

January 17, 2013

Mr. Jaime Rabins
Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

RE: Application for Permit or Construction Approval
Ash Surge Basin Liner Replacement
Midwest Generation Powerton Generating Station
13082 East Manito Road, Pekin, IL
NPDES Permit No. IL0002232

Dear Mr. Rabins:

Midwest Generation, LLC (MWG) is requesting a construction permit for liner replacement in the Ash Surge Basin at the Powerton Generating Station. This activity will allow MWG to fulfill the Compliance Commitment Agreement (CCA) with the IEPA pursuant to Violation Notice W-2012-00057 signed on October 24, 2012. Please find enclosed a copy of the Application for Permit or Construction Approval WPC-PS-1 and supporting documents.

The following information is attached:

- A site location map is included as Figure 1.
- A plan view of existing conditions, liner replacement plan, cross section and details drawings are included as Sheets.
- Form WPC-PS-1 "Application for Permit or Construction Approval", and Schedules G "Sludge Disposal & Utilization", J "Industrial Treatment Works Construction or Pretreatment Works", and N "Waste Characteristics" are provided in Appendix A.
- Representative photographs of the Ash Surge Basin are provided in Appendix B.
- Specification Section 02600 for installation of high-density polyethylene (HDPE) geomembrane liner is provided in Appendix C.

FACILITY DESCRIPTION

Bottom ash associated with boiler operations at the Powerton Generating Station is sluiced to dewatering bins for initial settling. Effluent from the dewatering bins is transferred to the Ash Surge Basin for additional settling before discharging to the Secondary Ash Settling Basin for final clarification. When the Ash Surge Basin is temporarily out-of-service for dredging, the Bypass Basin is used for additional settling of bottom ash.



MWG13-15_9583

Currently, the Ash Surge Basin is lined with Hypalon® geomembrane on the side slopes, and a 12-inch thick layer of Poz-o-pac at the base (Sheet C010) and 5 feet up the side slopes. The total depth of the basin is approximately 15 feet with a typical operating capacity of approximately 21 million gallons. The basin freeboard is approximately 3 to 5 feet during operation. Photographs of the current condition of the basin are provided in Appendix B.

PROJECT DESCRIPTION

Liner replacement activities for the Ash Surge Basin are anticipated to occur between June and September 2013, following scheduled dredging activities (dewatering followed by dry excavation). This schedule may change based upon plant operational needs. Liner replacement activities will include:

- Subgrade preparation for HDPE geomembrane liner (Sheet C020), including reshaping side slopes, as necessary; removal of the Poz-o-Pac liner that is present 5 feet up the side slopes of the basin (i.e., 12 inches of Poz-o-pac will remain at the base except in the area near the weir as shown on Sheet C030).
- Deployment and seaming of the HDPE geomembrane replacement liner. The permeability of geomembrane is typically between 2×10^{-13} and 4×10^{-13} centimeters per second.
- Placement of cushion and warning layers over the replacement liner at the base of the basin and along the access ramp.

The warning layer will consist of dense-graded aggregate, grade number CA6 conforming to Section 1004.01, Coarse Aggregate of State of Illinois Department of Transportation (IDOT), Standard Specifications for Road and Bridge Construction, or other easily-identifiable material.

The cushion layer will consist of sand or limestone screenings grade number FA 1, FA 2, FA3 or FA5 conforming to Section 1003.01 Fine Aggregate of IDOT Standard Specifications for Road and Bridge Construction.

The proposed HDPE geomembrane replacement liner, associated anchor trenches, and cushion and warning layers are shown on Sheet C030. Cross sections and details associated with the liner and cushion/warning layers are shown on Sheets C031 and C032.

CONSTRUCTION OPERATIONS

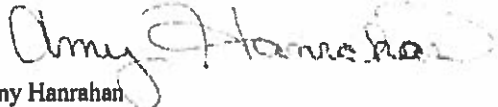
To remove the Ash Surge Basin temporarily out-of-service for dredging and liner replacement construction, bottom ash sluice water from the dewatering bins will be discharged to the Bypass Basin for additional settling. Subsequently, effluent from the Bypass Basin will be discharged to the Secondary Ash Settling Basin for final clarification.

In the unlikely event the plant loses power, there will be no flow into the Ash Surge Basin except storm water. If discharge is required, MWG will utilize a diesel generator to maintain discharge capabilities until power is reestablished.

Mr. Jaime Rabins, Div. of Water Pollution Control, IEPA
January 17, 2013
Page 3

If you have any questions or require additional information as you review this application, please call me at 312-771-7863.

Sincerely,



Amy Hanrahan
Senior Environmental Engineer

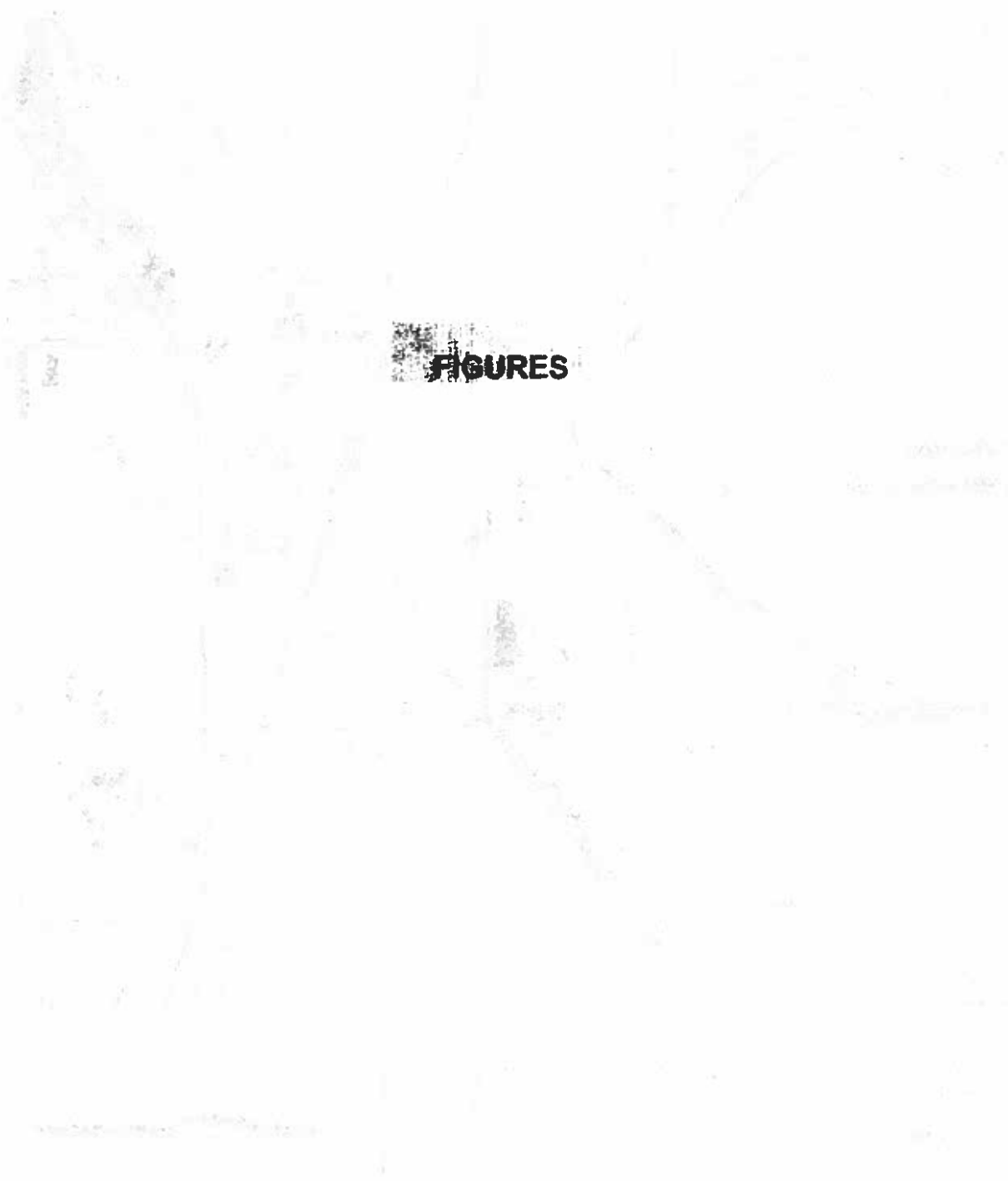
Attachments: Figure 1 – Site Location Map
Appendix A – WPC-PS-1 and Schedules G, J and N
Appendix B – Site Photographs
Appendix C – Specification Section 02600, HDPE Geomembrane
Sheet C010 – Pre-Construction Conditions
Sheet C020 – Liner Subgrade Preparation
Sheet C030 – Warning Layer Plan
Sheet C031 – Details and Sections
Sheet C032 – Details and Sections

cc: Mark Kelly, MWG-Powerton
Heather Simon, Natural Resource Technology, Inc.

