DRAFT REPORT
ROUND 10 DAM ASSESSMENT – JUNE 14, 2011
XCEL ENERGY – BAY FRONT GENERATING STATION
SURGE BASIN, POLISHING BASIN
ASHLAND, WISCONSIN

PREPARED FOR:

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

PREPARED BY:

GZA GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, Ma 02062
GZA File No. 01.0170142.30

DRAFT

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

March 15, 2012
GZA File No. 170142.30

Mr. Stephen Hoffman
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: DRAFT Assessment of Dam Safety of Coal Combustion Surface Impoundments at the Bay Front Generating Station

Dear Mr. Hoffman,

One Edgewater Drive
Norwood,
Massachusetts 02062
Phone: 781-278-3700
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In accordance with our proposal 01.P0000177.11 dated March 28, 2011, and U.S. Environmental Protection Agency (EPA) Contract No. EP10W001313, Order No. EP-B115-00049, GZA GeoEnvironmental, Inc. (GZA) has completed our inspection of the Bay Front Generating Station Coal Combustion Waste (CCW) Impoundments located in Ashland, Wisconsin. The site visit was conducted on June 14, 2011. The purpose of our efforts was to provide the EPA with a site specific inspection of the impoundments to assist EPA in assessing the structural stability of the impoundments under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104(e). We are submitting one hard copy and one CD-ROM copy of this Draft Report directly to the EPA.

Based on our visual inspection, and in accordance with the EPA's criteria, the Surge Basin and Polishing Basin are currently in **POOR** condition in our opinion. Further discussion of our evaluation and recommended actions are presented in the Task 3 Dam Assessment Report. The report includes: (a) a completed Coal Combustion Dam Inspection Checklist Form for each Basin; (b) a field sketch; and (c) selected photographs with captions. Our services and report are subject to the Limitations found in **Appendix A** and the Terms and Conditions of our contract agreement.

We are happy to have been able to assist you with this inspection and appreciate the opportunity to continue to provide you with dam engineering consulting services. Please contact the undersigned if you have any questions or comments regarding the content of this Task 3 Dam Assessment Report.

Sincerely,

GZA GeoEnvironmental, Inc.

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Geologic Engineer
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PREFACE

The assessment of the general condition of the dams/impoundment structures reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report.

In reviewing this report, it should be realized that the reported condition of the dams and/or impoundment structures was based on observations of field conditions at the time of inspection, along with data available to the inspection team. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is critical to note that the condition of the dam and/or impoundment structures depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Prepared by:

GZA GeoEnvironmental, Inc.

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Patrick Harrison, P.E.

License No.: 14164-6
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GZA GeoEnvironmental, Inc.

EXECUTIVE SUMMARY

This Inspection Report presents the results of a visual inspection of the Xcel Energy (Xcel) – Bay Front Generating Station (BFGS) Coal Combustion Waste (CCW) Impoundments located at 122 North 14th Avenue West, Ashland, Wisconsin. These inspections were performed on June 14, 2011 by representatives of GZA GeoEnvironmental, Inc (GZA), accompanied by representatives of Xcel.

The BFGS power plant currently has three coal fired boiler and turbines units with a current generating capacity of approximately 74 Megawatts (MW). Commercial operation of the facility began in the 1916 with small second hand boilers and turbines. Additions over the next forty (40) years increased the number of plant units to five boilers and six turbines for a generating capacity of 92 MW. The plant was renovated in 1986 to its present configuration and current generating capacity. The CCW Impoundments (Surge Basin and Polishing Basin) at the Site are embankment structures consisting of bottom ash fill placed/compacted in a controlled manner that were designed and constructed in 1976. The impoundments were built for the purpose of storing and disposing non-recyclable CCW from the BFGS facility and clarification of water prior to discharge into Lake Superior. Fly ash and bottom ash produced at the BFGS are managed in silos and trucked off-site for beneficial re-use. The Surge Basin receives process waste solids which include ash fines and bottom ash (slag) from the BFGS through a sluice transport pipe. Solids are allowed to settle in the Surge Basin and decant water is discharged into the Polishing Basin. Decant water from the Polishing Basin is subsequently discharged to Lake Superior.

For the purposes of this EPA-mandated inspection, the size of the impoundments was based on U. S. Army Corps of Engineers (COE) criteria. Based on the maximum structural height of 9.5 feet and a storage volume of approximately 1.4 acre-feet, the Surge Basin is classified as a **Small-**sized structure. Based on the maximum structural height of 7.5 feet and a storage volume of approximately 3.1 acre-feet, the Polishing Basin is classified as a **Small-**sized structure. According to guidelines established by the COE, dams with a storage volume less than 1,000 acre-feet and/or a height less than 40 feet are classified as Small-sized structures.

Under the EPA classification system, as presented on page 2 of the EPA check list (**Appendix C**) and Definitions section (**Appendix B**), it is GZA's opinion that the Surge and Polishing Basins would be considered as having a **Low** hazard potential. The hazard potential rating is based on no probable loss of human life due to failure and the low potential for environmental impacts outside of Utility-owned property.

Assessments

Overall, the Surge Basin was found to be in **POOR** condition primarily due to inadequate information pertaining to the original 1976 hydrologic/hydraulic analysis and lack of information on embankment stability under seismic loading conditions. In addition the Surge Basin was found to have the following deficiencies:

1. Localized (small diameter) animal burrows along the upstream slope;

2. Minor to moderate erosion on portions of the upstream slope (presumably from wave action);
3. Minor erosion at the downstream toe;
4. Incomplete documentation for the hydrologic/hydraulic analysis; and,
5. No stability analysis for seismic loading conditions.

Similarly to the Surge Basin, the overall condition of the Polishing Basin was found to be in **POOR** condition primarily due to inadequate information pertaining to the original 1976 hydrologic/hydraulic analysis and lack of information on embankment stability under seismic loading conditions. In addition the Polishing Basin was found to have the following deficiencies:

1. Localized (small diameter) animal burrows along the crest;
2. Minor to moderate erosion along portions of the upstream slope (presumably from wave action);
3. Incomplete documentation for the hydrologic/hydraulic analysis; and,
4. No stability analysis for seismic loading conditions.

In GZA's professional opinion, the embankment(s) visually appear to be sound and no immediate remedial action appears to be necessary. However, based on EPA's inspection criteria, each impoundment has been given a **POOR** Condition Rating, because complete hydrologic/hydraulic and geotechnical computations were not provided/available for GZA's review. Thus the hydrologic/hydraulic adequacy of the impoundments as well as the stability of the embankment(s) under seismic loading could not be independently verified.

The following sections describe the recommended approach to address current deficiencies. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of permits needs to be determined for activities that may occur within the jurisdiction of the appropriate regulatory agencies.

Studies and Analyses

GZA recommends the following studies and analyses:

1. Perform a stability analysis of the impoundments under seismic loading; and,
2. Update the hydrologic/hydraulic analysis for the impoundments to document the adequacy of the impoundments to accommodate the 100-year, 24-hour event.

Recurrent Operation & Maintenance Recommendations

GZA recommends the following operation and maintenance level activities:

1. Repair erosion on the downstream slope of the Surge Basin;
2. Fill currently observed animal burrows by injecting grout under low to moderate pressures to ensure the entire limits of the respective burrow is adequately filled;

3. Repair observed erosion on the upstream slopes of the Surge and Polishing Basins;

4. Monitor decant outflow structures and clear silt or debris which may block or impede outflow; and,

5. Take measures as necessary so as to maintain operability and function of the various impoundment water level control mechanisms.

Remedial Measures Recommendations

1. In conjunction with the results of the hydrologic and hydraulic analyses, make provisions for an emergency overflow spillway(s) if required; and,

2. In conjunction with the results of the stability analyses, make provisions to address deficiencies if required/as necessary.

SURGE BASIN AND POLISHING BASIN
XCEL ENERGY, BAY FRONT GENERATING STATION
ASHLAND, WISCONSIN

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1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The United States Environmental Protection Agency (EPA) has retained GZA GeoEnvironmental, Inc. (GZA) to perform a visual inspection and develop a report of conditions for Xcel Energy (Xcel, Owner) Bay Front Generating Station (BFGS, Site) Coal Combustion Waste (CCW) Impoundments in Ashland County, Wisconsin. This inspection was authorized by the EPA under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 104(e). This inspection and report were performed in accordance with Request for Quote (RFQ) RFQ-DC-16, dated March 16, 2011, and EPA Contract No. EP10W001313, Order No. EP-B11S-00049. The inspection generally conformed to the requirements of the Federal Guidelines for Dam Safety[1] and this report is subject to the limitations provided in **Appendix A** and the Terms and Conditions of our Contract Agreement.

1.1.2 Purpose of Work

The purpose of this investigation was to visually inspect and evaluate the condition of the impoundments and appurtenant structures (the management unit[s]) to attempt to identify conditions that may adversely affect their structural stability and functionality, to note the extent of any deterioration that may be observed, review the status of maintenance and needed repairs and to evaluate the conformity with current design and construction standards of care.

The investigation was divided into five parts: 1) obtain and review available reports, investigations and data from the Owner pertaining to the impoundment and appurtenant structures; 2) perform a review with the Owner of available design, inspection and maintenance data and procedures for the management unit(s); 3) perform a visual inspection of the Site; 4) prepare and submit a field assessment checklist; and 5) prepare and submit a draft and final report presenting the evaluation of the structure(s), including recommendations and proposed remedial actions.

1.1.3 Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided in **Appendix B**. Many of these terms may be included in this report. The terms are presented under common categories associated with dams, which include: 1) orientation; 2) dam components; 3) size classification; 4) hazard classification; 5) general; and 6) condition rating.

1.2 Description of Project

1.2.1 Location

The BFGS is located at 122 North 14th Avenue West in the City of Ashland, Wisconsin. The main entrance to the Site is located near the intersection of Lake Shore Drive W with

[1] FEMA/ICODS, April 2004: http://www.ferc.gov/industries/hydropower/safety/guidelines/fema-93.pdf.

11th Avenue West and the CCW impoundments are located on the western end of the Site approximately 650 feet southwest of the power plant at approximately latitude 46° 35' 14" North and longitude 90° 54' 08" West. A Site locus of the impoundments and surrounding area is shown on **Figure 1**. An aerial photograph of the impoundments and surrounding area is provided as **Figure 2**. The impoundments can be accessed by vehicles from access roads from the power plant.

1.2.2 Owner/Caretaker

The CCW impoundments are owned by Xcel and are operated by the BFGS.

	Dam Owner/Caretaker
Name	Xcel Energy, Bay Front Generating Station
Mailing Address	122 North 14th Avenue West
City, State, Zip	Ashland, Wisconsin 54806
Contact	David Fulweber
Title	Plant Manager
E-Mail	David.fulweber@xcelenergy.com
Daytime Phone	715-682-7200
Emergency Phone	911

1.2.3 Purpose of the Impoundments

The BFGS power plant currently has three coal fired boiler and turbine units with a current generating capacity of approximately 74 Megawatts (MW). Commercial operation of the facility began in the 1916 with small second hand boilers and turbines. Additions over the next forty (40) years increased the number of plant units to five boilers and six turbines for a generating capacity of 92 MW. The plant was renovated in 1986 to its present configuration and current generating capacity. The CCW Impoundments (Surge Basin and Polishing Basin) at the Site are embankment structures consisting of bottom ash fill that was placed and compacted with engineering oversight that were designed and constructed in 1976. The impoundments were built for the purpose of storing and disposing non-recyclable CCW from the BFGS facility and clarification of water prior to discharge into Lake Superior. Fly ash and bottom ash produced at the BFGS are managed in silos and trucked off-site for beneficial re-use.

The Surge Basin receives process waste solids which include ash fines and bottom ash (slag) from the BFGS through a sluice transport pipe. Solids are allowed to settle in the Surge Basin and decanted water is discharged into the Polishing Basin. Decanted water from the Polishing Basin is subsequently discharged to Lake Superior.

1.2.4 Description of the Surge Basin and Appurtenances

The Surge Basin was designed Barr Engineering (Barr) in 1976. Barr also analyzed the impoundments in 1992 for compliance to revisions in Chapter NR 213 of the Wisconsin Administrative Code for industrial lagoon and storage structure requirements. The following description of the impoundment is based on information provided in the Barr design drawings,

project specifications and studies, information received from Xcel and observations made by GZA during our Site visit.

The Surge Basin is located southwest of the BFGS as shown on **Figure 2**. This impoundment was commissioned in 1976, and functions as a settling pond for CCW generated by the BFGS that is not recycled for beneficial re-use. The CCW consists of process water and waste solids which include fly ash fines and bottom ash (slag). These materials are transported through piping from the plant to the Surge Basin intake structure and then into the Surge Basin through three 12-inch diameter steel pipes which are embedded in the east embankment. Decanted water and unsettled CCW from the Surge Basin are discharged into the Polishing Basin through a flow control structure which is located along the northwest embankment of the Surge Basin. The flow control structure design uses an orifice to moderate the discharge flow from the Surge Basin into the Polishing Basin. The orifice was designed to maintain the water level in the Surge Basin within one-half foot of the design operating level while minimizing variations in the discharge into the Polishing Basin. If the flow of water and CCW is less than the design discharge to the Surge Basin, the flow into the Polishing Basin is maintained by the constant overflow. If the flow of water and CCW is more than the design discharge to the Surge Basin, the flow control will discharge over the top of the weir in the structure which prevents overtopping of the Surge Basin embankments. The approximate location of the Surge Basin inlet and outlet structures are shown on **Figure 2**.

