid (d_L)	60.96 cm	
Thickness of Liner (t_L)	0.0208 feet	0.25 inches
Number of Holes	4 per acre	
Area of Holes	1 cm ²	
Hydraulic Conductivity (k)	1.0E-09 cm/sec	GCL

Gradient Term	8.6411
Good Contact	1.34E-08 m ³ /sec*acre
	0.306 gal/day*acre
	0.104 mm/year

Poor Contact	7.34E-08 m ³ /sec*acre
	1.674 gal/day*acre
	0.572 mm/year

Powerton Station - CCR Units
Seepage Analysis

Powerton Station - Ash Surge and Metal Cleaning Basins
Revised Giroud Bonaparte Equation (Giroud, 1997) - Seepage through Single Geomembrane Liner

$$q = 0.21 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_s^{0.74})$$

Good Contact

$$q = 1.15 \left[1 + \frac{1}{10} \left(\frac{d_L}{t_L} \right)^{0.95} \right] (h^{0.9})(a^{0.1})(K_s^{0.74})$$

Poor Contact

Depth of Liquid (d _L)	2 ft		
Depth of Liquid (d _L)	60.96 cm		
Thickness of Liner (t _L) (Geotextile)	0.0098 feet	0.118 inches	3 mm
Number of Holes	4 per acre		
Area of Holes	1 cm ²		
Hydraulic Conductivity (k)	1.0E-02 cm/sec	Non Woven Geotextile	
Gradient Term	16.59		
Good Contact	3.90E-03 m ³ /sec*acre		
	88,851 gal/day*acre		
	30,368 mm/year		
Poor Contact	2.13E-02 m ³ /sec*acre		
	486,566 gal/day*acre		
	166,302 mm/year		

Appendix C
Summary of July 2026 Public Meetings

**Midwest Generation, LLC
Powerton Generating Station
Ash Surge Basin and Metal Cleaning Basin Groundwater Corrective Action
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 groundwater corrective action at Powerton Generating Station’s Ash Surge Basin and Metal Cleaning 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 two miles of the facility on June 5, 2026, which totaled 1,126 residential mailing addresses. The notice was also posted in 27 public locations within 10 miles of the facility boundary.

The public meetings for Powerton Generating Station’s Ash Surge Basin and Metal Cleaning Basin were held on July 6, 2026 from 6:00 p.m. to 8:00 p.m. and on July 7, 2026 from 10:00 a.m. to 12:00 p.m. The meetings were held in person. Six members of the public attended the July 6th meeting. Five members of the public, including one who attended the previous meeting, attended the July 7th meeting. 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 meeting. Ten attendees requested a copy of the meeting summary and transmittal of their email address to the Agency to be added to the Agency’s listserv for the facility. All email addresses received will be transmitted to the Agency. After an introduction and approximate 60-minute presentation on the proposed groundwater corrective action 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 a corrective action plan that includes the following remedies: (1) redesigning the geomembrane attachment to the Ash Surge Basin weir wall, (2) retrofit both the Ash Surge Basin and Metal Cleaning Basin by removing the remaining material in the basin, retaining and decontaminating the existing geomembrane liner as an additional protective layer under the new composite liner system, and installing a new composite liner system and leachate collection and removal system, and (3) monitored natural attenuation.

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETINGS

Retrofit Design and Process

Questions were asked about the repair process and longevity of the liners. The HDPE geomembrane liner and geosynthetic clay liner materials proposed to be used in the retrofit plans are designed to meet the standards outlined by the U.S. Environmental Protection Agency and Illinois EPA in their respective CCR Rules. When initially constructed and during any repairs, the seams of the liner are welded together, followed by rigorous testing of the welds prior to use, as required by the construction quality assurance program prescribed in the IL CCR Rule. These liners are used in many environmental applications across the country and ongoing research estimates these geosynthetic materials, which will be covered, can last hundreds of years.

Questions were asked about the leachate collected after the retrofit and how it is treated. Leachate collected after the retrofit of the ponds will be treated in the onsite wastewater treatment system, which consists of chemical and physical treatment, before it is discharged via the Powerton Station's NPDES permit.

A question was asked about ash handling during the retrofit process. Any ash that is removed from the pond during the retrofit construction process will be dewatered and sent off-site to a permitted landfill or a beneficial use site located in Canton, IL.

A question was asked whether there is ash located under the liner of the Metal Cleaning Basin and voiced concern that groundwater may be in contact with bottom of the basin at times. While some slag was beneficially used as structural fill in the berms of the basin, the material under the liner and poz-o-pac layer is native soil material. The base elevation of the Metal Cleaning Basin is 457.5 ft above mean sea level (amsl) and the upper limit groundwater elevation is 450.14 ft amsl, which is greater than the 5-foot minimum separation required by the IL and US EPA CCR Rules.

Groundwater Monitoring and Modeling

A question was asked whether the groundwater modeling took river level fluctuations into account and whether there is a mixing zone extending under the entire facility. The groundwater modeling of the river was set at an average level, based on the monthly level measurements collected as required by the IL CCR Rule. The mixing zone between river water and groundwater does not extend under the entire facility and is limited to the northernmost portion of the monitoring network.

A question was asked how high the river level must be before the groundwater levels rise to reach the bottom of the basins. The base of the Metal Cleaning Basin is approximately 450.14 feet amsl. The base of the proposed retrofit liner for the Ash Surge Basin is approximately 450.50 feet amsl. The estimated last 10-year average for the stage of the Illinois River, based on concurrent

measurements at the U.S. Geological Survey gauge station at Kingston Mines and those from northern-most site monitoring wells (i.e., wells closest to river), is 435.26 feet amsl. The Illinois River stage would need to rise at least 15 feet and maintain that elevation for this scenario to occur. There is no indication or evidence that such a large, sustained increase in river stage would occur.