[2113.2 Powerton Ash Surge Basin - Permit App Letter 130117]

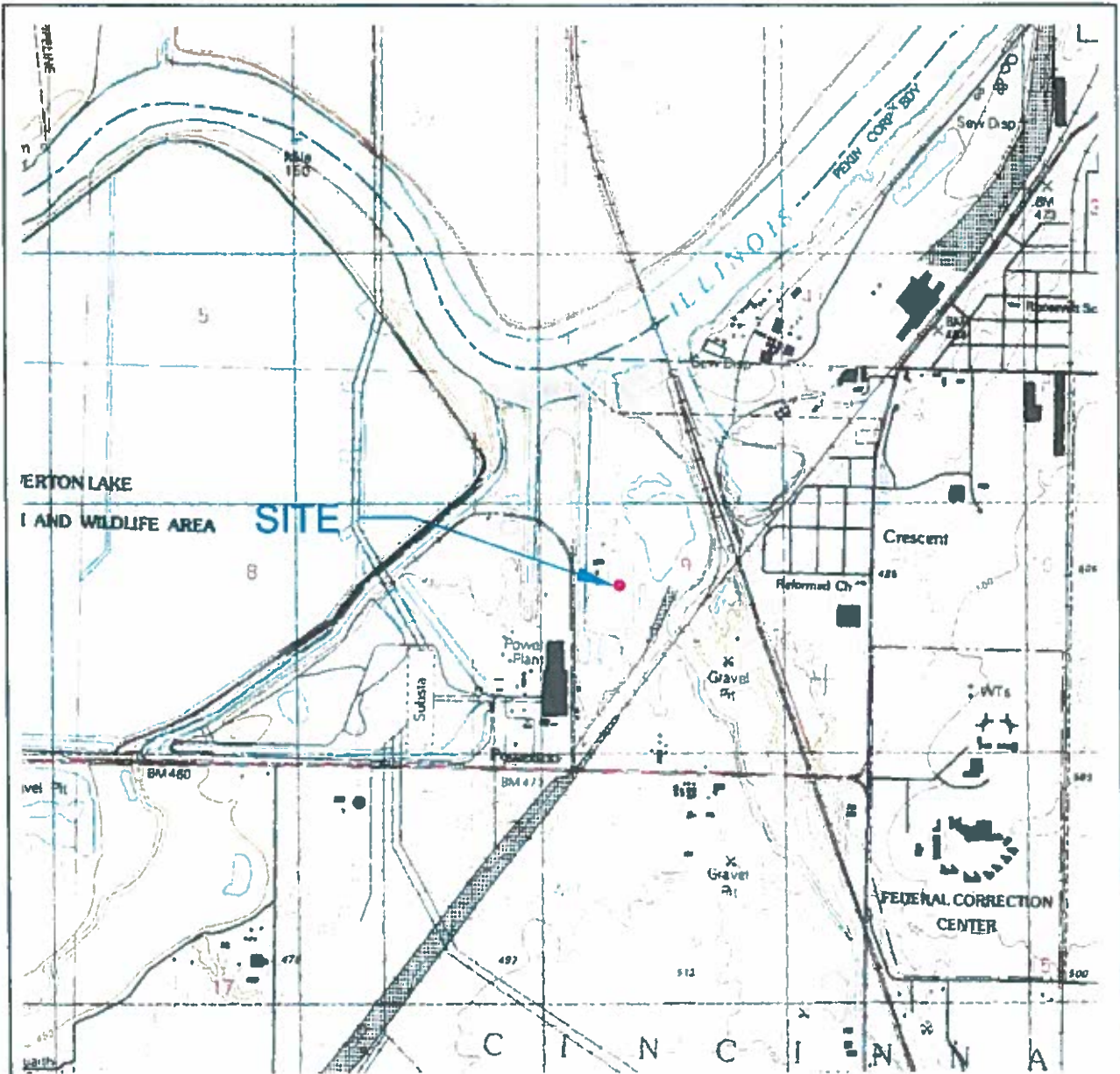
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MWG13-15 9586



FIGURES

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SOURCES: ESRI, DELORME, NAVTEQ, TOMTOM, INTERMAP, IPC, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI, JAPAN, METI, ESRI CHINA (HONG KONG), AND THE GIS USER COMMUNITY



SITE LOCATION MAP



MIDWEST GENERATION
 POWERTON GENERATING STATION
 PEKIN, ILLINOIS

PROJECT NO.
 2113 2

DRAWING NO.
 21132-A01C

FIGURE NO.
 1

DRAWN: RLH DATE: 01/14/13 CHK'D: HMS DATE: 01/14/13 APP'D: HMS DATE: 01/14/13

Appendix

10/10/13 10:00 AM

10/10/13 10:00 AM



APPENDIX A
APPLICATION FOR PERMIT OR CONSTRUCTION
APPROVAL
(WPC-PS-1 and Schedules G, J, and N)



Illinois Environmental Protection Agency
 Permit Section, Division of Water Pollution Control
 P.O. Box 19276
 Springfield, Illinois 62794-9276

For IEPA Use:

**Application for Permit or Construction Approval
 WPC-PS-1**

1. Owner Name: Midwest Generation EME, LLC
 Name of Project: Powerton Ash Surge Basin Liner Replacement
 Township: Pekin County: Tazewell

2. Brief Description of Project:
 Maintenance on Ash Surge Basin includes replacement of the pond liner. There will be no significant changes to current operation of the pond.

3. Documents Being Submitted: If the Project involves any of the items listed below, submit the corresponding schedule, and check the appropriate boxes.

	<u>Schedule</u>		<u>Schedule</u>
Private Sewer Connection/Extension	A/B <input type="checkbox"/>	Spray Irrigation	H <input type="checkbox"/>
Sewer Extension Construct Only	C <input type="checkbox"/>	Septic Tanks	I <input type="checkbox"/>
Sewage Treatment Works	D <input type="checkbox"/>	Industrial Treatment/Pretreatment	J <input checked="" type="checkbox"/>
Excess Flow Treatment	E <input type="checkbox"/>	Waste Characteristics	N <input checked="" type="checkbox"/>
Lift Station/Force Main	F <input type="checkbox"/>	Erosion Control	P <input type="checkbox"/>
Fast Track Service Connection	FTP <input type="checkbox"/>	Trust Disclosure	T <input type="checkbox"/>
Sludge Disposal	G <input checked="" type="checkbox"/>		

Plans: Title Ash Surge Basin Liner Replacement, Midwest Generation, Powerton Power Station, Pekin, IL

No. of Pages: _____

Specifications: Title Section 02600, High Density Polyethylene (HDPE) Geomembrane

No. of Books/Pages: _____

Other Documents: Facility photos (see attached)
 (Please Specify)

- 3.1 Illinois Historic Preservation Agency approval letter: Yes No
4. Land Trust: Is the project identified in item number 1 herein, for which a permit is requested, to be constructed on land which is the subject of a trust? Yes No

If yes, Schedule T (Trust Disclosure) must be completed and item number 7.1.1 must be signed by a beneficiary, trustee or trust officer.

5. This is an Application for (Check Appropriate Line):
- A. Joint Construction and Operating Permit
 - B. Authorization to Construct (See Instructions) NPDES Permit No. IL00 02232
 - C. Construct Only Permit (Does Not Include Operations)
 - D. Operate Only Permit (Does Not Include Construction)

6. Certifications and Approval:

6.1 Certificate by Design Engineer (When required: refer to instructions)

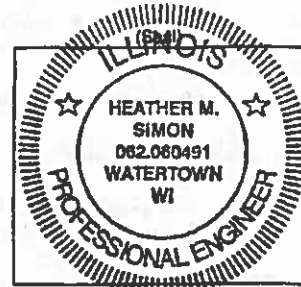
I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

Engineer Name: Heather M. Simon, PE

Registration Number: 062 - 060491
(3 digits) (6 digits)

Firm: Natural Resource Technology, Inc.

Address: 23713 W. Paul Rd, Suite D



City: Pewaukee State: WI Zip: 53072 Phone No: (262) 523-9000

Signature X *Heather M. Simon* Date: 1/15/13

7. Certifications and Approvals for Permits:

7.1 Certificate by Applicant(s)

I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board. I/We hereby agree to conform with the Standard Conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name of Applicant for Permit to Construct: Midwest Generation EME, LLC

Address: 13082 E Manito Road

City: Pekin State: IL Zip Code: 61554

Signature X *Jeff Kickert* Date: 1-15-13

Printed Name: Jeff Kickert Phone No: 309-477-5212

Title: Station Director

Organization: _____

7.1.2 Name of Applicant for Permit to Own and Operate: Same as above

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

7.2 Attested (Required When Applicant is a Unit of Government) N/A

Signature X _____ Date: _____

Title: _____
(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

7.3 Applications from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or a duly authorized representative.

7.4 Certificate By Intermediate Sewer Owner N/A

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction of facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary: N/A

Sewer System Owner: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

7.4.1 Additional Certificate By Intermediate Sewer Owner N/A

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction facilities that are the subject of this application.
- 3. Not applicable

Name and location of sewer system to which this project will be tributary:

Sewer System Owner: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

7.5 Certificate By Waste Treatment Works Owner **N/A**

I hereby certify that (Please check one):

- 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.
- 3. Not applicable

I also certify that, if applicable, the industrial waste discharges described in the application are capable of being treated by the treatment works.