The Surge Basin consists of bottom ash fill embankments (placed/compacted in a controlled manner) with a crest length of approximately 540 feet, a structural height (from the lowest downstream toe elevation to the crest of the impoundment) of approximately 9.5 feet, and a corresponding crest elevation of approximately 613.5 feet MSL. The embankments were designed and constructed with 3-foot horizontal to one-foot vertical (3H:1V) upstream and downstream slopes consisting of compacted bottom ash fill (designated as granular fill on the design drawings). The embankments were constructed on native and/or prepared subgrade (i.e. compacted bottom ash fill) soils. Within the exterior embankments, a liner consisting of a 2 foot layer of compacted clay ("impervious blanket") was placed over the base of the basin and extended along the upstream slopes to form an "impervious core" approximately 10 feet from upstream face. The southwestern embankment of the Surge Basin is common to the Polishing Basin and does not have this compacted clay core. A plan view of the impoundment design is provided on **Figure 4.** Typical sections of the embankments and other design details are provided on **Figures 5, 6 and 7**.

No instrumentation is present in the area of the Surge Basin.

1.2.5 Description of the Polishing Basin and Appurtenances

The Polishing Basin was designed Barr Engineering (Barr) in 1976. Barr also analyzed the impoundments in 1992 for compliance to revisions in Chapter NR 213 of the Wisconsin Administrative Code for industrial lagoon and storage structure requirements. The following description of the impoundment is based on information provided in the Barr design drawings, project specifications and studies, information received from Xcel and observations made by GZA during our Site visit.

The Polishing Basin is located southwest of the BFGS and the Surge Basin as shown on **Figure 2**. This impoundment was commissioned in 1976, and receives water and unsettled fine CCW at a controlled rate from the Surge Basin outlet structure. Decanted water and unsettled

CCW enters the Polishing Basin from the Surge Basin flow control structure through three 12-inch diameter steel discharge pipes which are located near the northern corner of the basin and are embedded in the northwest embankment. The Polishing basin is divided for ¾ths of its length by a "training dike" which increases the effluent detention time. Decanted water from the Polishing Basin flows into a concrete decant structure which is located on the northwestern embankment of the impoundment and then into the water quality monitoring structure. Water from the water quality monitoring structure discharges through a 12-inch diameter steel pipe into Lake Superior. The approximate location of the discharge pipes and decant structure in the Polishing Basin are shown on **Figure 3**.

Similar to the Surge Basin, the Polishing Basin consists of bottom ash fill embankments (placed/compacted in a controlled manner) with a crest length of approximately 684 feet, a structural height (from the lowest downstream toe elevation to the crest of the impoundment) of approximately 7.5 feet, and a corresponding crest elevation of approximately 611.5 feet MSL. The embankments were constructed with 3H:1V upstream and downstream slopes consisting of a compacted bottom ash (designated as granular fill on the design drawings). The embankments were constructed on native and/or prepared subgrade (i.e. compacted bottom ash fill) soils. Within the exterior embankments, a liner consisting of a 2 foot layer of compacted clay ("impervious blanket") was placed over the base of the basin and extended along the upstream slopes to form an "impervious core" approximately 10 feet from upstream face. The northeastern embankment of the Polishing Basin is common to the Surge Basin and does not have this compacted clay core. A plan view of the impoundment design is provided on **Figure 4.** Typical sections of the embankments and other design details are provided on **Figures 5, 6 and 7**.

No instrumentation is present in the area of the Polishing Basin.

1.2.6 Operations and Maintenance

The BFGS and the impoundments are maintained by Xcel Energy personnel. Maintenance of the BFGS facility, including the impoundments, is regulated by the EPA under the National Pollutant Discharge Elimination System (NPDES) Permit No. WI-0002887-06-0. BFGS personnel perform routine visual and formal annual inspections of the impoundments. Copies of the annual inspection reports for the period of November 25, 1997 through August 17, 2010 were provided to GZA for review. Other maintenance performed on the impoundments by BFGS personnel includes cleaning the basins, repair of slope erosion, grass mowing, repair of animal burrows, and maintenance of the monitoring building equipment.

1.2.7 Size Classification

For the purposes of this EPA-mandated inspection, the size of the impoundments was based on U. S. Army Corps of Engineers (COE) criteria. Based on the maximum structural height of 9.5 feet and a storage volume of approximately 1.4 acre-feet, the Surge Basin is classified as a **Small-**sized structure. Based on the maximum structural height of 7.5 feet and a storage volume of approximately 3.1 acre-feet, the Polishing Basin is classified as a **Small-**sized structure. According to guidelines established by the COE, dams with a storage volume less than 1,000 acre-feet and/or a height less than 40 feet are classified as Small-sized structures.

1.2.8 Hazard Potential Classification

Under the EPA classification system, as presented on page 2 of the EPA check list (**Appendix C**) and Definitions section (**Appendix B**), it is GZA's opinion that the Surge and Polishing Basins would be considered as having a **Low** hazard potential. The hazard potential rating is based on no probable loss of human life due to failure and the low potential for environmental impacts outside of Utility-owned property. The impoundments are not regulated as dams by the State of Wisconsin.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The Surge and Polishing Basins are elevated relative to the surrounding area and have no appreciable drainage areas.

1.3.2 Reservoir

Based on information provided by Excel, the Surge and Polishing Basins have surface areas of 0.15 and 0.41 acres at the normal operating levels. The pool areas observed on GZA's June 14, 2011 Site visit were generally consistent with those reported by Xcel. The storage volumes at normal operating levels of the Surge and Polishing Basins are approximately 1.4 and 3.1 acre-feet, respectively.

1.3.3 Discharges at the Impoundment Sites

As discussed previously, water from the Surge Basin discharges into the Polishing Basin and then into Lake Superior. Average rate of discharge flow is generally 0.4 million gallons per day (MGD) under normal operating conditions.

1.3.4 General Elevations (feet – MSL)

Elevations were taken from design drawings and data provided by Xcel. Unless otherwise noted, elevations were based on the United States Geological Survey (USGS) topographic map MSL vertical datum.

Surge Basin

A. Crest of Embankment	± 613.5 feet
B. Upstream Water at Time of Inspection	± 609.3 feet
C. Downstream Water at Time of Inspection	± 608.5 feet[2] (Polishing Pond)
D. Maximum Pond Water Elevation	± 610.7 feet

Polishing Basin

A. Crest of Embankment (Minimum)	± 611.5 feet
B. Upstream Water at Time of Inspection	± 608.6 feet
C. Downstream Water at Time of Inspection	± Not Applicable[3]
D. Maximum Pond Water Elevation	± 608.6 feet

[2] The water level in the Polishing Basin was taken to be the downstream water level south of the Surge Basin. There is no downstream water level northwest, northeast, and southeast of the impoundment.

[3] Given the distance from the decant structure to the discharge point, the water level in Lake Superior is not appropriate to be considered as the downstream water level. Therefore, no downstream water elevation is provided.

1.3.5 Design and Construction Records and History

Design drawings, specifications and other documents for the Surge and Polishing Basins were provided to GZA. The information included descriptions of the as-built construction quality control documentation that was prepared for Xcel by Barr with regards to the impoundments. A list of the documents provided to GZA by Xcel is provided in **Appendix D**.

1.3.6 Operating Records

No operating records were available for the impoundments.

1.3.7 Previous Inspection Reports

Inspection of the impoundments includes routine visual inspections and annual formal inspections by Xcel personnel in accordance with the "Inspection and Maintenance Plan for the Surge Basin and Polishing Pond". The inspection reports from the period of November 25, 1997 through August 17, 2010 were reviewed by GZA and are included as **Appendix E**. In general, minor erosion of the upstream slope was the only deficiency noted and it appeared that the erosion was repaired each year.

2.0 INSPECTION

2.1 Visual Inspection

The BFGS impoundments were inspected on June 14, 2011, by Patrick J. Harrison, P.E., and Douglas P. Simon, P.E., of GZA, and accompanied by several Xcel personnel. The weather was sunny with temperatures in the 70°s Fahrenheit. Photographs to document the current conditions of the impoundments were taken during the inspection and are provided in **Appendix F**. The water levels in the impoundments at the time of the inspection were as provided in Section 1.3.4. Areas beneath the water levels were not inspected, as this level of investigation was beyond GZA's scope of services. Copies of the EPA Checklists are provided in **Appendix C**.

With respect to our visual inspection, there was no evidence of prior releases, failures, or repairs observed by GZA.

2.1.1 Surge Basin General Findings

Overall, the Surge Basin was found to be in **POOR** condition primarily due to inadequate information pertaining to the original 1976 hydrologic/hydraulic analysis and lack of information on embankment stability under seismic loading conditions. An overall Site plan showing the impoundments is provided as **Figure 2**. The location and orientation of the Surge Pond photographs provided in **Appendix F** are shown on **Figure 3**.

2.1.2 Surge Basin Upstream Slope (Photos 1 through 5, 7)

The water surface elevation at the time of inspection was at elevation 609.3 feet MSL. Therefore, the lower portion of the upstream slope was below the water level and not visible. The upstream slope above the water level generally appeared to be in good condition. Minor to

moderate erosion (presumably from wave action) was noted at the interface between the water surface and the upstream slope generally around the eastern half of the impoundment. Small, localized animal burrows (less than 2 inches in diameter) were observed on the slope. No unusual movement, depressions or sloughing was observed on the slope.

2.1.3 Surge Basin Crest of Impoundment (Photos 1, 2, 4, and 7)

The crest of the Surge Basin was vegetated with well maintained grass. The crest of the impoundment had occasional localized animal burrows present at the time of inspection. The alignment of the crest of the impoundment appeared generally level with no structurally significant depressions or irregularities observed. Based on information provided by Xcel, the crest of the impoundment is at approximately elevation 613.5 feet MSL. No significant settlement was observed at the time of our inspection. There was approximately 4 feet of free board at the time of our inspection.

2.1.4 Surge Basin Downstream Slope (Photos 4, 6, and 7)

The downstream slope of the impoundment was vegetated with well maintained grass. No seepage was observed on the downstream slope. An area of minor erosion was present where an access road intersects the toe near the southern corner of the impoundment.

2.1.5 Surge Basin Discharge Pipes (Photos 8 through 10)

Water and CCW from the plant are discharged into the Surge Basin through three (3) 12-inch diameter steel pipes that are located along the southeastern embankment of the impoundment. Water is decanted from the Surge Basin through three (3) 12-inch diameter steel pipes which are located along the northwestern embankment of the impoundment. The decant pipes converge at the flow control structure. The discharge pipes and decant pipes are located below the water level and were not visible during our inspection. The flow control structure was generally in good condition with no cracks or defects observed.

2.1.6 Polishing Basin General Findings

Similarly to the Surge Basin, the overall condition of the Polishing Basin was found to be in **POOR** condition primarily due to inadequate information pertaining to the original 1976 hydrologic/hydraulic analysis and lack of information on embankment stability under seismic loading conditions. An overall Site plan showing the impoundments is provided as **Figure 2**. The location and orientation of photographs provided in **Appendix F** are shown on the Photo Plan in **Figure 3**.

2.1.7 Polishing Basin Upstream Slope (Photos 11 through 17)

The water surface elevation at the time of inspection was at elevation 608.6 feet MSL. Therefore, the lower portion of the upstream slope was below the water level and not visible. The upstream slope above the water level generally appeared to be in good condition. Minor to moderate erosion (presumably from wave action) was noted at the interface between the water surface and the upstream slope generally along the eastern side. Small, localized animal burrows (less than 2 inches in diameter) were observed on the slope. No unusual movement, depressions or sloughing was observed on the slope.

2.1.8 Polishing Basin Crest of Impoundment (Photos 12 through 15, 17)

The crest of the Surge Basin was vegetated with well maintained grass. The crest of the impoundment had occasional localized animal burrows present at the time of our inspection. The alignment of the crest of the impoundment appeared generally level with no structurally significant large depressions or irregularities observed. Based on information provided by Xcel, the crest of the impoundment is at approximately elevation 611.5 feet MSL. No significant settlement was observed at the time of our inspection. There was approximately 3 feet of free board at the time of our inspection.

2.1.9 Polishing Basin Downstream Slope (Photos 27 and 28)

The downstream slope of the impoundment was vegetated with well maintained grass. No seepage, sloughing or depressions were observed on the downstream slope.

2.1.10 Polishing Basin Discharge Pipes (Photos 19 through 26)

Decanted water and CCW from the Surge Basin is discharged into the Polishing Basin through three (3) 12-inch diameter steel pipes which are located along the northwestern embankment at the approximate locations shown on **Figure 3**. The discharge pipes are located below the water level and were not visible.