A question was asked whether the Mohamet aquifer has been analyzed for comingling with the groundwater near the ash basins. MWG has not completed a specific evaluation of the Mohamet aquifer because monitoring shows that any groundwater impacts have been localized within the facility boundaries with discharge into the Illinois River which is a regional hydrogeologic boundary. The impacts will not affect the existing overall water quality of the Mohamet Aquifer.

A question was asked about a potential arsenic source other than the Metal Cleaning and Ash Surge Basins. The boring log for monitoring well MW-24 located on the west side of the former intake channel noted some ash in the boring column. That ash was placed long ago before any environmental regulations existed. US EPA's Legacy CCR Rule was designed to address areas like these.

A question was asked if elevated levels of heavy metals are still being observed and where one could find groundwater trends. All groundwater data is posted on our public website, www.midwestgenerationllc.com, in a tabular format on a quarterly basis. The groundwater data is showing stable to improving conditions at this time.

A question was asked about future groundwater monitoring. Groundwater monitoring will continue throughout the operating life of the basins, as well as throughout the post-closure care period once the basins are closed. The post-closure care period lasts a minimum of three years for closure by removal and a minimum of thirty years for closure in place. Once the required post-closure care monitoring has been completed, the owner or operator of a CCR surface impoundment must request Illinois EPA approval to terminate post-closure care. The Illinois EPA will continue to have oversight for CCR surface impoundments until the Agency agrees that its oversight is no longer necessary.

Groundwater Corrective Action Plan

A question was asked to further explain monitored natural attenuation (MNA). MNA is a remediation method that uses natural processes to decrease the concentration of contaminants in the environment. It uses in-situ physical, chemical, and biological processes that occur naturally in the environment. MNA works best when used in conjunction with an active corrective action, such as the basin retrofits MWG is proposing here.

A question was asked whether we could use electronic leak detection on a periodic basis to determine liner system integrity as opposed to going through the remedies proposed during the meeting. The electronic leak detection works best when the basin is emptied, which occurs every 1-2 years. The IL CCR rule prescribes that quarterly groundwater sampling detects any potential

leak and requires a corrective action process that all CCR impoundment owners/operators must follow when a groundwater protection standard is exceeded. MWG is following that process, which includes the corrective measures alternatives analysis, presentation of proposed remedies to the public, and submittal of a groundwater corrective action plan via a corrective action construction permit application for Illinois EPA review and approval.

A comment was made that the corrective action alternative analysis showed a similar benefit between closure by removal and retrofit of the Metal Cleaning and Ash Surge Basins. Powerton is an operating electric generating facility, and at this time both basins are needed to ensure electric generating operations can continue reliably. Once electric generation ceases at Powerton, closure construction permit applications will be submitted to Illinois EPA for the retrofitted basins.

NPDES Permit

A question was asked about the NPDES permitted outfalls and where they are located. There are two permitted outfalls that discharge to the Illinois River and two permitted outfalls that discharge to Powerton Lake.

A question was asked whether water analysis is performed at Powerton Lake. MWG does not study Powerton Lake. Instead, we monitor our discharges to the Illinois River and Powerton Lake and report those to the Illinois EPA as required by the Station's NPDES permit.

Ash Handling

Questions were asked about the ash handling process at the Station. Ash is sluiced from the boilers to hydrobins, which are dewatering bins that allow the overwhelming majority of ash to settle out while the water is decanted to an ash basin for further settling (polishing) before discharge via the NPDES permit. The bulk ash remaining in the hydrobins is removed and either beneficially reused or sent to a permitted landfill for disposal.

A question was asked about the current status of the CCR basins at the Station. The Ash Bypass Basin has been retrofitted in accordance with the IL CCR Rule and is in service. It is used to settle any ash remaining in the decanted sluice water after the significant majority of ash is removed in the hydrobins. The Ash Surge Basin is out of service. The Metal Cleaning Basin is used occasionally to collect and treat boiler cleaning wash waters during boiler outages, and to temporarily store ash from maintenance activities outside of boiler outages. The Former Ash Basin (FAB) is an inactive basin that has not been used since the 1970's. MWG submitted a closure construction permit application for the FAB which is under review by Illinois EPA.

A question was asked if there is analysis of the ash from the ash basins. Ash from each basin was analyzed in accordance with the IL CCR Rule. The results of that sampling can be found in the Initial Operating Permit applications, available at www.midwestgenerationllc.com.

A question was asked about wildlife interaction with the ash basins. On occasion, wildlife such as birds or turtles are seen in or around the basins. No adverse effects to the animals have been observed.

Future

General concerns were raised about potential future impacts to the ponds due to climate change, such as groundwater level fluctuations and flooding, historic fill, and impacted soils under the basins. During the useful life of the impoundments and throughout the closure and post-closure care periods (if applicable), groundwater monitoring will continue, which includes monitoring and reporting the groundwater levels in the monitoring wells. Additionally, the impoundments will continue to be inspected weekly by qualified staff and annually by a certified Professional Engineer. MWG has no evidence of any sustained long-term rise in water levels around the impoundments at Powerton Station.

A question was asked about MWG's plans to address historical deposits of ash in light of EPA proposing revisions to the rule originally published in 2024. MWG reviews and evaluates all federal and state rules that are or may be applicable to its facilities and will continue to follow the laws and regulations while prioritizing the community, the environment, and the well-being of our employees.

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 corrective action at the Ash Surge Basin and the Metal Cleaning Basin 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.