Name of Waste Treatment Works: _____

Waste Treatment Works Owner: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

Please return completed form to the following address:

Illinois Environmental Protection Agency
Permit Section, Division of Water Pollution Control
P.O. Box 19276
Springfield, Illinois 62794-9276

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 ½, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

IL 532-0010
WPC 150

MWG13-15_9595

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that section. Failure to do so may prevent this form from being processed and could result in your application being denied.

For IEPA Use:

LOG #

DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE G SLUDGE DISPOSAL & UTILIZATION

1. Name of Project Powerton Ash Surge Basin Liner Replacement
2. General Information
 - 2.1 Source(s) Bottom ash sluice water
 - 2.2 Production Volume per year 6,250 yd3 Dry Tons per year NA
 - 2.3 Sludge to be disposed of is: Liquid NA Dry Tons NA
 - 2.4 Sludge is: Aerobically digested , Anaerobically digested , Heat Anaerobically digested , Raw , Chemically Stabilized , Composted , Wastewater Lagoon , WTP Lime , WTP Alum , WTP Iron , Other , if other, describe Coal Ash . Mixture , if mixture, describe _____
 - 2.5 Is the sludge defined as hazardous by State or Federal Law? YES NO . If yes, basis. _____
 - 2.6 Is sludge to be stored on the STP site? YES NO If yes, type of storage, lagoon , storage tank , Other . If other, describe _____ capacity of storage, _____ cu. ft.
 - 2.7 Sludge Hauling
 - 2.7.1 Name(s), address(es) and Illinois Transporters I.D. Numbers

Dave Clinard Trucking - DOT # 280869
 - 2.7.2 For industrial generators, has Illinois Generator ID Number and Authorization Number been issued? YES NO
If no, contact the Division of Land Pollution Control.

Illinois Generator ID Number ILD000665471
Authorization Number 9290-99
3. Methods of Sludge Disposal and/or Utilization
 - 3.1 Land Application Average Flow (gpd)
 - 3.1.1 Indicate the number of dry tons of sludge per year to be disposed by each of the following methods:
Agricultural land , Commercial Fertilizer Production , Dedicated Land Disposal , Disturbed Land Reclamation , Silviculture , Horticultural Lands , Public Distribution , Other .
If other, specify _____
 - 3.1.2 Sludge Disposal Site Location. Provide a map (USGS Quadrangle map or plat map) showing location.
Name of USGS Quadrangle Map (7.5 or 15 minute) or plat map _____
 - 3.1.3 Provide soil survey map and soil description for disposal site. Identify name of soil survey and map sheet number for each soil survey map provided.

3.1.4 Is sludge to be stored at disposal site? YES NO . If yes, describe and state the storage volume NA
cubic feet.

3.1.5 Provide a copy of sludge user information sheet and completed, signed copies for any known users.

3.1.6 In a narrative description provide operating practices and design features to prevent ground and/or surface water pollution, potable water supply wellhead protection and other buffer distances, calculations supporting storage capacity, total acres available, soil characteristics, operational contingencies, etc.

Disposed at Coal Mine once a year:
Buckheart Mine
22116 E County 6 Hwy
Canton, IL 61520

3.1.7 Submit calculations of sludge application rate for agronomic rate, organic loading and metal loading rate.

3.2 Landfilling on-site off-site

3.2.1 Sanitary Landfill Special Waste Landfill Hazardous Waste Landfill Other

If other, specify _____

3.2.2 Name and Location of Landfill(s)

3.2.3 IEPA Permit Number(s) _____ ; _____ ;

3.3 Incineration

3.3.1 Name and Location NA _____

3.3.2 IEPA Permit Number(s) _____ ; _____ ;

3.3.3 Ultimate Disposal of Incinerator residue

4. Sludge Characteristics

Submit complete analyses of sludge characteristics in mg/kg dry wt. basis unless otherwise indicated. The analyses shall be performed unless the sludge is disposed of by incineration or at an off-site landfill. Analyses performed shall include but not be limited to parameters below:

Parameter

% TS
% VS
COD mg/l
pH
BOD₅ mg/l
Acidity meq of CaCO₃ at pH
Alkalinity meq of CaCO₃ at pH
Oil and Grease mg/l
Phenols mg/l
Cyanide
Sulfate (total) mg/l
Sulfide (total) mg/l
Sodium
EC mmhos/cm
TOC

Parameter

Sulfur
Aluminum (total)
Arsenic (total)
Barium (total)
Cadmium (total)
Cobalt (total)
Chromium, hex (total)
Chromium (total)
Copper (total)
Iron (total)
Mercury (total)
Manganese (total)
Molybdenum (total)
Nickel (total)
Lead (total)

Ammonia mg/l
Total Kjeldahl Nitrogen mg/l
Phosphorus
Potassium
% Volatile Acids, if anaerobically digested

Selenium (total)
Vanadium (total)
Zinc (total)
Radium 226 pCi/g
Radium 228 pCi/g
Other*

*Include results of any hazardous waste characteristics tests performed for: 1) EP Toxicity, 2) Corrosivity, 3) Ignitability, and 4) Reactivity.

IL 532-0016

WPC 156

MWG13-15_9598

ANALYTICAL REPORT

Job Number: 500-22894-1

Job Description: Powerton Basin Sampling

For:

Midwest Generation EME LLC
13082 E Manito Road
Pekin, IL 61554

Attention: Mr. Joe Heredia

Cindy Pritchard

Approved for release
Cindy R Pritchard
Project Mgmt Assistant
12/14/2009 12:33 PM

Designee for
Bonnie M Stadelmann
Project Manager II
bonnie.stadelmann@testamericainc.com
12/14/2009

cc: Mark Kelly
Ms. Maria Race

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

The Lab Certification ID# is 100201.
TestAmerica Portland OR00040

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

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



SAMPLE RESULTS

Mr. Joe Heredia
 Midwest Generation EME LLC
 13082 E Manito Road
 Pekin, IL 61554

Job Number: 500-22894-1

Client Sample ID: BY-PASS BASIN
 Lab Sample ID: 500-22894-3

Date Sampled: 12/02/2009 1330
 Date Received: 12/04/2009 1030
 Client Matrix: Solid

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: TCLP-6010B		Date Analyzed:	12/08/2009 1708	
Prep Method: 3010A		Date Prepared:	12/08/2009 0931	
Arsenic	<0.050	mg/L	0.050	1.0
Barium	0.85	mg/L	0.50	1.0
Cadmium	<0.0050	mg/L	0.0050	1.0
Chromium	<0.025	mg/L	0.025	1.0
Lead	<0.050	mg/L	0.050	1.0
Selenium	<0.050	mg/L	0.050	1.0
Silver	<0.025	mg/L	0.025	1.0
Method: 6010B		Date Analyzed:	12/07/2009 2340	
Prep Method: 3050B		Date Prepared:	12/07/2009 0758	
Potassium	3200	mg/Kg	49	1.0
Method: 6010B		Date Analyzed:	12/08/2009 1005	
Prep Method: 3050B		Date Prepared:	12/07/2009 0758	
Sodium	7900	mg/Kg	99	1.0
Method: TCLP-7470A		Date Analyzed:	12/09/2009 1107	
Prep Method: 7470A		Date Prepared:	12/09/2009 0710	
Mercury	<0.0020	mg/L	0.0020	1.0
Method: Soluble-305.1		Date Analyzed:	12/09/2009 0749	
Acidity	<200	mg/Kg	200	1.0
Method: 9014		Date Analyzed:	12/09/2009 1448	
Prep Method: 9010B		Date Prepared:	12/09/2009 1100	
Cyanide, Total	<0.43	mg/Kg	0.43	1.0
Method: 9034		Date Analyzed:	12/11/2009 1403	
Prep Method: 9030B		Date Prepared:	12/11/2009 0925	
Sulfide	<25	mg/Kg	25	1.0
Method: 9038		Date Analyzed:	12/08/2009 0002	
Prep Method: 300_Prep		Date Prepared:	12/06/2009 2231	
Sulfate	62	mg/Kg	51	1.0
Method: 9045C		Date Analyzed:	12/08/2009 1437	
pH	6.86	SU	0.200	1.0
Method: 9066		Date Analyzed:	12/10/2009 0755	
Prep Method: Distill/Phenol		Date Prepared:	12/09/2009 1430	
Phenolics, Total Recoverable	7.8	mg/Kg	0.49	1.0
Method: 9071B		Date Analyzed:	12/09/2009 1426	

Mr. Joe Heredia
 Midwest Generation EME LLC
 13082 E Manito Road
 Pekin, IL 61554