Decanted water from the Polishing Basin is discharged into Lake Superior through a decant structure which is located along the northwestern embankment. The decant structure and discharge pipe to Lake Superior appeared to be in good condition.

2.2 Caretaker Interview

Maintenance of the impoundments is the responsibility of BFGS personnel. GZA met with BFGS personnel and discussed the operations and maintenance procedures, regulatory requirements and the history of the impoundments since their construction. The observations, descriptions and findings presented in this report reference these discussions.

2.3 Operation and Maintenance Procedures

Operation and maintenance of the BFGS facility, including the impoundments, is regulated by the EPA under the National Pollutant Discharge Elimination System (NPDES) Permit No. WI-0002887-06-0. As discussed in Section 1.2.5, BFGS personnel are responsible for maintenance of the impoundments. Maintenance is conducted in accordance with the *NSPW Bay Front Generation Facility Inspection and Maintenance Plan for the Surge Basin and Polishing Basin* (Maintenance Plan). Based on the Maintenance Plan, the impoundments are to be informally inspected 'regularly' by the certified treatment system operator and a formal inspection is to occur on an annual basis.

2.4 Emergency Action Plan

The BFGS has a general Emergency Action Plan (EAP) for the facility; however, it is not specific to potential situations that may arise at the impoundments. Note that the hazard potential classification for the impoundments is discussed in Section 1.2.8. The State of

Wisconsin does not regulate the impoundments as dams and therefore does not require an EAP for the structures.

2.5 Hydrologic/Hydraulic Data

Based on the information provided, a hydrologic/hydraulic analysis of the impoundments was performed as part of the original 1976 design work by Barr and was the basis for the selection of the maximum operating water levels. However, the details of the analysis including the design storm event were not included in the documents provided by Xcel to GZA. GZA did not perform an independent assessment of the hydraulics and hydrology for the impoundments as this was beyond our scope of services.

2.6 Structural and Seepage Stability

A stability analysis was conducted by Barr as part of the 1976 design of the impoundments. The analysis considered piping, sliding failure, block failure of the downstream slope, and rapid drawdown conditions. The parameters used for the analysis were based on soil borings, laboratory testing and literature research on the properties of bottom ash. The analysis indicated factors of safety above the generally accepted values for the failure modes noted. However, the analysis did not address the stability of the impoundments under seismic loading conditions. GZA did not perform an independent assessment of embankment stability for the impoundments as this was beyond our scope of services.

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, the overall condition of the Surge Basin was judged to be **POOR** and was found to have the following deficiencies:

1. Localized (small-diameter) animal burrows along the upstream slope;
2. Minor to moderate erosion on portions of the upstream slope (presumably due to wave action);
3. Minor erosion at the downstream toe;
4. Incomplete documentation for the hydrologic/hydraulic analysis; and,
5. No stability analysis for seismic loading conditions.

In general, the overall condition of Polishing Basin was judged to be **POOR** and was found to have the following deficiencies:

1. Localized (small diameter) animal burrows along the crest;
2. Minor to moderate erosion along portions of the upstream slope (presumably due to wave action);
3. Incomplete documentation for the hydrologic/hydraulic analysis; and,
4. No stability analysis for seismic loading conditions.

In GZA's professional opinion, the embankment(s) visually appear to be sound and no immediate remedial action appears to be necessary. However, based on EPA's inspection criteria, the impoundment has been given a **POOR** Condition Rating, because complete hydrologic/hydraulic analysis and geotechnical computations were not provided/available for GZA's review. Thus the hydrologic/hydraulic adequacy of the impoundments as well as the stability of the embankment(s) under seismic loading could not be independently verified.

The following sections describe the recommended approach to address current deficiencies. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of permits needs to be determined for activities that may occur within the jurisdiction of the appropriate regulatory agencies.

3.2 Studies and Analyses

GZA recommends the following studies and analyses:

1. Perform a stability analysis of the impoundments under seismic loading; and,

2. Update the hydrologic/hydraulic analysis for the impoundments to document the adequacy of the impoundments to accommodate the 100-year, 24-hour event.

3.3 Recurrent Operation & Maintenance Recommendations

GZA recommends the following operation and maintenance level activities:

1. Repair erosion on the downstream slope of the Surge Basin;

2. Fill currently observed animal burrows by injecting grout under low to moderate pressures to ensure the entire limits of the respective burrow is adequately filled;

3. Repair observed erosion on the upstream slopes of the Surge and Polishing Basins;

4. Monitor decant outflow structures and clear silt or debris which may block or impede outflow; and,

5. Take measures as necessary so as to maintain operability and function of the various impoundment water level control mechanisms.

3.4 Remedial Measures Recommendations

1. In conjunction with the results of the hydrologic and hydraulic analyses, make provisions for an emergency overflow spillway(s) if required; and,

2. In conjunction with the results of the stability analyses, make provisions to address deficiencies if required/as necessary.

3.5 Alternatives

There are no alternatives currently recommended.

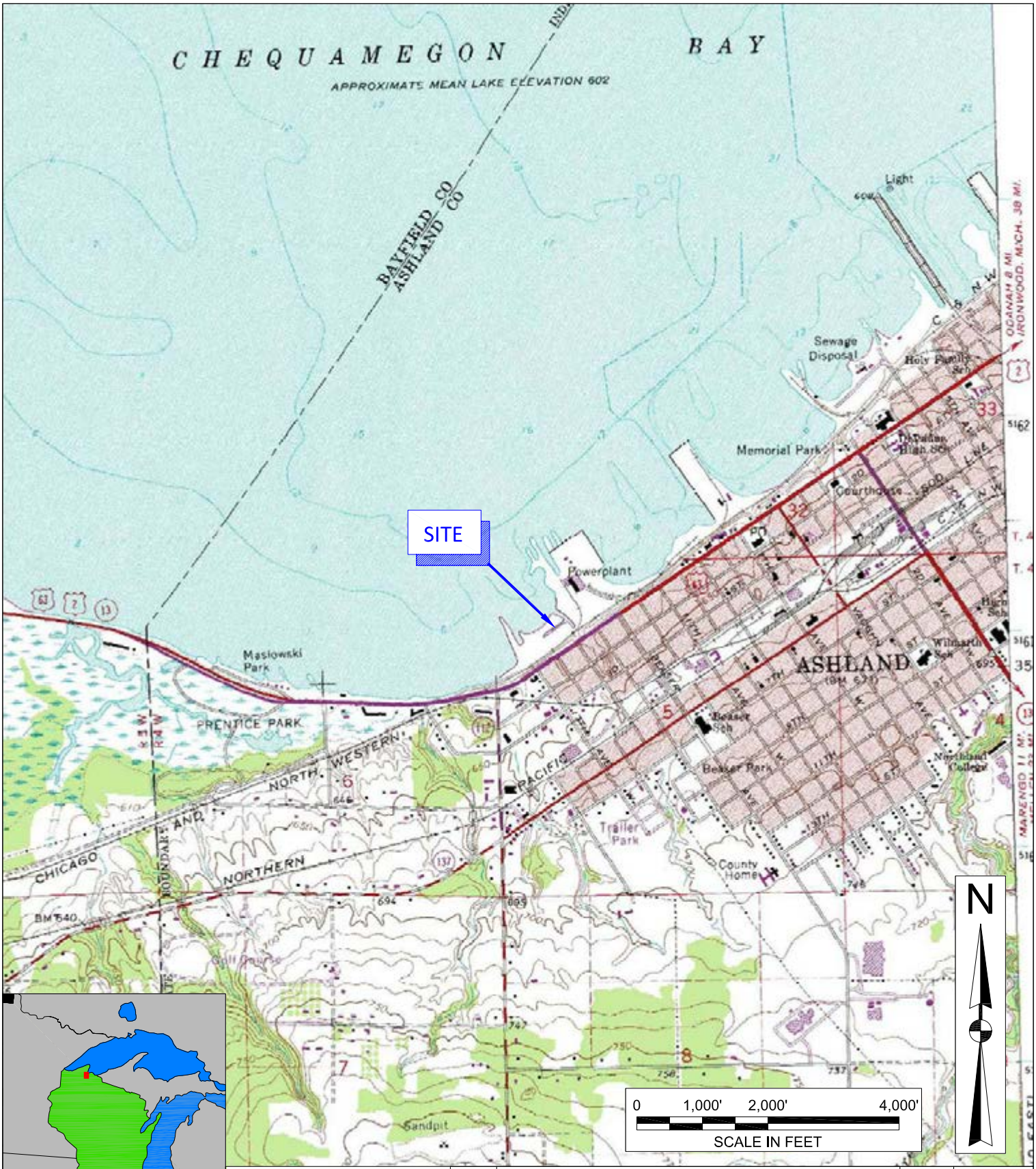
4.0 ENGINEER'S CERTIFICATION

I acknowledge that the management units referenced herein, the Surge Basin and Polishing Basin have been assessed to be in **POOR** condition on June 14, 2011.

Patrick J. Harrison, P.E.
Senior Consultant

J:\170,000-179,999\170142\170142-30 Round 10\Bayfront\Stability Calc Edits\2nd DRAFT - Bayfront Report.docx

FIGURES



SOURCE: U.S.G.S. QUADRANGLE MAP
ASHLAND WEST, WI (1964)
PHOTOREVISED (1975)

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
20900 SWENSON DRIVE, SUITE 150
WAUKESHA, WISCONSIN 53186
(262) 754-2560

PREPARED FOR:

SITE LOCATION MAP

BAY FRONT GENERATING STATION
ASHLAND, WISCONSIN
N. 14th AVE. W.

FIGURE 1

PROJ MGR: DS	REVIEWED BY: DS	CHECKED BY: DS	DATE 11/15/11	PROJECT NO. 01.0170142.30	REVISION NO.
DESIGNED BY: DS	DRAWN BY: CLK	SCALE: 1 : 24000			SHEET NO.

SOURCE: DIGITAL ORTHOPHOTO/AERIAL IMAGERY PRODUCED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) AND RETRIEVED THROUGH USE OF A PROFESSIONAL LICENSE OF THE GOOGLE EARTH MAPPING PROGRAM.
DATA ACCESSED JULY 2011

N
W E
S

200 100 0 200 Feet

SURGE BASIN

POLISHING BASIN

LAKE SHORE DRIVE W

LEGEND

APPROXIMATE IMPOUNDMENT BOUNDARY

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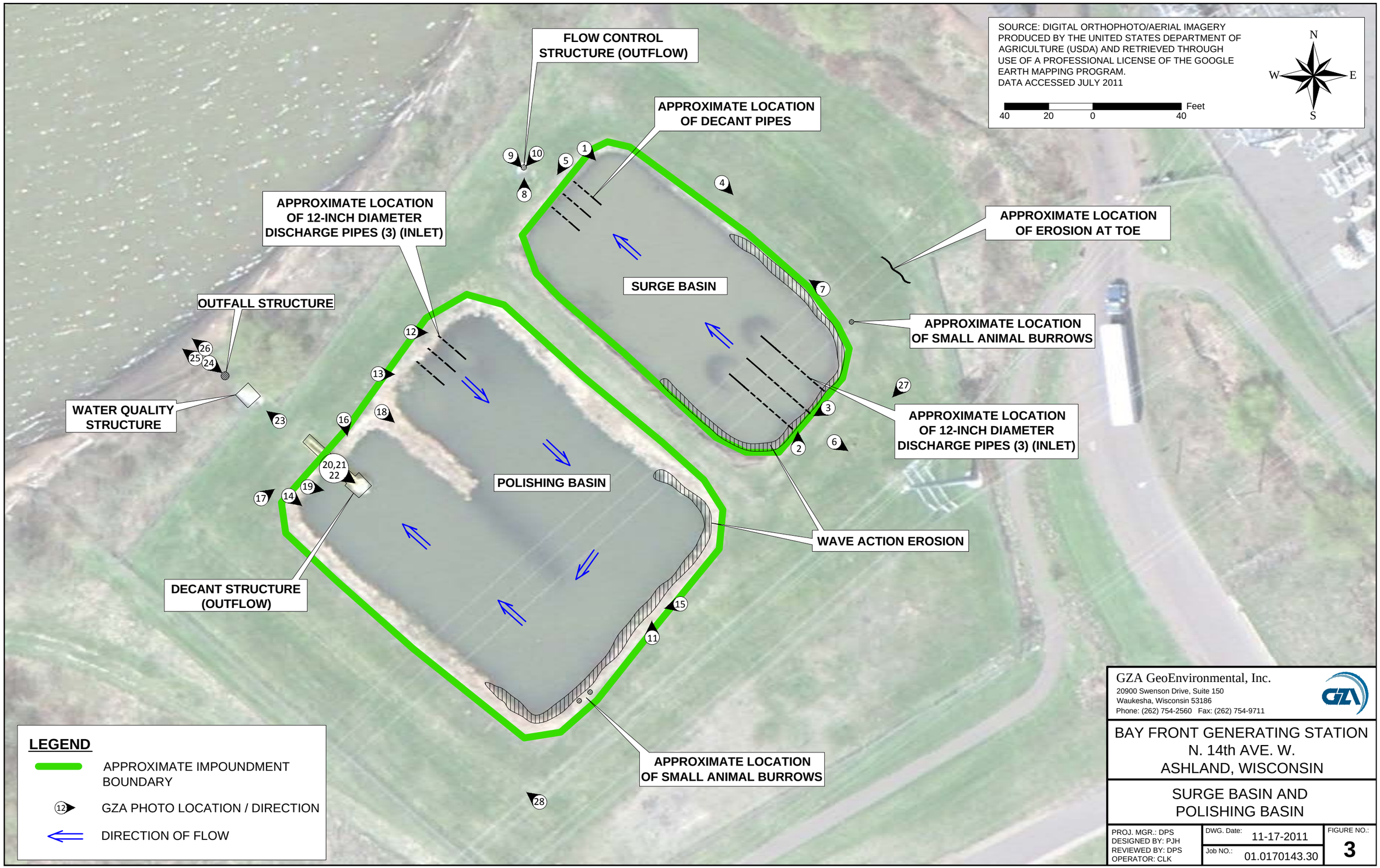
BAY FRONT GENERATING STATION
N.14th AVE. W.
ASHLAND, WISCONSIN

OVERALL ASH BASIN PLAN

PROJ. MGR.: DPS DESIGNED BY: PJH REVIEWED BY: DPS OPERATOR: CLK	DWG. Date: 11-15-2011 Job NO.: 01.0170143.30	FIGURE NO.: 2



GZA GeoEnvironmental, Inc.
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Waukesha, Wisconsin 53186
Phone: (262) 754-2560 Fax: (262) 754-9711

BAY FRONT GENERATING STATION
N. 14th AVE. W.
ASHLAND, WISCONSIN

SURGE BASIN AND POLISHING BASIN

PROJ. MGR.: DPS DESIGNED BY: PJH REVIEWED BY: DPS OPERATOR: CLK	DWG. Date: 11-17-2011 Job NO.: 01.0170143.30	FIGURE NO.: 3

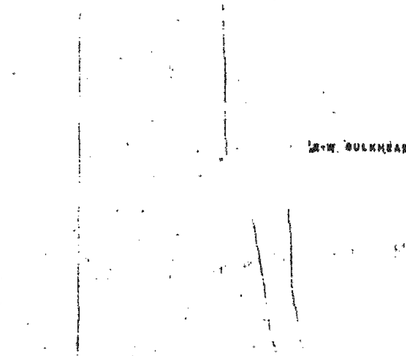
BOILER #5 BLDG.

NORTH

0 10 20 30 40 50
SCALE IN FEET

NOTE:
LOCAL GRID SYSTEM ESTABLISHED FOR LOCATING SETTLING BASINS ONLY.

SHEET INDEX



LOCATION MAP

LAKE SUPERIOR

N.W. BULKHEAD LINE N62° 64'E

ANGLE IRON

SURGE BASIN OUTLET

CONSTRUCTION LIMITS

FLOW CONTROL STRUCTURE

POLISHING BASIN INLET

WATER QUALITY MONITORING STRUCTURE

END POST

WALKWAY BRIDGE

TERMINAL POST

POLISHING BASIN OUTFLOW STRUCTURE

LINE POST (TYP.)

7' CHAIN LINK FENCE INCLUDING 3 STRANDS BARBED WIRE

POLISHING BASIN

SURGE BASIN

TRAINING DIKE

SUBSTATION

SURGE BASIN INLET

INTAKE PIPE STRUCTURE (PIPING FROM PLANT TO INTAKE STRUCTURE BY OTHERS)

NOTE: FOR PIPING SEE 5/2

STEEL TOWER

STUB POLE (PROTECT)

TERMINAL POST

6 POLE A-FRAME 85'x7' LINE (PROTECT)

GATE POSTS

CONSTRUCTION LIMITS

NOTE: EXACT ALIGNMENT OF FENCE TO BE DETERMINED BY THE ENGINEER IN THE FIELD

CONNECT TO EXISTING FENCE

FINAL CONTOURS

EXISTING CONTOURS CHANGED BY PROJECT

2-10' PANEL SWING GATE 7' CHAIN LINK INCLUDING 3 STRANDS BARBED WIRE

ACCESS

C.C.F. NW RR

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DATE: 4/1/76

REVISIONS
MAY 4, 1976
Add Fencing And Gate

SCALE: AS SHOWN
DWG. BY: W.J.O.
DATE: 3/10/76
DWG. NO.: 10/1-3 [illegible] 809

LAKE SUPERIOR DISTRICT POWER CO
ASHLAND, WISCONSIN

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CONSULTING HYDRAULIC ENGINEERS
MINNEAPOLIS, MINNESOTA

BAY FRONT SETTLING BASINS
SITE PLAN

SHEET NO. 1 OF 5 SHEETS

BAY FRONT GENERATING STATION
N. 14th AVE. W.
ASHLAND, WISCONSIN

PLAN OF DESIGN

PROJ MGR: DPS
DESIGNED BY: PJH
REVIEWED BY: DPS
OPERATOR: CLK
DATE: 11-10-2011

JOB NO. 01.0170142.30

FIGURE NO. 4

NOTE: IMAGE HAS BEEN REDUCED AND IS NO LONGER TO A SCALE

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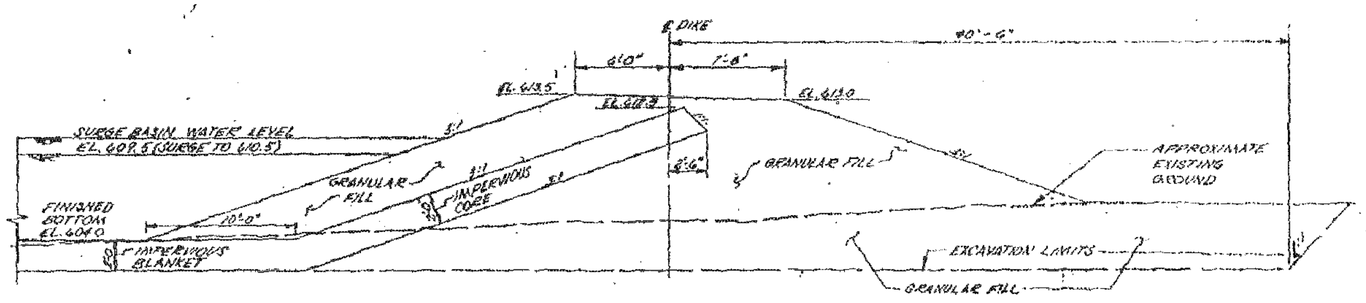
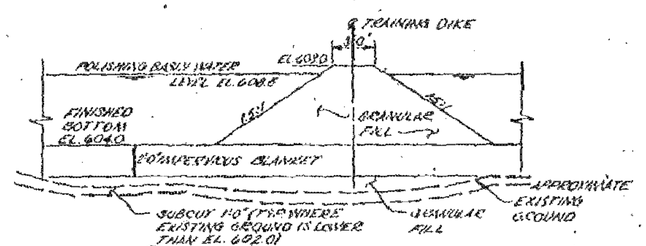
REV. NO.	DESCRIPTION	BY	DATE

GZA Drawing Name: J:\GZA_USA\01.0170142.30 Ash Imp. Round 10\01.0170142.30 Task 2 – Bayfront\Drawings\Autocad\Scanned Figures – Bay Front.dwg Last Modified: Nov 15, 2011 – 2:01pm Printed on: Nov 15, 2011 – 2:02pm by justin.hagerty



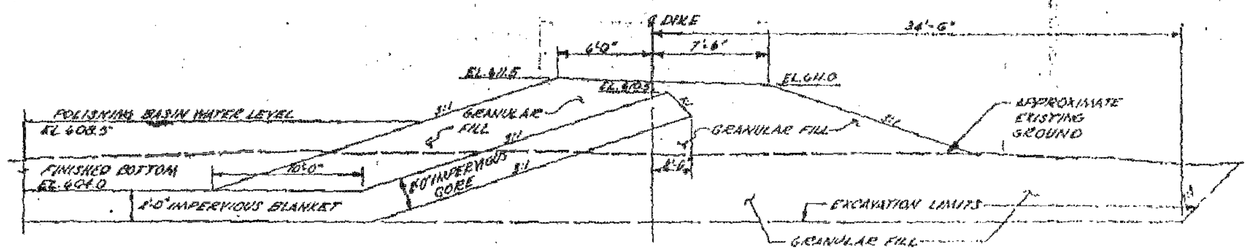
1/2 SECTION: SURGE BASIN DIKE (TYP)

SCALE 1"=5'-0"



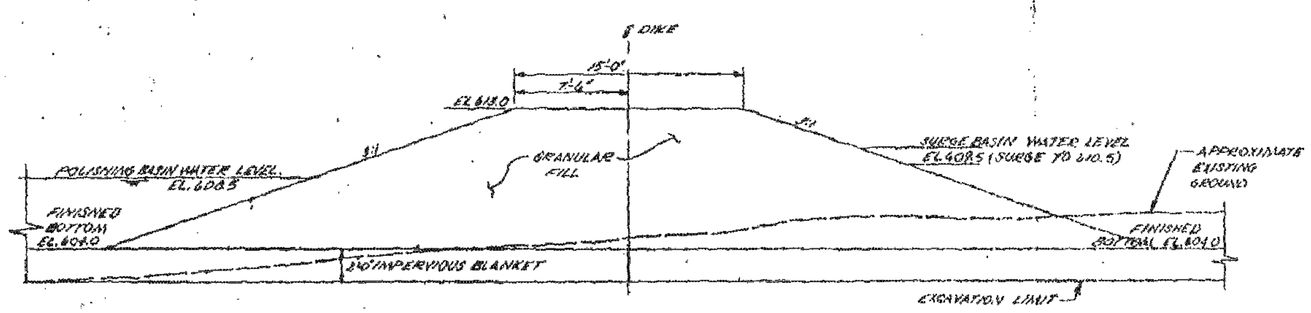
4/2 SECTION: TRAINING DIKE

SCALE 1"=5'-0"



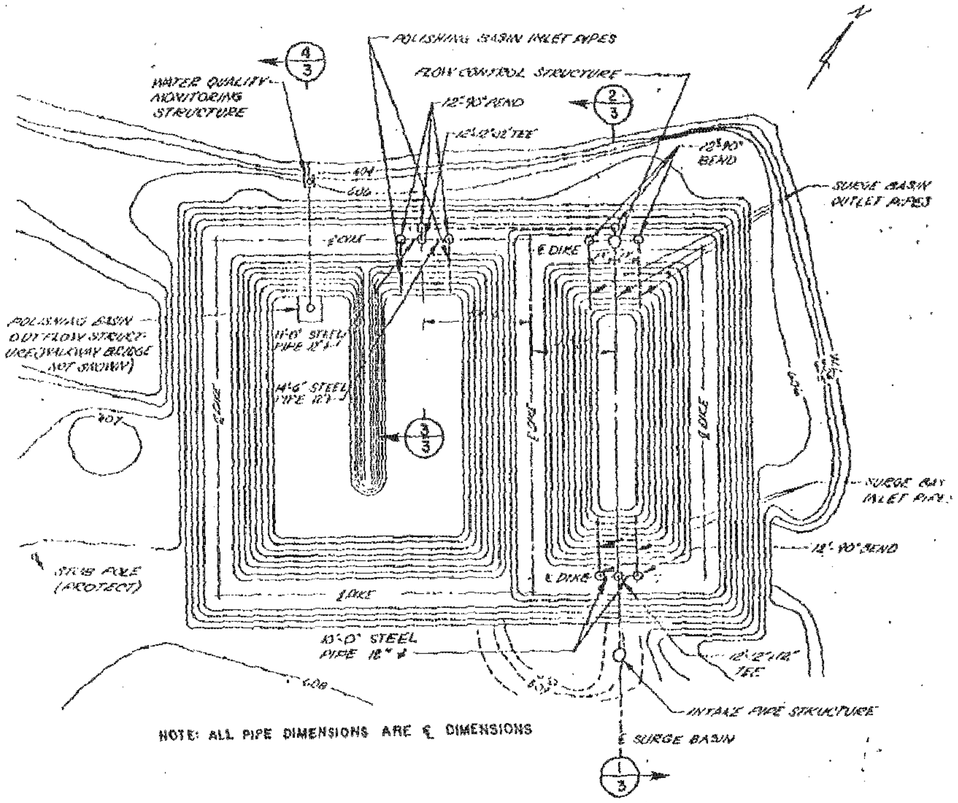
2/2 SECTION: POLISHING BASIN DIKE (TYP)

SCALE 1"=5'-0"



3/2 SECTION: DIKE BETWEEN SURGE BASIN AND POLISHING BASIN

SCALE 1"=5'-0"



NOTE: ALL PIPE DIMENSIONS ARE ℄ DIMENSIONS

3/2 DETAIL: PIPING PLAN

SCALE 1"=40'

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ASHLAND, WISCONSIN

BARR ENGINEERING CO.