Job Number: 500-22894-1

Client Sample ID: BY-PASS BASIN
 Lab Sample ID: 500-22894-3

Date Sampled: 12/02/2009 1330
 Date Received: 12/04/2009 1030
 Client Matrix: Solid
 Percent Solids: 97

Analyte	Result/Qualifier	Unit	RL	Dilution
Prep Method: 9071B HEM (Oil & Grease)	<510	mg/Kg	510	1.0
Method: Lloyd Kahn TOC Dup	2300	mg/Kg	120	1.0
Method: Moisture Percent Moisture	3.1	%	0.10	1.0
Method: Soluble-SM 2320B Alkalinity	<430	mg/Kg	430	1.0
Method: SM 4500 NH3 C Prep Method: SM 4500 NH3 B Ammonia	<20	mg/Kg	20	1.0
Method: SM 4500 Norg C Prep Method: 351.3_Prep Nitrogen, Kjeldahl	42	mg/Kg	40	1.0
Method: SM 4500 P E Prep Method: SM 4500 P B Phosphorus as P	1200	mg/Kg	230	25
Method: SM 5210B Biochemical Oxygen Demand	<21	mg/Kg	21	10
Method: SM 5220C Prep Method: SM 5220 Chemical Oxygen Demand	27000	mg/Kg	1700	10

FOR IEPA USE:
LOG #
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION

Springfield, Illinois 62706

SCHEDULE J INDUSTRIAL TREATMENT WORKS CONSTRUCTION OR PRETREATMENT WORKS

1. **NAME AND LOCATION:**

1.1 Name of project Powerton Ash Surge Basin Liner Replacement

1.2 Plant Location

1.2.1 SW 9 Pekin R5W
Quarter Section Section Township Range P.M.

1.2.2 Latitude 40 deg. 32 min. 80 sec. "NORTH

1.2.3 Longitude 89 deg. 40 min. 90 sec. "WEST

1.2.3 Name of USGS Quadrangle Map (7.5 or 15 minute) _____

2. **NARRATIVE DESCRIPTION AND SCHEMATIC WASTE FLOW DIAGRAM: (see instructions)**

Bottom ash sluice water is pumped to the Ash Surge Basin (labeled Ash Settling Basin on attached schematic) and is discharged to the Secondary Ash Settling Basin (labeled Settling Basin on attached schematic).

2.1 **PRINCIPAL PRODUCTS:**

Electrical power

2.2 **PRINCIPAL RAW MATERIALS:**

Coal

3. **DESCRIPTION OF TREATMENT FACILITIES:**

3.1 Submit a flow diagram through all treatment units showing size, volumes, detention times, organic loadings, surface settling rate, weir overflow rate, and other pertinent design data. Include hydraulic profiles and description of monitoring systems.

3.2 Waste Treatment Works is: Batch , Continuous , No. of Batches/day _____ , No. of Shifts/day _____

3.3 Submit plans and specifications for proposed construction.

3.4 Discharge is: Existing ; Will begin on _____

4. **DIRECT DISCHARGE IS TO:** Receiving Stream Municipal Sanitary Sewer Municipal storm or municipal combined sewer

If receiving stream or storm sewer are indicated complete the following:

Name of receiving stream Old Intake Channel ; tributary to Illinois River ;

tributary to _____ ; tributary to _____ ;

5. Is the treatment works subject to flooding? Yes No If so, what is the maximum flood elevation of record (in reference to the treatment works datum) and what provisions have been made to eliminate the flooding hazard?

6. **APPROXIMATE TIME SCHEDULE:** Estimated construction schedule:

Start of Construction 06/04/13 ; Date of Completion 09/07/13

Operation Schedule take out of service 04/09/13 ; Date Operation Begins 09/08/13

100% design load to be reached by year 2013

7. **DESIGN LOADINGS**

7.1 Design population equivalent (one population equivalent is 100 gallons of wastewater per day, containing 0.17 pounds of BOD₅ and 0.20 pounds of suspended solids);

BOD NA ; Suspended Solids NA ; Flow NA

7.2 Design Average Flow Rate NA MGD.

MWG13-15_9603

- 7.3 Design Maximum Flow Rate NA MGD.
7.4 Design Minimum Flow Rate NA MGD.
7.5 Minimum 7-day, 10-year low flow NA cfs NA MGD.
Minimum 7-day, 10-year flow obtained from NA
7.6 Dilution Ratio NA

8. **FLOW TO TREATMENT WORKS (if existing):**

- 8.1 Flow (last 12 months)
8.1.1 Average Flow 8.6 MGD
8.1.2 Maximum Flow 19.2 MGD

8.2 Equipment used in determining above flows

9. Has a preliminary engineering report for this project been submitted to this Agency for Approval?

Yes No . If so, when was it submitted and approved. Date Submitted _____
Certification # _____
Dated _____

10. List Permits previously issued for the facility:

NPDES Permit No. IL0002232

11. Describe provisions for operation during contingencies such as power failures, flooding, peak loads, equipment failure, maintenance shut downs and other emergencies.

In the unlikely event the plant loses power, there will be no flow into the Ash Surge Basin except storm water. If discharge is required, MWG will utilize a diesel generator to maintain discharge capabilities until power is reestablished

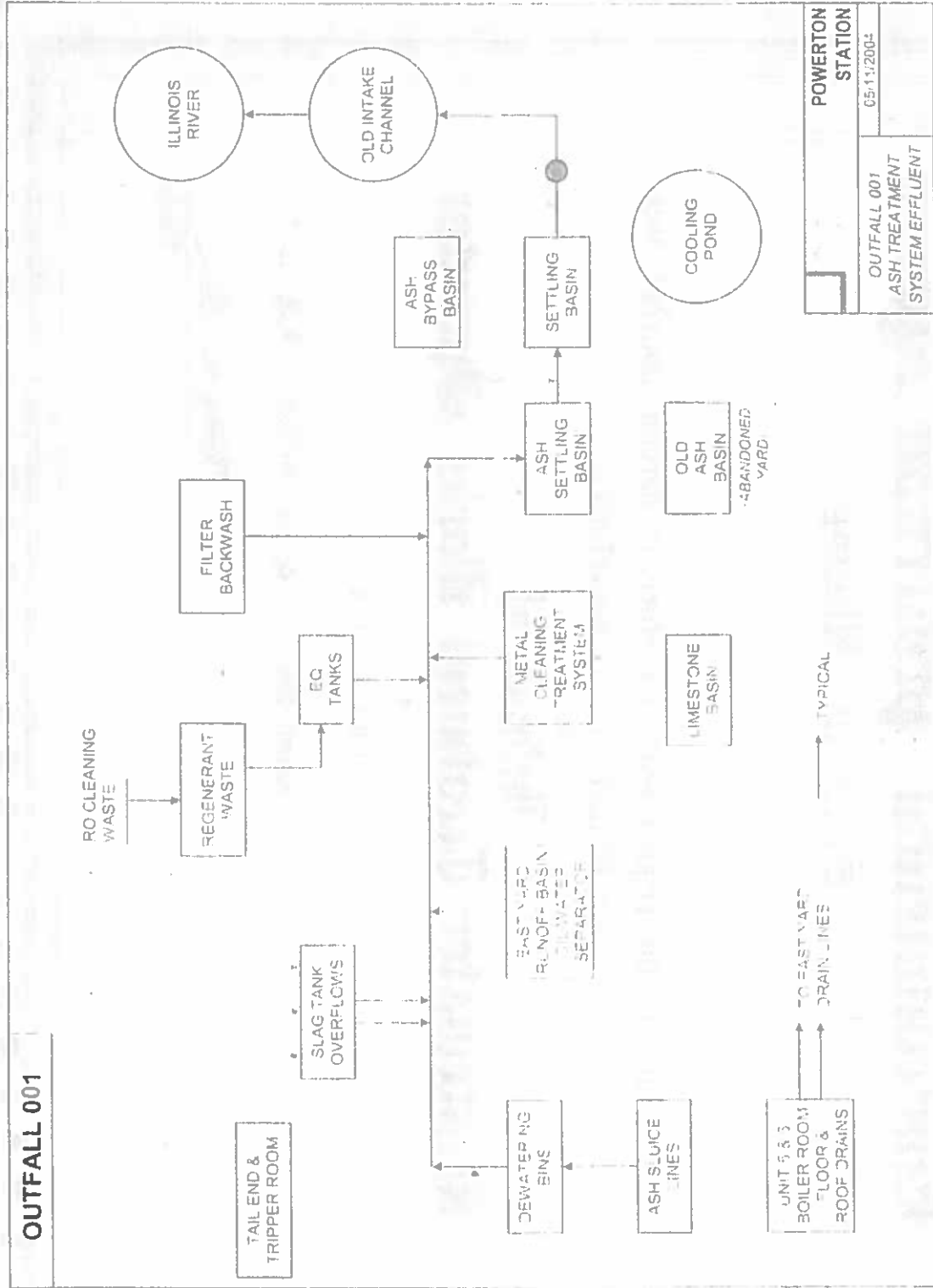
12. Complete and submit Schedule G if sludge disposal will be required by this facility.