CONSULTING HYDRAULIC ENGINEERS

MINNEAPOLIS, MINNESOTA

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REVISIONS

SCALE: AS SHOWN

DWN. BY: JEL & REG

DATE: 11/30/76

NO.	DESCRIPTION	BY	DATE

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20900 Swenson Drive ■ Waukesha, Wisconsin 53186
Phone (262) 754-2800 ■ Fax (262) 754-9911
www.gza.com

PROJ MGR: DPS
DESIGNED BY: PJH
REVIEWED BY: DPS
OPERATOR: CLK
DATE: 11-10-2011

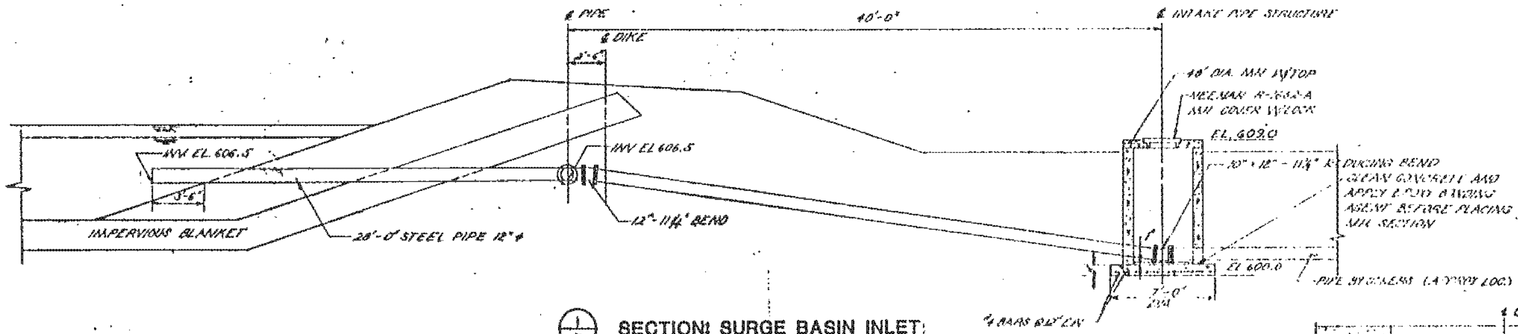
BAY FRONT GENERATING STATION
N. 14th AVE. W.
ASHLAND, WISCONSIN

TYPICAL SECTIONS

JOB NO. 01.0170142.30

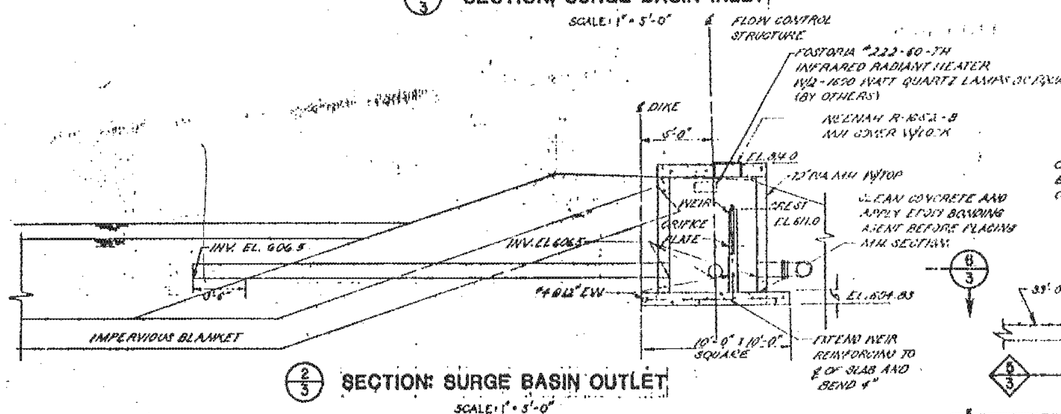
FIGURE NO. 5

GZA Drawing Name: J:\GZA_USA\01.0170142.30 Ash Imp. Round 10\01.0170142.30 Task 2 - Bayfront\Drawings\Autocad\Scanned Figures - Bay Front.dwg Last Modified: Nov 15, 2011 - 2:03pm Plotted on: Nov 16, 2011 - 10:30am by doug.simon



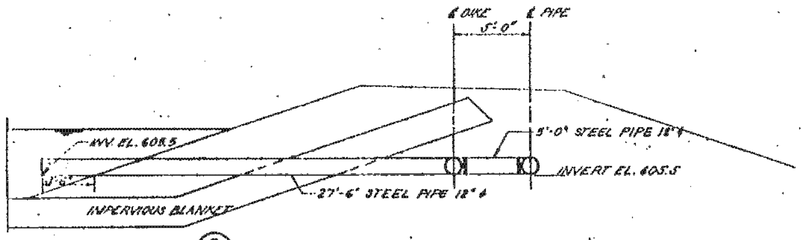
1/3 SECTION: SURGE BASIN INLET

SCALE: 1" = 5'-0"



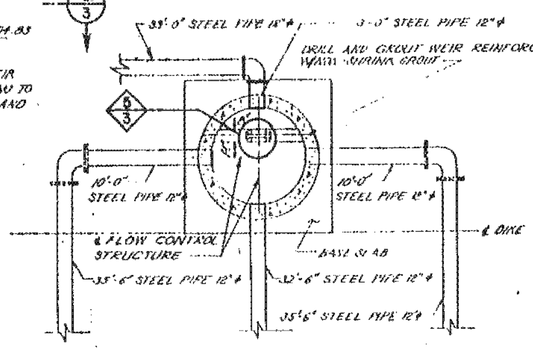
2/3 SECTION: SURGE BASIN OUTLET

SCALE: 1" = 5'-0"



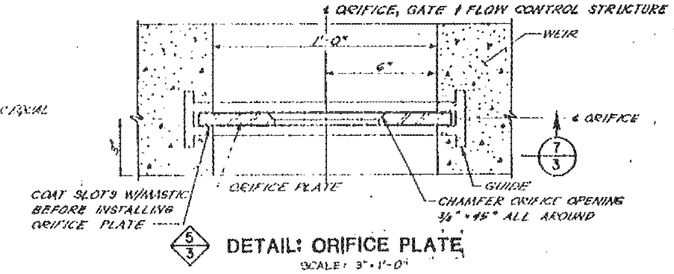
3/3 SECTION: POLISHING BASIN INLET

SCALE: 1" = 5'-0"



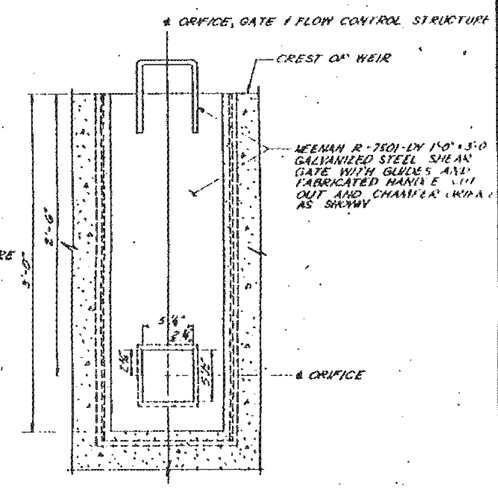
6/3 SECTION: FLOW CONTROL STRUCTURE

SCALE: 1" = 5'-0"



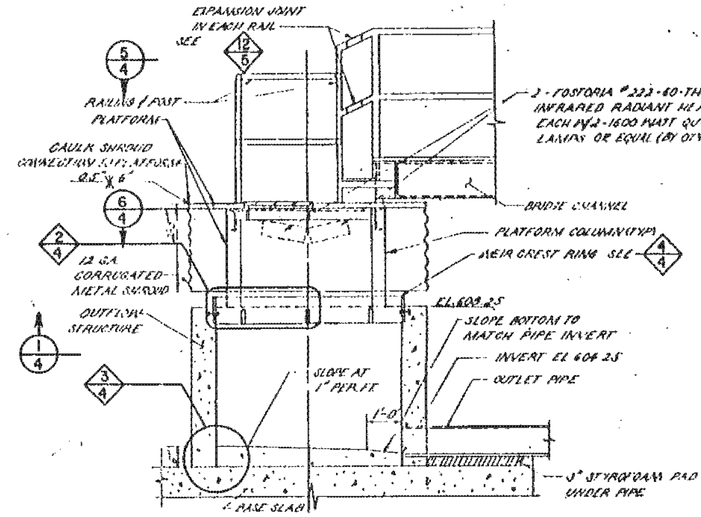
5/3 DETAIL: ORIFICE PLATE

SCALE: 3" = 1'-0"



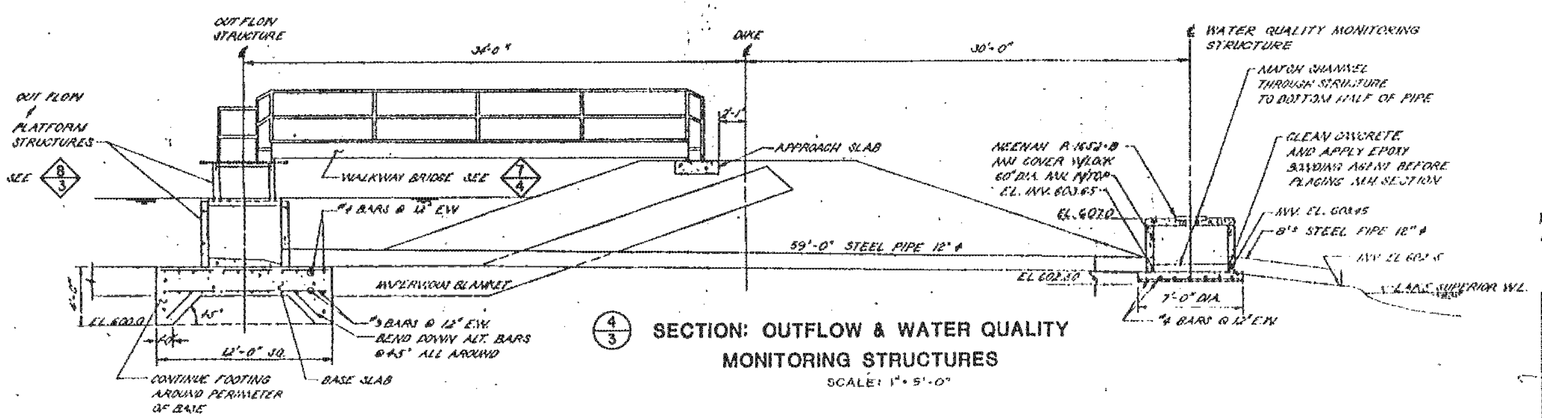
7/3 SECTION: ORIFICE PLATE

SCALE: 1½" = 1'-0"



6/3 DETAIL: OUTFLOW STRUCTURE & PLATFORM

SCALE: ½" = 1'-0"



4/3 SECTION: OUTFLOW & WATER QUALITY MONITORING STRUCTURES

SCALE: 1" = 5'-0"

NOTE: ALL PIPE DIMENSIONS ARE ℄ DIMENSIONS

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DATE:

REG. NO. E13595

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SCALE: AS SHOWN
DWN. BY: A.A.V.
DATE: 5/30/76
DWG. NO.: 412-3[illegible] B11

LAKE SUPERIOR DISTRICT POWER CO.
ASHLAND, WISCONSIN

BARR ENGINEERING CO.
CONSULTING HYDRAULIC ENGINEERS
MINNEAPOLIS, MINNESOTA

BAY FRONT SETTLING BASINS
PIPING & STRUCTURE DETAILS

SHEET NO. 3 OF 5 SHEETS

NO.	DATE	BY	DESCRIPTION

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DESIGNED BY: PJH
REVIEWED BY: DPS
OPERATOR: CLK
DATE: 11-10-2011

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ASHLAND, WISCONSIN

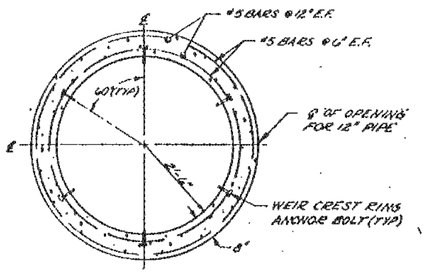
PIPING DETAILS

JOB NO. 01.0170142.30

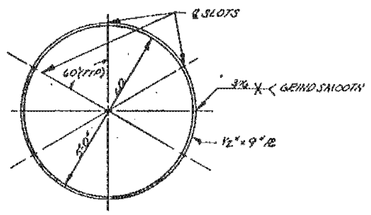
FIGURE NO. 6

GZA Drawing Name: z:\GZA_USA\01.0170142.30 Ash Imp. Round 1\01.0170142.30 Task 2 – Bayfront\Drawings\Autocad\Sconned Figures – Bay Front.dwg Last Modified: Nov 15, 2011 – 2:03pm Plotted on: Nov 16, 2011 – 10:31am by doug.simon