13. **WASTE CHARACTERISTICS:** Schedule N must be submitted.

14. **TREATMENT WORKS OPERATOR CERTIFICATION:** List names and certification numbers of certified operators:

Mark Kelly (see attached certification)

OUTFALL 001



POWERTRON STATION	
OUTFALL 001	05/11/2001
ASH TREATMENT SYSTEM EFFLUENT	

Environmental Protection Agency
State of Illinois

MARK S. KELLY

having fulfilled the requirements therefore, is hereby awarded this
Certificate of Competency

as an

**Industrial
Wastewater Treatment Works Operator**

COM ED
POWER TON

Issued this 3rd day of August A.D. 1993

Mark S. Kelly
Director

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that section. Failure to do so may prevent this form from being processed and could result in your application being denied.

For IEPA Use:

LOG #

DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE N WASTE CHARACTERISTICS

1. Name of Project Powerton Ash Surge Basin Liner Replacement

2. FLOW DATA

EXISTING

PROPOSED-DESIGN

2.1 Average Flow (gpd) 8,600,000 same

2.2 Maximum Daily Flow (gpd) 19,200,000 same

2.3 TEMPERATURE

Time of Year	Avg. Intake Temp. F	Avg. Effluent Temp. F	Max. Intake Temp. F	Max. Effluent Temp. F	Max. Temp. Outside Mixing Zone F
SUMMER	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
WINTER	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

2.4 Minimum 7-day, 10-year flow: NA cfs NA MGD.

2.5 Dilution Ratio: NA ;

2.6 Stream flow rate at time of sampling NA cfs NA MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ; Existing conditions ; Proposed Permitted Conditions

Type of sample: grab (time of collection _____); composite (Number of samples per day NA)

(see instructions for analyses required)

CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Ammonia Nitrogen (as N)	NA	NA	NA	NA
Arsenic (total)	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Boron	NA	NA	NA	NA
BOD ₅	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Carbon Chloroform Extract	NA	NA	NA	NA
Chloride	NA	NA	NA	NA
Chromium (total hexavalent)	NA	NA	NA	NA
Chromium (total trivalent)	NA	NA	NA	NA

CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Copper	NA	NA	NA	NA
Cyanide (total)	NA	NA	NA	NA
Cyanide (readily released @ 150° F & pH 4.5)	NA	NA	NA	NA
Dissolved Oxygen	NA	NA	NA	NA
Fecal Coliform	NA	NA	NA	NA
Fluoride	NA	NA	NA	NA
Hardness (as Ca CO ₃)	NA	NA	NA	NA
Iron (total)	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
MBAS	NA	NA	NA	NA
Mercury	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Nitrates (as N)	NA	NA	NA	NA
Oil & Grease (hexane solubles or equivalent)	NA	5.4 ppm / 6 ppm	NA	NA
Organic Nitrogen (as N)	NA	NA	NA	NA
pH	NA	NA	NA	NA
Phenols	NA	NA	NA	NA
Phosphorous (as P)	NA	NA	NA	NA
Radioactivity	NA	NA	NA	NA
Selenium	NA	NA	NA	NA
Silver	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA
Suspended Solids	NA	5.4 ppm / 10 ppm	NA	NA
Total Dissolved Solids	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Others				

IL 532-0019
WPC 159



CHICAGO TRANS

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APPENDIX B
PHOTOGRAPHS

Midwest Generation Powertron Generating Station
Ash Surge Basin



Photo Number: 1
Date of Photo: 10/17/2012
Description: Looking northwest at the Ash Surge Basin inlet structure.
Creator: JRR





Photo Number: 2
Date of Photo: 10/17/2012
Description: Looking at Ash Surge Basin inlet structure trough.
Creator: JRR

Midwest Generation Powerlon Generating Station
Ash Surge Basin



Photo Number: 3
Date of Photo: 10/17/12
Description: Looking north at Ash Surge Basin inlet structure.
Creator: JRR



Midwest Generation Powerton Generating Station
Ash Surge Basin



Photo Number: 4
Date of Photo: 10/17/12
Description: Looking east across Ash Surge Basin.
Creator: JRR



APPENDIX C
SPECIFICATION SECTION 02600

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.

2113 MWG - Ash Surge Basin Liner Replacement Specifications

Section 02600-1

MWG13-15_9617

High Density Polyethylene (HDPE) Geomembrane

- 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).

High Density Polyethylene (HDPE) Geomembrane

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:

High Density Polyethylene (HDPE) Geomembrane

- 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

<u>Property</u>	<u>Units</u>	<u>Value</u>	<u>Test</u>	<u>Criterion</u>
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

<u>Property</u>	<u>Units</u>	<u>Value</u>	<u>Test</u>	<u>Criterion</u>
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

High Density Polyethylene (HDPE) Geomembrane

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:

High Density Polyethylene (HDPE) Geomembrane

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

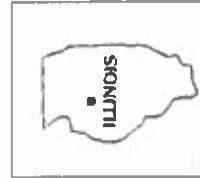
Streets

SHEETS

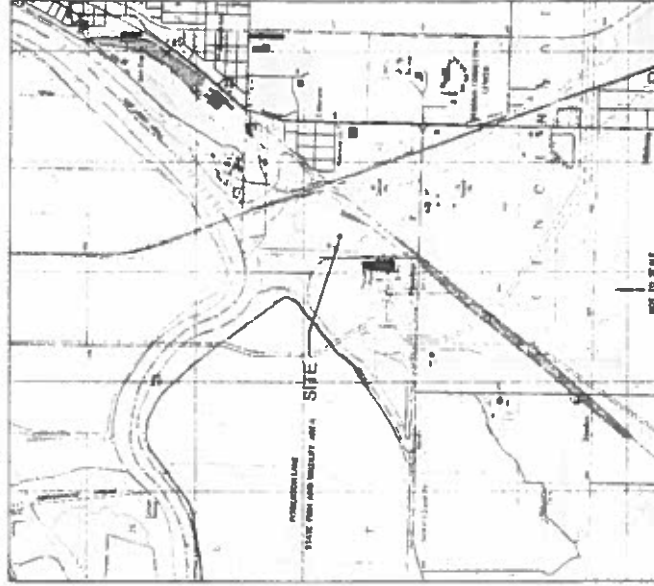
ASH SURGE BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON GENERATING STATION PEKIN, ILLINOIS

LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
15	TITLE SHEET	0211 3215 00
C010	PRE CONSTRUCTION SITE CONDITIONS	0211 320210 00
C020	LINER SURGRADE PREPARATION	0211 320220 00
C030	WEARING LAYER PLAN	0211 320230 00
C001	DETAILS AND SECTIONS	0211 320201 00
C002	DETAILS AND SECTIONS	0211 320202 00



ILLINOIS



SITE LOCATION

PROJECT NO. 21-12

DESIGNED BY [blank]

CHECKED BY [blank]

DATE 02/11/13

SCALE 1/8" = 1'-0"

PROJ. NO. 21-12

NAVAEAL
RESOURCES
TECHNOLOGY

PROJECT NO. 21-12

DESIGNED BY [blank]

CHECKED BY [blank]

DATE 02/11/13

SCALE 1/8" = 1'-0"

PROJ. NO. 21-12

ASH SURGE BASIN LINER REPLACEMENT

MIDWEST GENERATION

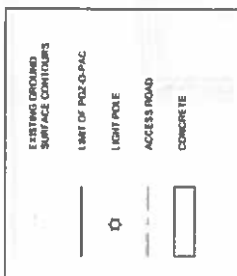
POWERTON GENERATING STATION

PEKIN, ILLINOIS

PREPARED FOR:
MIDWEST GENERATION POWERTON GENERATING STATION
13082 EAST MANITO ROAD
PEKIN, IL 61554

JANUARY 2013

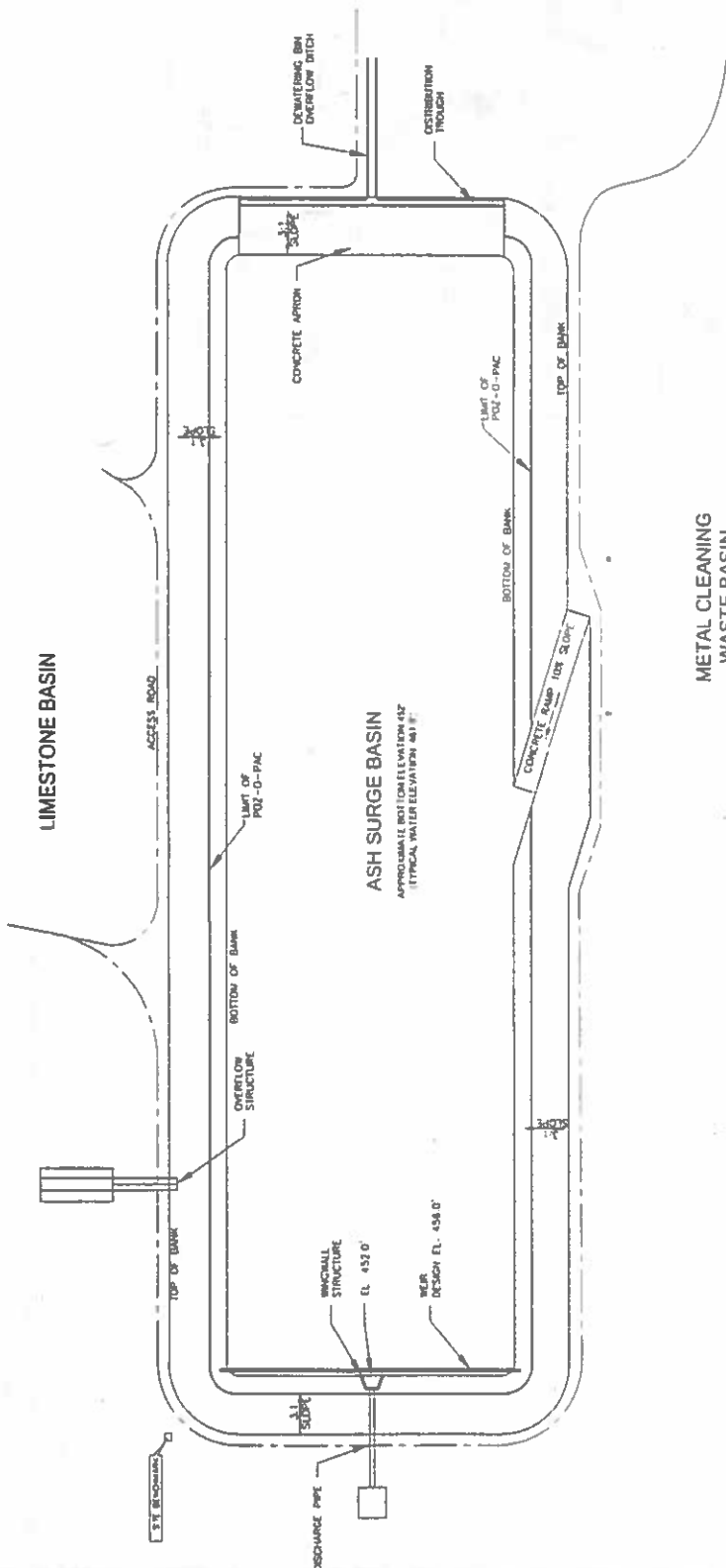
MWG13-15_9637



NOTES:
 1. SITE BENCH-MARK: INTERIOR CORNER OF AT RESTATION
 AND TO 17111 (GROUND 20)

HORIZONTAL BENCH
 ALONG STATE PLANE GEODESIC SYSTEM
 (SEE PLAN, POINT 100)
 VERTICAL BENCH
 TO THE MEAN SEA LEVEL

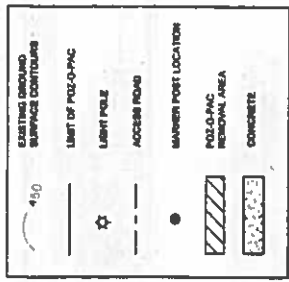
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 8-19-2008. PROJECT NO. 1008011. PROVIDED BY
 AEGIS-INT'L, INC. 1008011.01.01.01.01.01
 2. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE
 SPECIFIED. DIMENSIONS ARE TO FACE UNLESS
 OTHERWISE SPECIFIED. DIMENSIONS ARE TO
 CENTERLINE UNLESS OTHERWISE SPECIFIED.
 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE
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1	ISSUED FOR PERMIT			
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PROJECT NO.	1008011
TITLE	PRE-CONSTRUCTION SITE CONDITIONS
DRAWN BY	MARK GUYTON
CHECKED BY	MARK GUYTON
DATE	10/11/08
PROJECT LOCATION	ASH SURGE BASIN LINER REPLACEMENT POWERTRON GENERATING STATION MIDWEST GENERATION PEKIN, ILLINOIS
DESIGNED BY	MARK GUYTON
DATE	10/11/08
SCALE	AS SHOWN
SHEET NO.	0310
TOTAL SHEETS	0310

MWG13-15_9638



CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING:

1. VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURES AND UTILITIES.

2. EXISTING POL-D-PAC SHALL BE REMOVED TO A MINIMUM 2 FEET FROM ALL EXISTING STRUCTURES AND UTILITIES.

3. EXISTING POL-D-PAC SHALL BE REMOVED TO A MINIMUM 2 FEET FROM ALL EXISTING STRUCTURES AND UTILITIES.

4. EXISTING POL-D-PAC SHALL BE REMOVED TO A MINIMUM 2 FEET FROM ALL EXISTING STRUCTURES AND UTILITIES.

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9. EXISTING POL-D-PAC SHALL BE REMOVED TO A MINIMUM 2 FEET FROM ALL EXISTING STRUCTURES AND UTILITIES.

10. EXISTING POL-D-PAC SHALL BE REMOVED TO A MINIMUM 2 FEET FROM ALL EXISTING STRUCTURES AND UTILITIES.

SCALE IN FEET

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PROJECT NO. 1111-1111-1111

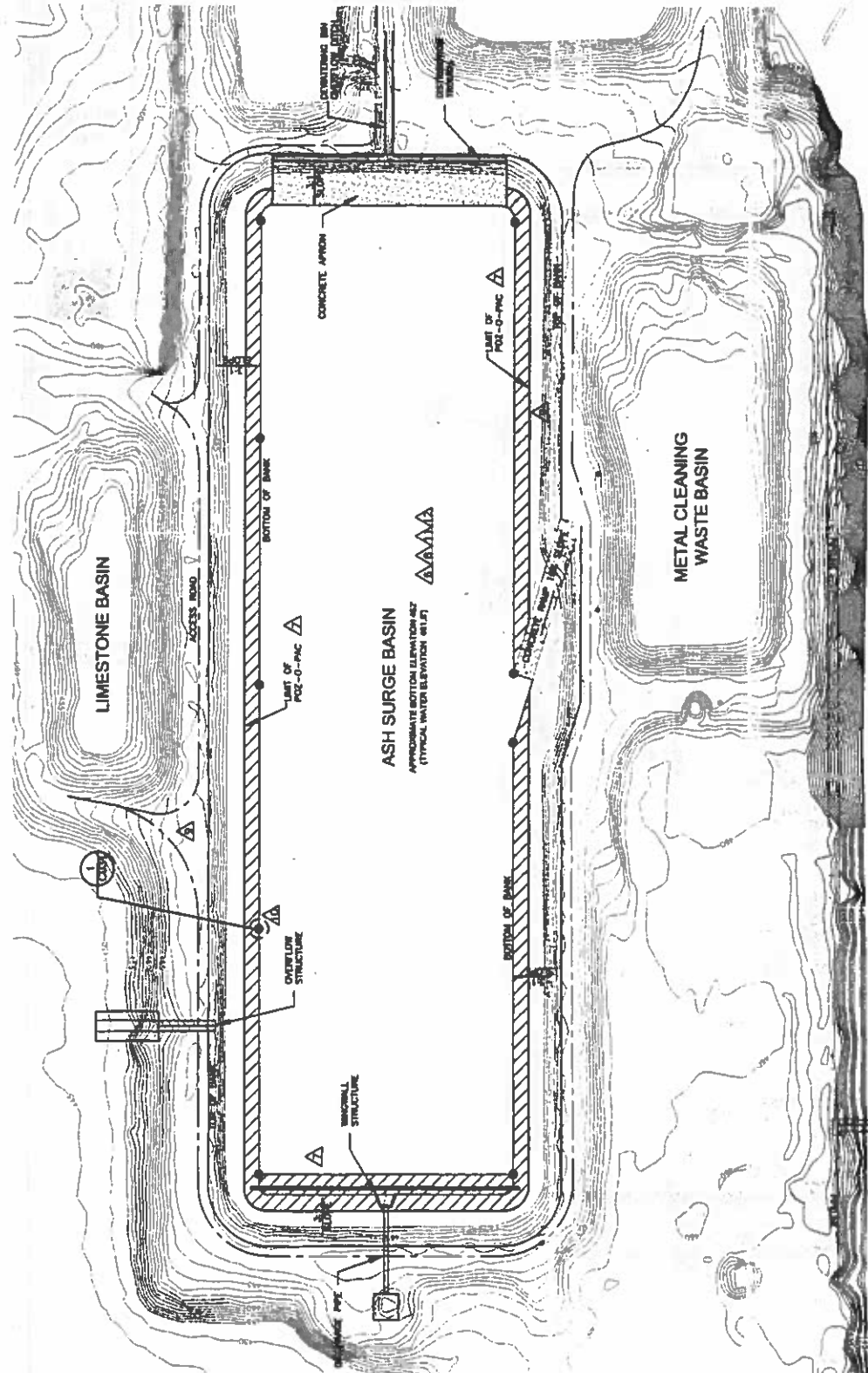
DATE 11-11-11

BY 111111

CHECKED BY 111111

APPROVED BY 111111

DATE 11-11-11



NATURAL RESOURCE TECHNOLOGY

LINER SUBGRADE PREPARATION

ASH SURGE BASIN LINER REPLACEMENT

POWER TOWN GENERATING STATION

MIDWEST GENERATION

PEKIN, ILLINOIS

PROJECT NO. 1111-1111-1111

DATE 11-11-11

BY 111111

CHECKED BY 111111

APPROVED BY 111111

DATE 11-11-11

SHEET NO. 1111

OF 1111

○	LIGHT POLE
—	ACCESS ROAD
—	WADING POOL LOCATION
—	ASBESTOS LAYER
—	WARRANTY LAYER
—	FOUR EPOXYRESIN
—	CONCRETE
—	GRAVEL