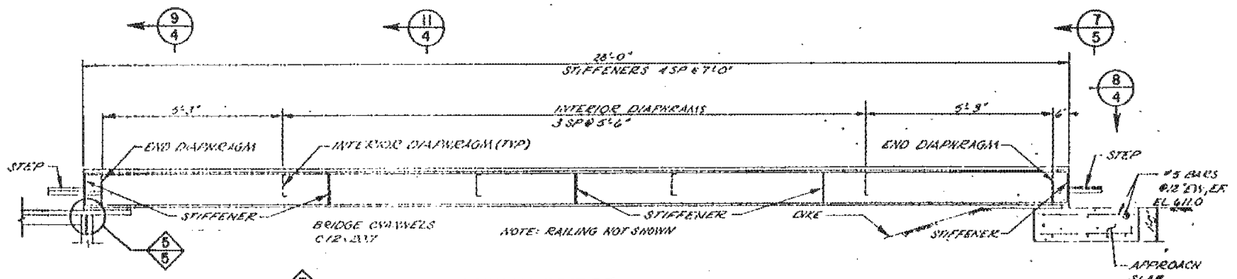
NOTE: COAT OUTSIDE OF WEIR CREST RING W/MASTIC & SECURELY SUPPORT THE RING IN ITS CORRECT POSITION INSIDE THE FORMS WHILE CASTING THE OUTFLOW RISER



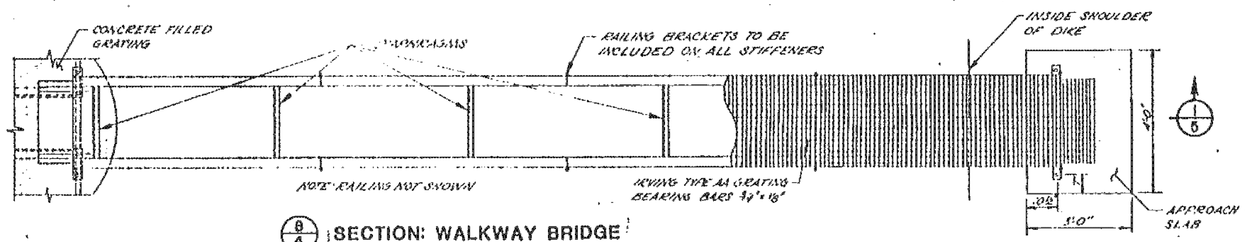
(1/4) **SECTION: OUTFLOW RISER**
SCALE ½"=1'-0"



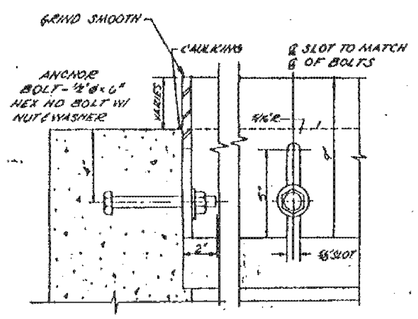
(4/4) **DETAIL: WEIR CREST RING**
SCALE ½"=1'-0"



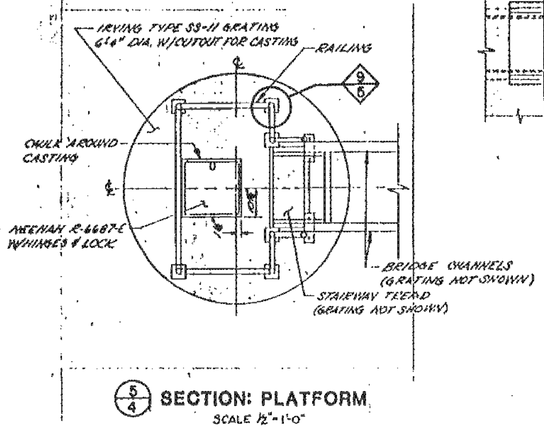
(7/4) **DETAIL: WALKWAY BRIDGE**
SCALE ½"=1'-0"



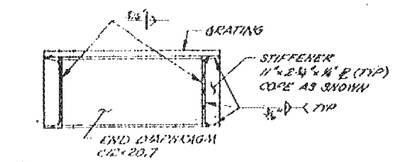
(8/4) **SECTION: WALKWAY BRIDGE**
SCALE ½"=1'-0"



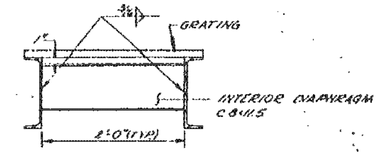
(2/4) **DETAIL: WEIR CREST RING INSTALLATION**
SCALE 3"=1'-0"



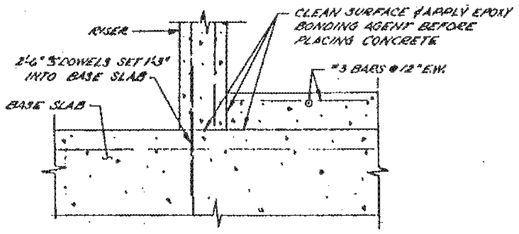
(6/4) **SECTION: PLATFORM**
SCALE ½"=1'-0"



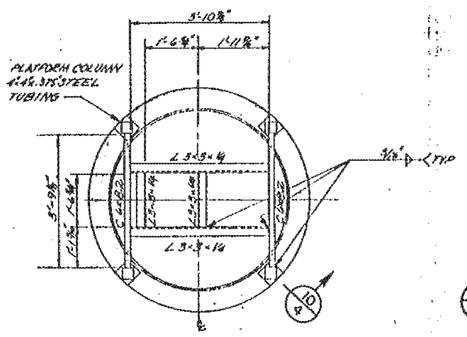
(9/4) **SECTION: END DIAPHRAGM (TYP)**
SCALE 1"=1'-0"



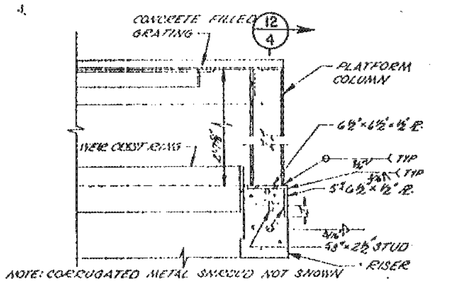
(11/4) **SECTION: INTERIOR DIAPHRAGM (TYP)**
SCALE 1"=1'-0"



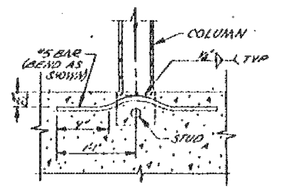
(3/4) **DETAIL: CONNECTION TO BASE**
SCALE 1"=1'-0"



(6/4) **SECTION: PLATFORM FRAME**
SCALE ½"=1'-0"



(10/4) **SECTION: PLATFORM COLUMN CONNECTION**
SCALE 1"=1'-0"



(12/4) **SECTION: PLATFORM COLUMN ANCHOR**
SCALE 1"=1'-0"

NOTE: THE DIAMETER OF ALL BOLT HOLES SHALL BE EQUAL TO THE MINIMAL DIA. OF THE BOLT + ⅛" UNLESS OTHERWISE SPECIFIED.

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SIGNED: [illegible]
DATE: [illegible]
REG. NO. E-13295

REVISIONS	

SCALE: AS SHOWN
DWN. BY: V.C.L.F.R.L.G
DATE: 3/30/76
DWG. NO.: 6112 5000 B12

LAKE SUPERIOR DISTRICT POWER CO.
ASHLAND, WISCONSIN

BARR ENGINEERING CO.
CONSULTING HYDRAULIC ENGINEERS
MINNEAPOLIS, MINNESOTA

BAY FRONT SETTLING BASINS
WALKWAY BRIDGE & PLATFORM DETAILS

SHEET NO. 4 OF 5 SHEETS

NOTE:
IMAGE HAS BEEN REDUCED AND IS NO LONGER TO A SCALE

NO.	DESCRIPTION	BY	DATE

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Consulting Engineers and Scientists
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Phone: (508) 543-1500 ■ Fax: (508) 543-1503
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PROJ MGR: DPS
DESIGNED BY: PJH
REVIEWED BY: DPS
OPERATOR: CLK
DATE: 11-10-2011

BAY FRONT GENERATING STATION
N. 14th AVE. W.
ASHLAND, WISCONSIN

ADDITIONAL PIPING DETAILS

JOB NO. 01.0170142.30

FIGURE NO. 7

GZA Drawing Name: J:\GZA_LIVE\01.0170142.30 Ash Imp. Round 10\01.0170142.30 Task 2 — Bayfront\Drawings\Autocad\Scanned Figures — Rev Front.dwg Last Modified: Nov 10, 2011 – 10:09pm Plotted on: Nov 15, 2011 – 1:59pm by johnhegarty

APPENDIX A

LIMITATIONS

DAM ENGINEERING & VISUAL INSPECTION LIMITATIONS

1. The observations described in this report were made under the conditions stated herein. The conclusions presented in the report were based solely on the services described therein, and not on scientific tasks or procedures beyond the scope of described services.

2. In preparing this report, GZA GeoEnvironmental, Inc. (GZA) has relied on certain information provided by Alliant Energy (and their affiliates) as well as Federal, state, and local officials and other parties referenced therein. GZA has also relied on other parties which were available to GZA at the time of the inspection. Although there may have been some degree of overlap in the information provided by these various sources, GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this work.

3. In reviewing this Report, it should be noted that the reported condition of the dam is based on observations of field conditions during the course of this study along with data made available to GZA. The observations of conditions at the dam reflect only the situation present at the specific moment in time the observations were made, under the specific conditions present. It may be necessary to reevaluate the recommendations of this report when subsequent phases of evaluation or repair and improvement provide more data.

4. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions may be detected.

5. Water level readings have been reviewed and interpretations have been made in the text of this report. Fluctuations in the level of the groundwater and surface water may occur due to variations in rainfall, temperature, and other factors different than at the time measurements were made.

6. GZA's comments on the hydrology, hydraulics, and embankment stability for the dam are based on a limited review of available design documentation available from Alliant Energy and the Wisconsin Department of Natural Resources. Calculations and computer modeling used in these analyses were not available and were not independently reviewed by GZA.

7. This report has been prepared for the exclusive use of US EPA for specific application to the existing dam facilities, in accordance with generally accepted dam engineering practices. No other warranty, express or implied, is made.

8. This dam inspection verification report has been prepared for this project by GZA. This report is for broad evaluation and management purposes only and is not sufficient, in and of itself, to prepare construction documents or an accurate bid.

APPENDIX B

DEFINITIONS

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to references published by the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, the Department of the Interior Bureau of Reclamation, or the Federal Emergency Management Agency.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate there from, including but not be limited to, spillways; reservoirs and their rims; low level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

General

EAP – Emergency Action Plan - Shall mean a predetermined plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam break.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

Height of Dam – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the crest of the dam.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Condition Rating

SATISFACTORY - No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

FAIR - Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable safety regulatory criteria. Minor deficiencies may exist that require remedial action and/or secondary studies or investigations.

POOR - A management unit safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.

UNSATISFACTORY - Considered unsafe. A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary.

Hazard Potential

(In the event the impoundment should fail, the following would occur):

LESS THAN LOW HAZARD POTENTIAL: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

LOW HAZARD POTENTIAL: Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

SIGNIFICANT HAZARD POTENTIAL: Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

HIGH HAZARD POTENTIAL: Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

APPENDIX C

INSPECTION CHECKLISTS

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Bayfront Generating Plant	Date:	6/14/11
Unit Name:	Surge Pond	Operator's Name:	Excel Energy, Inc
Unit I.D.:		Hazard Potential Classification:	High Significant Low ✓

Inspector's Name: Patrick J. Harrison, P.E. and Doug P. Simon, P.E.

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1 Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	609.5		19. Major erosion or slope deterioration?		✓
3 Decant inlet elevation (operator records)?	609.3		20. Decant Pipes:		
4 Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?	613.5		Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7 Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		✓
9. Trees growing on embankment? (If so, indicate largest diameter below)		✓	At isolated points on embankment slopes?		✓
10. Cracks or scarps on crest?		✓	At natural hillside in the embankment area?		✓
11. Is there significant settlement along the crest?		✓	Over widespread areas?		✓
12. Are decant trashracks clear and in place?		✓	From downstream foundation area?		✓
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		✓	"Boils" beneath stream or ponded water?		✓
14. Clogged spillways, groin or diversion ditches?		✓	Around the outside of the decant pipe?		✓
15 Are spillway or ditch linings deteriorated?		✓	22. Surface movements in valley bottom or on hillside?		✓
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		✓
17. Cracks or scarps on slopes?		✓	24 Were Photos taken during the dam inspection?	✓	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments

4. No open channel spillway is present.

6. No instrumentation is present.

8. No information regarding foundation preparation is available.

16, 20. Outlet discharges below the water level in the Polishing Pond and was not visible.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # WI-0002887-06-0 INSPECTOR Patrick L. Harrison, P.E.
Date June 14, 2011 Doug P. Simon, P.E.

Impoundment Name Surge Pond
Impoundment Company Excel Energy, Inc.
EPA Region Region V
State Agency (Field Office) Addresss Wisconsin Department of Natural Resources
Rhinelander, WI

Name of Impoundment Surge Pond
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?	_____	X
Is water or ccw currently being pumped into the impoundment?	X	_____

IMPOUNDMENT FUNCTION: Settlement of Slag from water.