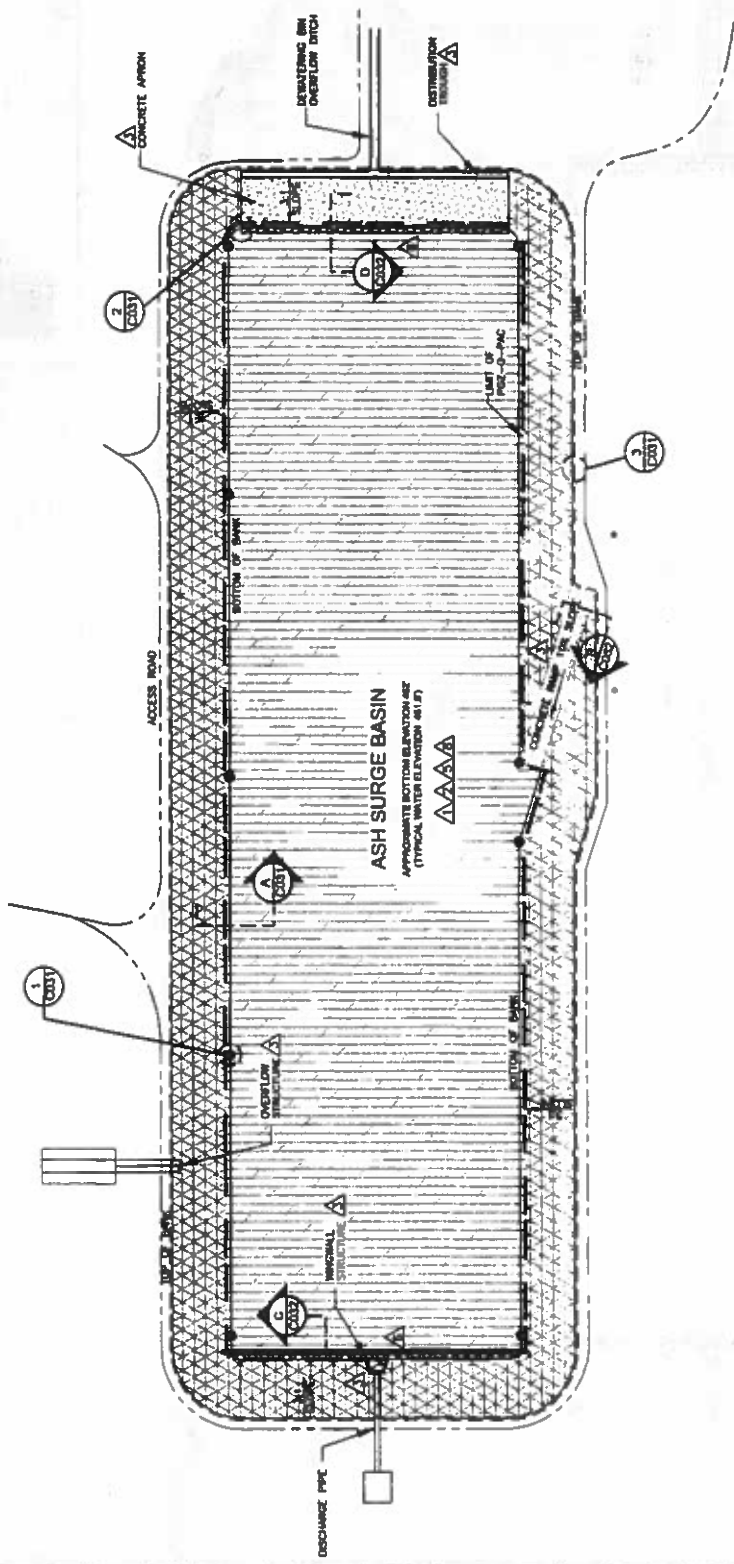
CONSTRUCTION NOTES:

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR ASBESTOS LAYER REPLACEMENT.
2. THE ASBESTOS LAYER SHALL BE REPLACED WITH A 2" THICK LAYER OF FIBERGLASS REINFORCED POLYESTER (FRP) ASBESTOS LAYER.
3. THE FRP ASBESTOS LAYER SHALL BE INSTALLED OVER THE EXISTING ASBESTOS LAYER.
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10. THE FRP ASBESTOS LAYER SHALL BE INSTALLED OVER THE EXISTING ASBESTOS LAYER.

DESIGNER'S NOTE:
 CONSULT WITH THE COMMUNITY SYSTEMS UNIT FOR ANY CHANGES TO THIS PLAN.



PROJECT NOTES:
 THE DESIGNER HAS CONDUCTED VISUAL INSPECTIONS OF THE ASBESTOS LAYER AND HAS FOUND NO SIGNIFICANT DAMAGE TO THE ASBESTOS LAYER. THE DESIGNER HAS NOT CONDUCTED ANY TESTING OF THE ASBESTOS LAYER.



1	ASBESTOS LAYER	2	WARRANTY LAYER
3	FOUR EPOXYRESIN	4	CONCRETE
5	GRAVEL	6	FRP ASBESTOS LAYER

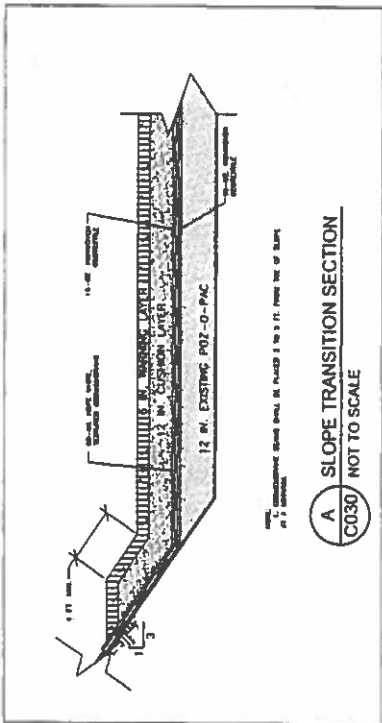


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DESIGNED BY: [Name]
DRAWN BY: [Name]
CHECKED BY: [Name]

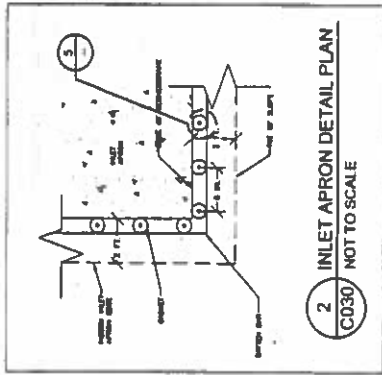
WARNING LAYER PLAN
ASH SURGE BASIN LINER REPLACEMENT
POWERTRON GENERATING STATION
MIDWEST GENERATION
PERKIN, ILLINOIS

PROJECT NO: 1111-2
 SHEET NO: 020

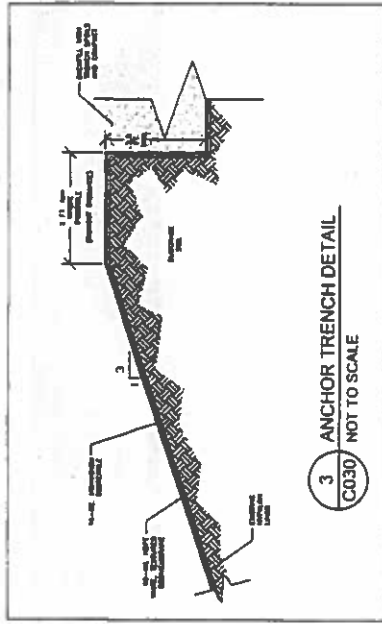
MWG13-15_9640



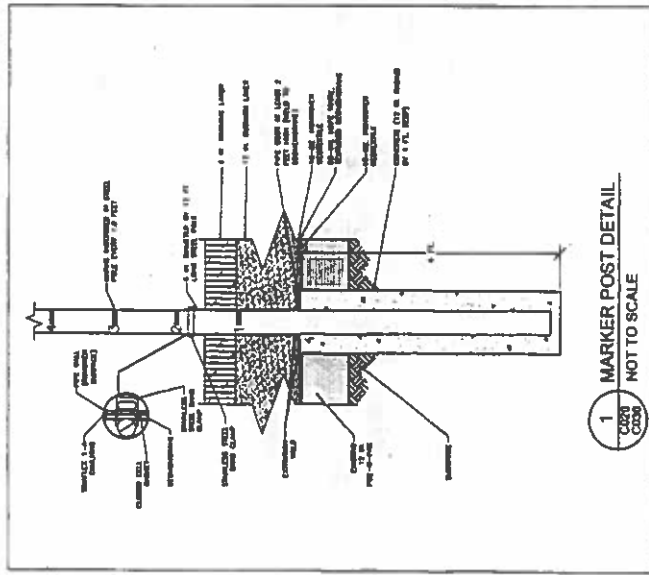
A SLOPE TRANSITION SECTION
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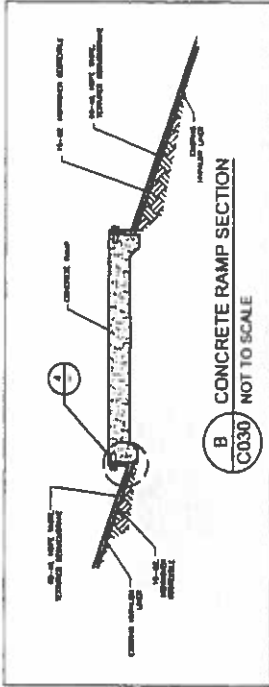
2 INLET APRON DETAIL PLAN
C030 NOT TO SCALE



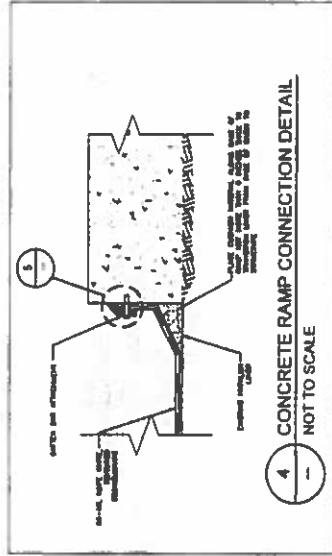
3 ANCHOR TRENCH DETAIL
C030 NOT TO SCALE



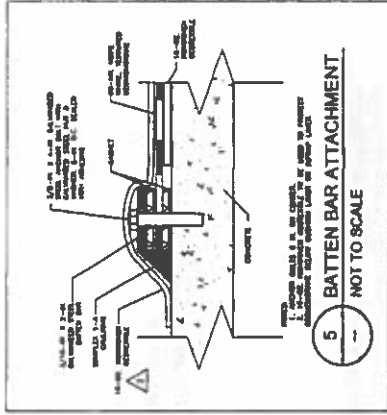
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C030 NOT TO SCALE



B CONCRETE RAMP SECTION
C030 NOT TO SCALE



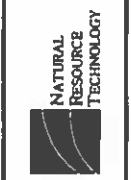
4 CONCRETE RAMP CONNECTION DETAIL
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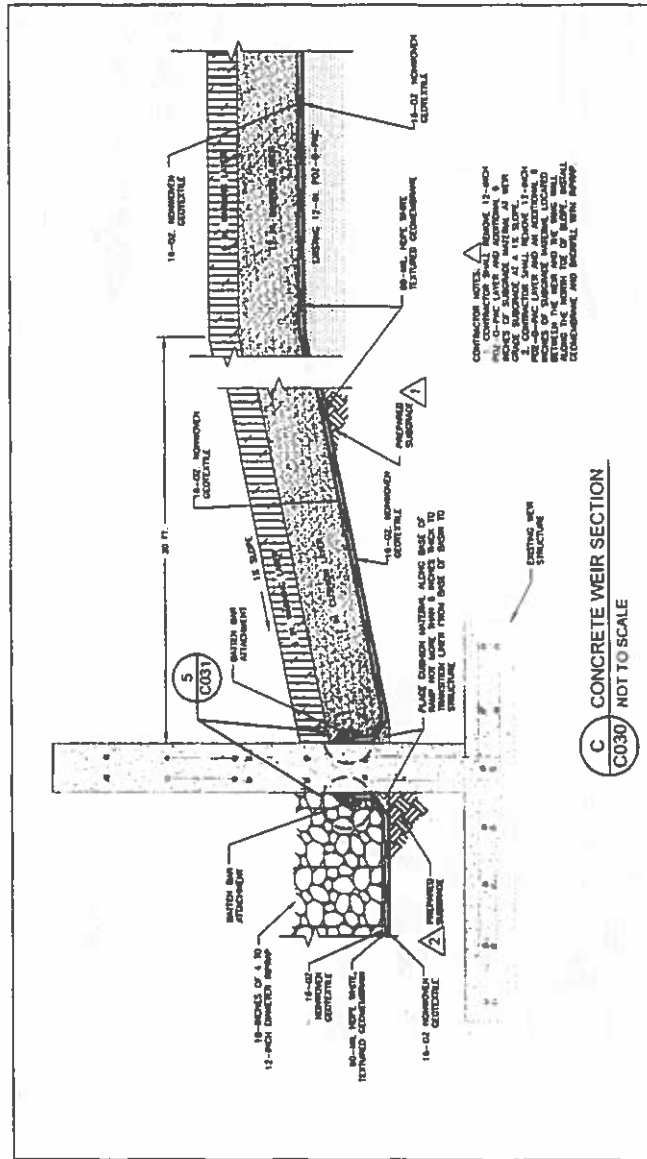
5 BATTEN BAR ATTACHMENT
NOT TO SCALE

PROJECT NO.		SHEET NO.	
2112	1112	1112	1112
DESIGNED BY		CHECKED BY	
DATE		DATE	
APPROVED BY		DATE	
PROJECT NAME		SHEET NO.	
PROJECT LOCATION		CR#1	

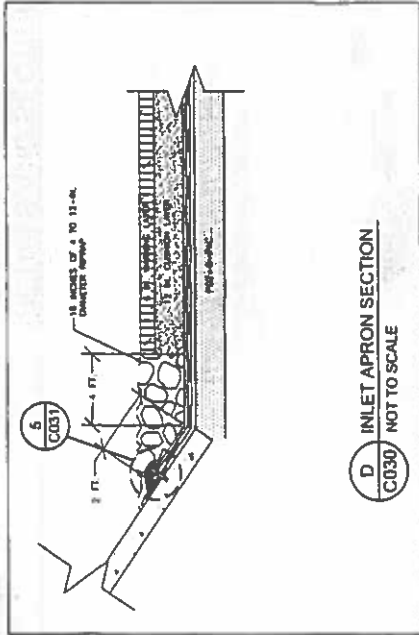
DETAILS AND SECTIONS
ASH SURGE BASIN LINER REPLACEMENT
POWERTRON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS



COUNTY OF DEKALB



CONTRACTOR NOTE:
 1) CONTRACTOR SHALL REMOVE 12-INCH
 MIN. C-25 CONCRETE LAYER AND REPLACE WITH
 CRACKS EXPOSED AT 15 DEGREE SLOPE.
 2) CONTRACTOR SHALL REMOVE EXISTING
 POLY-PROPYLENE LINER AND AN ADDITIONAL 2
 INCHES OF DAMAGE WASTELAND LAYER
 ALONG THE NORTH SIDE OF WEIR. INSTALL
 CORRUGATED METAL AND SLOPE WITH APRON.



DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
 POWERTRAIN GENERATING STATION
 MIDWEST GENERATION
 PEKIN, ILLINOIS

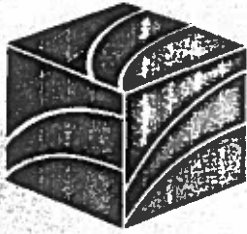
PROJECT NO.: 11113
 DRAWN BY: R.H. HARRIS
 CHECKED BY: H.B. HARRIS
 APPROVED BY: H.B. HARRIS

DATE: 01/13/2013



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MMWG13-15_9642



NATURAL RESOURCE TECHNOLOGY, INC.
23713 W. PAUL ROAD, SUITE D
PEWAUKEE, WI 53072
(P) 262.523.9000 (F) 262.523.9001
WWW.NATURALRT.COM

MWG13-15_9643

1. 我 們 第 一 步 是 要 確 定 這 個 問 題 的 重 要 性 和 緊 要 性

2. 我 們 第 二 步 是 要 確 定 這 個 問 題 的 原 因



1. 我 們 第 一 步 是 要 確 定 這 個 問 題 的 重 要 性 和 緊 要 性
2. 我 們 第 二 步 是 要 確 定 這 個 問 題 的 原 因
3. 我 們 第 三 步 是 要 確 定 這 個 問 題 的 解 決 方 案
4. 我 們 第 四 步 是 要 確 定 這 個 問 題 的 預 防 措 施