Nearest Downstream Town : Name Impoundment along Lake Superior - No downstream
Distance from the impoundment town present.
Impoundment
Location: Longitude 90 Degrees 54 Minutes 18 Seconds
Latitude 46 Degrees 35 Minutes 14 Seconds
State Wisconsin County Ashland

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? The Wisconsin Department of Natural Resources regulates the discharge of water (NPDES Permit).

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

__X__ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

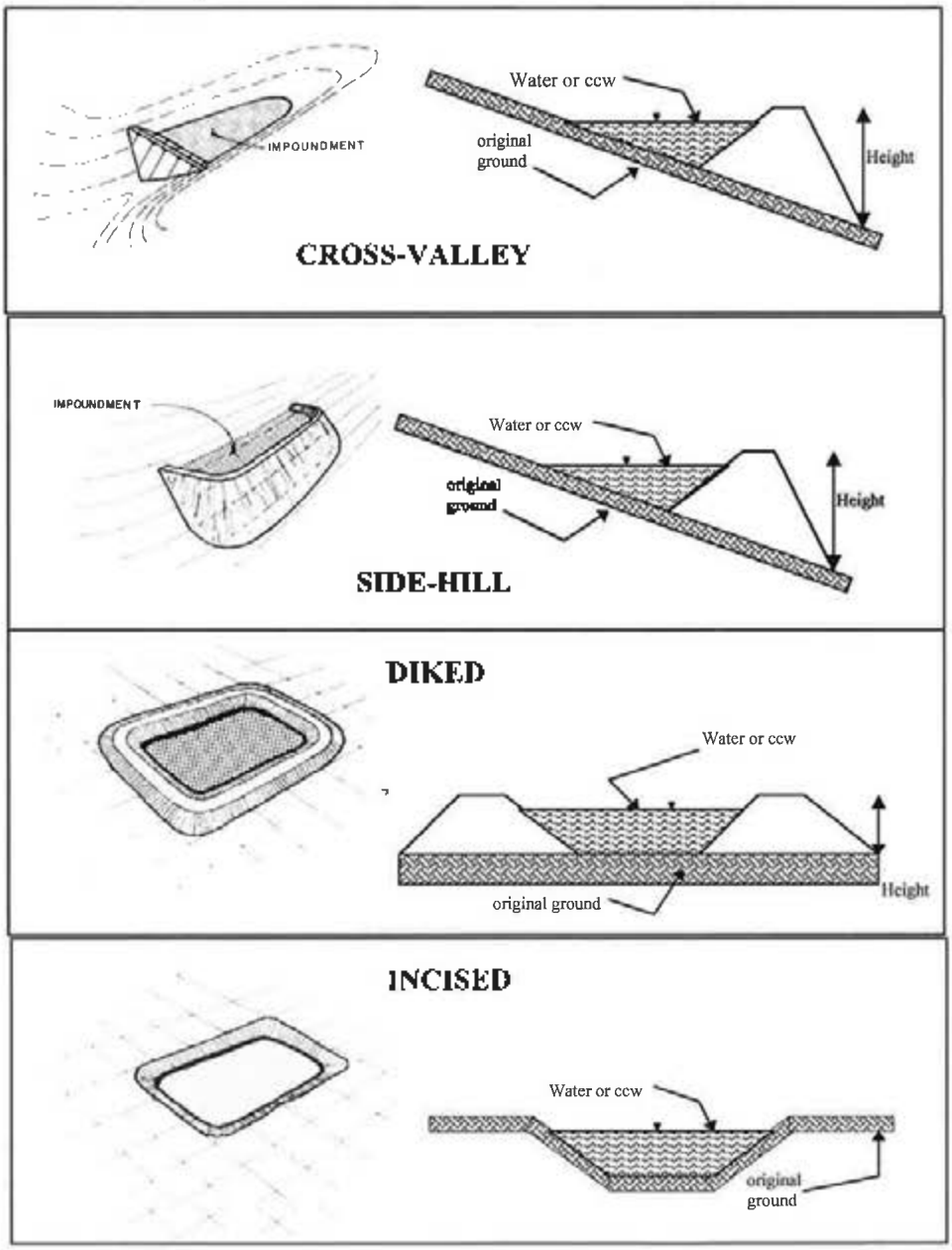
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Potential failure of the impoundment embankment would not likely result in loss of human life, economic or environmental damages.

CONFIGURATION:



___ Cross-Valley
___ Side-Hill
X Diked
___ Incised (form completion optional)
___ Combination Incised/Diked

Granular Fill with Impervious

Embankment Height 9.5 feet
Pool Area 0.15 acres
Current Freeboard 4.2 feet

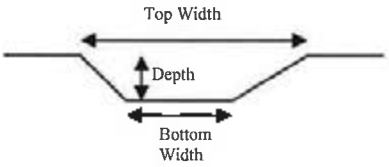
Embankment Material Core
Liner No liner present
Liner Permeability Unknown

TYPE OF OUTLET (Mark all that apply)

____ **Open Channel Spillway**
____ Trapezoidal
____ Triangular
____ Rectangular
____ Irregular

____ depth
____ bottom (or average) width
____ top width

TRAPEZOIDAL



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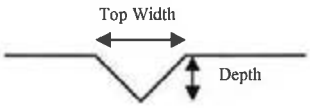
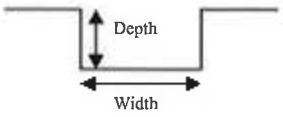
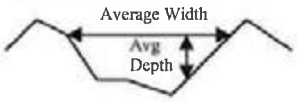


RECTANGULAR

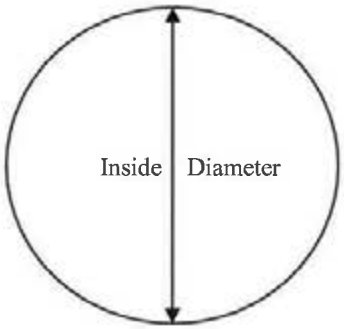


IRREGULAR



X **Outlet**

12 inside diameter
Varies: See Below.



Material
____ corrugated metal
X welded steel
____ concrete
____ plastic (hdpe, pvc, etc.)
____ other (specify) _____

Is water flowing through the outlet? YES X NO ____

____ **No Outlet**

____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By Barr Engineering Company, Minneapolis, MN

Has there ever been a failure at this site? YES _____ NO ___X_____

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO X

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO N/A

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Bayfront Generating Plant	Date:	6/14/11
Unit Name:	Polishing Basin	Operator's Name:	Excel Energy, Inc
Unit I.D.:		Hazard Potential Classification:	High Significant Low ✓

Inspector's Name: Patrick J. Harrison, P.E. and Doug P. Simon, P.E.

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	608.6		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	608.5		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		✓
5. Lowest dam crest elevation (operator records)?	611.5		Is water exiting outlet, but not entering inlet?		✓
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?	✓	
7. Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		✓
9. Trees growing on embankment? (If so, indicate largest diameter below)		✓	At isolated points on embankment slopes?		✓
10. Cracks or scarps on crest?		✓	At natural hillside in the embankment area?		✓
11. Is there significant settlement along the crest?		✓	Over widespread areas?		✓
12. Are decant trashracks clear and in place?	✓		From downstream foundation area?		✓
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		✓	"Boils" beneath stream or ponded water?		✓
14. Clogged spillways, grain or diversion ditches?		✓	Around the outside of the decant pipe?		✓
15. Are spillway or ditch linings deteriorated?		✓	22. Surface movements in valley bottom or on hillside?		✓
16. Are outlets of decant or underdrains blocked?		✓	23. Water against downstream toe?		✓
17. Cracks or scarps on slopes?		✓	24. Were Photos taken during the dam inspection?	✓	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments

4. No open channel spillway is present.
6. No instrumentation is present.
8. No information about foundation preparation is available.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # WI-0002887-06-0 INSPECTOR Patrick J. Harrison, P.E.
Date June 14, 2011 Doug P. Simon, P.E.

Impoundment Name Polishing Basin
Impoundment Company Excel Energy, Inc.
EPA Region Region V
State Agency (Field Office) Addresss Wisconsin Department of Natural Resources
Rhinelander, WI
Name of Impoundment Polishing Basin
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?	_____	X
Is water or ccw currently being pumped into the impoundment?	X	_____

IMPOUNDMENT FUNCTION: Clarification of water prior to discharge.

Nearest Downstream Town : Name Impoundment along Lake Superior - No downstream
Distance from the impoundment town present.
Impoundment
Location: Longitude 90 Degrees 54 Minutes 10.1 Seconds
Latitude 46 Degrees 35 Minutes 7.4 Seconds
State Wisconsin County Ashland

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? The Wisconsin Department of Natural Resources regulates the discharge of water (NPDES Permit).

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

X **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

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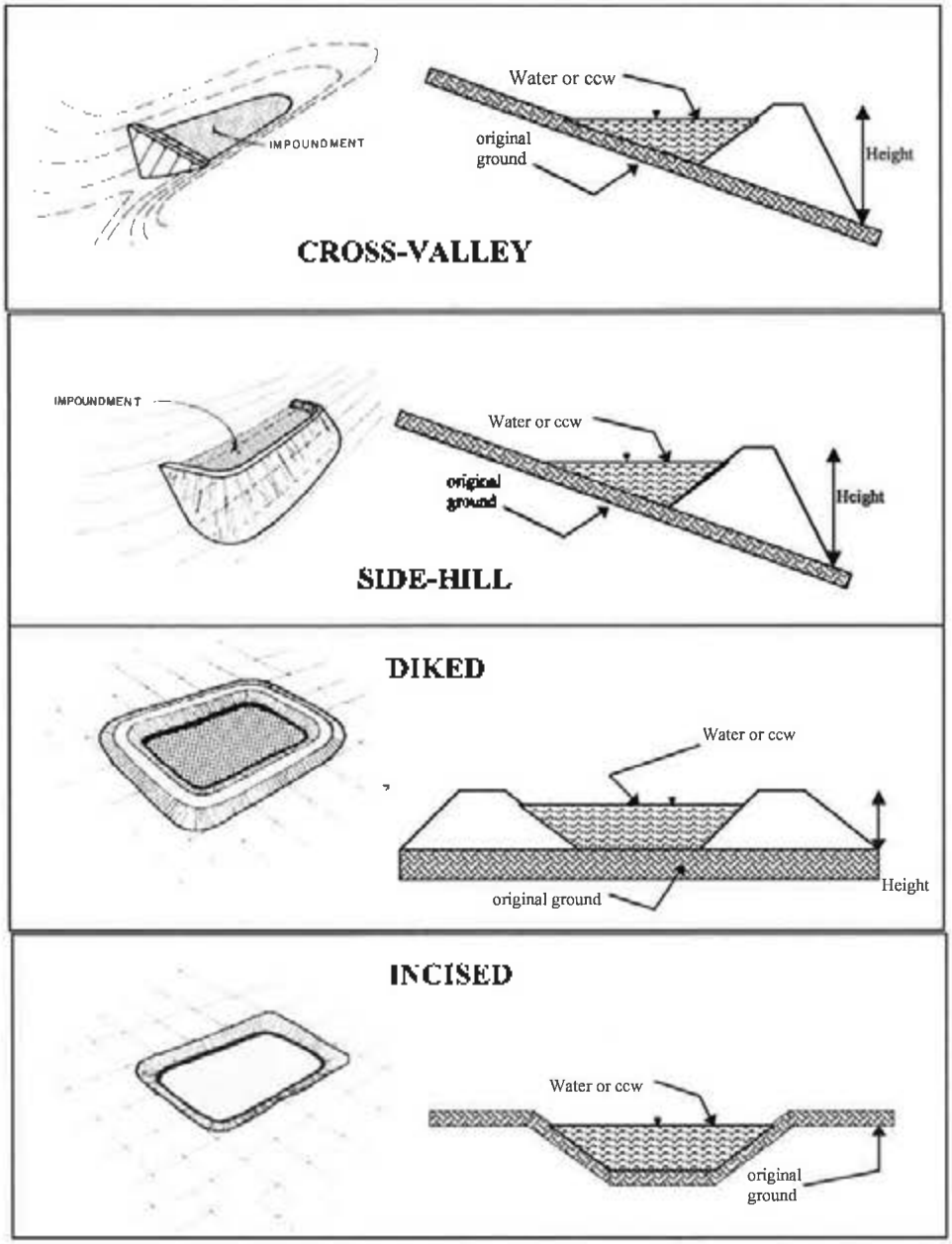
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Potential failure of the impoundment embankment would not likely result in loss of human life, economic or environmental damages.

CONFIGURATION:



_____ Cross-Valley
_____ Side-Hill
X Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height 7.5 feet
Pool Area 0.41 acres
Current Freeboard 2.9 feet

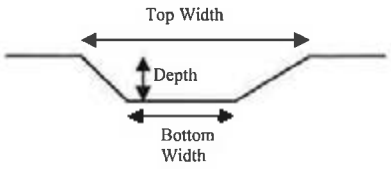
Embankment Material Granular Fill with Impervious Core
Liner No liner present
Liner Permeability Unknown

TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

TRAPEZOIDAL



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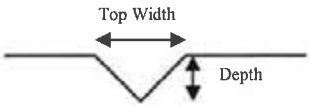

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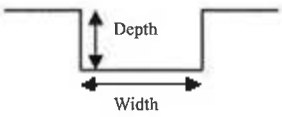
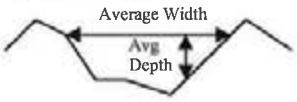
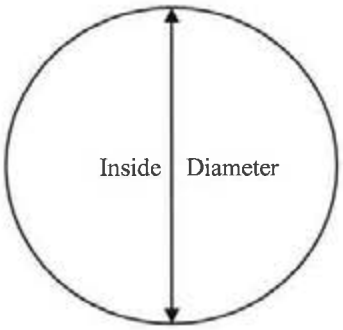


IRREGULAR



X **Outlet**

12 inside diameter
Varies: See Below.



Material
_____ corrugated metal
X welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES X NO _____

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By Barr Engineering Company, Minneapolis, MN

Has there ever been a failure at this site? YES _____ NO X

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO X

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO N/A

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : _____

APPENDIX D

REFERENCES

REFERENCE LIST
BAY FRONT GENERATING STATION

Barr Engineering Company, "Lake Superior Power District Bayfront Settling Basins", "Soil Boring Locations", drawing Dated February 2, 1976.

Barr Engineering Company, "Bayfront Settling Basins", Sheet 1 of 5, Site Plan, Dated March 3, 1976, and revised May 6, 1974.

Barr Engineering Company, "Bayfront Settling Basins", Sheet 2 of 5, "Typical Sections & Piping", Dated March 30, 1976.

Barr Engineering Company, "Bayfront Settling Basins", Sheet 3 of 5, "Piping & Structural Details", Dated March 30, 1976.

Barr Engineering Company, "Bayfront Settling Basins", Sheet 4 of 5, "Walkway Bridge & Platform Details", Dated March 30, 1976.

Barr Engineering Company, "Bayfront Settling Basins", Sheet 5 of 5, "Railing & Bridge Details", Dated March 30, 1976.

Barr Engineering Company, "Bayfront Settling Ponds Demonstration of Non-Adverse Impact on the Waters of the State of Wisconsin", Dated March 3, 1992.

Wilder, Jr., LeRoy, Coordinator, Environmental Activities, "NSPW Bay Front Generating Facility, Inspection and Maintenance Plan for the Surge Basin and Polishing Pond", Revised: September 23, 1997, October 16, 1997.

SEH, Engineers, Architects, Planners, "Bayfront Generating Plant Facility Plot", Dated October 3, 1992.

State of Wisconsin Department of Natural Resources, "Beneficial Use of Cyclone Boiler Ash (Slag) As a Substitute for Sand and Gravel or Aggregate Material", letter Dated May 8, 1990.

State of Wisconsin Department of Natural Resources, Chapter NR 213, Lining of Industrial Lagoons and Design of Storage Structures, Pages 83 thru 84-15, History: Cr. Register, June, 1990, No. 414, eff. 7-1-90.

State of Wisconsin Department of Natural Resources, "Ch. NR 213 Wis. Adm. Code Lagoon Evaluation Northern States Power-Bay Front Generating Facility, Final Determination", letter, Dated January 6, 1995.

State of Wisconsin Department of Natural Resources, "Beneficial Use of Northern States Power Company (NSP) Bay Front Boiler Slag as Base Course, Subbase or Sub-Grade Fill for the Construction of Paved Roadways", letter Dated July 28, 1999.

State of Wisconsin Department of Natural Resources, WPDES Permit Reissuance No. WI-00082887-06-0, Dated December 30, 2002.

Wisconsin Administrative Code, Chapter 213, "Lining of Industrial Lagoons and Design of Storage Structures, Pages 109 thru 115, Register, September, 1997, No. 501.

Hall, Lynn "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated August17, 2010.

Sanders, Susan, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated November 17, 2009.

Sanders, Susan, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated October 23, 2008.

Sanders, Susan, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated April 30, 2007.

Sullivan, Ed, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated June 27, 2006.

Sullivan, Ed, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated September 13, 2005.

Sullivan, Ed, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated August 31, 2004.

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Sullivan, Ed, "NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log", Dated October 24, 2000.

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Sullivan, Ed, “NSPW Bay Front Surge Basin and Polishing Pond Annual Inspection Log”, Dated November 25, 1997.

Unknown Author, Bayfront Settling Pond, Dike and Structure Design, 1976.

APPENDIX E

PREVIOUS INSPECTION REPORTS

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Not much weed growth this year. No erosion noted.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Pond seem was minimal through August. Some emergent growth around edges. Cleaned out seam + brush around outlet / confined space on catwalk in August. Area around both ponds ~~maintained~~ manicured by Jensen Lawn service. Some purple loosestrife invasive species growing around edges of ponds. Jenny Tyler painted catwalk in August + contacted mike Mantone to catwalk.

Lynn Hall
August 17th, 2010.

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin — **Circle One**

Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

There was much less weed growth during the past summer. Boiler 5 was taken offline on 9/27/07 for an indefinite amount of time. Slag was visible when the Boiler 5 was off and the flow to the pond is low. No erosion noticed.

Polishing Pond — **Circle One**

Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Pond scum started to emerge beginning of August. It formed around the east and west sides and was a little heavier on the north side. Cleaned out scum that hung on screen and around outlet area. Area around both ponds was maintained by Lawn Lawn Service and Plant employee Mike Foley. No erosion noticed. Mike also trimmed brushes growing along north side outside the chain-linked fence by Outfall 003

Susan Sanders
November 17, 2007

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Surge basin was drained into polishing pond on 10/22/08 by Brad Swartz & Mike Foley. Wendy & Wendy also dredged the pond starting 10/23/08.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Slight build-up of scum during end of June & July on north side. Covered grass area was checked every week while getting Outfall 003 water samples. Cleared debris surrounding the manhole flow as needed. Mike Foley trimmed weeds and underbrush around discharge area and gate area.

Susan Sarden
10/23/08

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Pond was drained starting on April 20, 2007. Veerdy & Hassly Inc dredged the pond starting April 23 and completing on April 25. Slag Gravel the pond was stockpiled on the north side of the plant. See attached email from Jerry Tyler

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Floating pond access. Heavy on north side.

Susan Gardner
April 30, 2007

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

SURGE BASIN WAS CLEANED IN OCT 05.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

pond scum covering about half of pond surface

Ed Lutkiewicz 6/27/06

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

HS BOILER SLAG BUILDING UP IN FRONT OF INLET PIPES. SURGE POND WILL BE CLEANED IN 2005

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

HEAVY POND SCUM DURING MONTH OF AUGUST.

E.L. Sullivan 9/13/05

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin	**Circle One**
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

N & East side slope building up in front of toilet pipes.

Polishing Pond	**Circle One**
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

floating pump screen heavy fouling and covering approx 3/4 of polishing pond.

Ed Sullivan 8/31/04

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

BOILER SLAG IS BUILDING UP ACROSS POND IN FRONT OF INLET PIPES.

Polishing Pond	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

ONLY A SMALL AMOUNT OF POND SCUM THIS YEAR. SO FAR, CATAILS WERE PULLED FROM SOUTHEAST CORNER OF SETTLING BASIN EARLIER THE SUMMER.

Ed Sullivan 7/30/03

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

MORE THAN USUAL FLOATING POND SCUM DURING SUMMER, ALMOST ALL CLEARED UP NOW. ASHLAND CONSTRUCTION CLEANED BOTH SIDES AS FAR AS THEY COULD REACH WITH BACKHOE ON 10/10/02. POND SLUG STOCKPILED ON NORTH SIDE OF PLANT.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

MORE THAN USUAL FLOATING POND SCUM DURING SUMMER, BUT HAS ALMOST ALL CLEARED UP AS OF THIS DATE. CLUMP OF CATAILS IN SW CORNER PULLED OUT WITH BACKHOE ON 10/10/02

Ed Sullivan
10/11/02

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

Some pond scum accumulating on NW corner of Surge Basin polishing pond.

EJ Sulzman 9/20/01

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

SURGE BASIN CLEANED BY ROPPERS CONSTRUCTION ON 10/11/2000. LANDSCAPING AND SEEDING WILL BE DONE IN SPRING TO REPAIR SURFACE DAMAGE ON TOP & OUTSIDE SLOPE OF SURGE BASIN. APPROXIMATELY 500 YARDS OF SOLIDS REMOVED.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	(Yes) No

Comments/Observations

SLIGHT ENHENTATION ON INSIDE ON NORTH END OF POND, DOES NOT REQUIRE IMMEDIATE ATTENTION, WILL BE REPAIRED IN SPRING ALONG WITH SURGE BASIN LAND SCAPING

Ed Sullivan
10/24/2000

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	(Yes) No

Comments/Observations

EROSION CAUSED BY WATER ENTERING POND FOR CLEANING WAS REPAIRED BY ADDING CLAY FILL IN JUNE OF 1999. VERY LITTLE WEED GROWTH IN SUMMER OF 1999

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

VERY LITTLE WEED GROWTH IN SUMMER OF 1999

Ed Sullivan 7/29/99

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin	**Circle One**
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	(Yes) No

Comments/Observations

SURGE BASIN CLEANED ON 8/26/98. APP. 300 YARDS OF SOLIDS WERE REMOVED. SOME EROSION WAS NOTED WHERE WATER ENTERED POND. WILL BE REPAIRED IN SPRING OF 99. BY SOUTHWEST EXP.

Polishing Pond	**Circle One**
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	(Yes) No

Comments/Observations

SLIGHT EROSION ON NORTH END OF POND. WILL BE REPAIRED IN SUMMER OF 1999

Ed Anderson

3/25/99

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

When #5 Berlin is off - coal slag can be seen above the water surface. It settles out fast north of the 4 10" influent lines. The sand extends about 30 ft long almost across pond east to west. Management agrees that Surge Basin should be cleaned during summer of 1998.

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	(Yes) No

Comments/Observations

Some Erosion noted on inside on north end of polishing pond. It should be restored when Surge Basin is cleaned this summer.

Ed Sullivan
5/1/98

NSPW Bay Front
Surge Basin and Polishing Pond Annual Inspection Log

Surge Basin

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

There was much less weed growth during summer of 1997 than other years. There was a buildup of [illegible] in front of [illegible] 18 inch pipe coming into the surge basin from the dewatering bin. This is possible only when [illegible] flow [illegible]

Polishing Pond

	Circle One
Is there excessive emergent weed growth?	Yes (No)
Is there excessive submergent weed growth?	Yes (No)
Are there signs of animal damage to the berms?	Yes (No)
Are there signs of erosion occurring along either the interior or exterior of the berms?	Yes (No)

Comments/Observations

There was much less weed growth during summer of 1997 than other years.

Ed Sullivan
11/25/97

APPENDIX F

PHOTOGRAPHS

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
1	6/14/11

Direction Photo Taken:
Southeast

Description:
Upstream slopes and Crest of the Surge Basin.

Photo No.	Date:
2	6/14/11

Direction Photo Taken:
North

Description:
Upstream Slopes and Crest of the Surge Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
3	6/14/11

Direction Photo Taken:
Southwest

Description:
Upstream slope of the Surge Basin and overview of Polishing Basin.

Photo No.	Date:
4	6/14/11

Direction Photo Taken:
Southeast

Description:
Upstream slope, Downstream slope and Crest of the Surge Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
5	6/14/11

Direction Photo Taken:
Southwest

Description:
Upstream slopes and Crest of the Surge Basin.

Photo No.	Date:
6	6/14/11

Direction Photo Taken:
Southeast

Description:
Surge Basin intake pipe clean-out.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
7	6/14/11

Direction Photo Taken:
Northwest

Description:
Upstream slope, downstream slope, and crest of the Surge Basin.

Photo No.	Date:
8	6/14/11

Direction Photo Taken:
Northwest

Description:
Surge Basin Flow Control structure.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No. 9	Date: 6/14/11

Direction Photo Taken:
Southeast

Description:
Surge Basin flow control structure.

Photo No. 10	Date: 6/14/11

Direction Photo Taken:
Southwest

Description:
Surge Basin flow control structure.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
11	6/14/11

Direction Photo Taken:
North

Description:
Upstream slope of the Polishing Basin.

Photo No.	Date:
12	6/14/11

Direction Photo Taken:
East

Description:
Upstream slope and Crest of the Polishing Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
13	6/14/11

Direction Photo Taken:
East

Description:
Upstream slopes and Crest of the Polishing Basin.

Photo No.	Date:
14	6/14/11

Direction Photo Taken:
Southeast

Description:
Upstream slopes and Crest of the Polishing Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
15	6/14/11

Direction Photo Taken:
West

Description:
Upstream slopes and Crest of the Polishing Basin.

Photo No.	Date:
16	6/14/11

Direction Photo Taken:
South

Description:
Upstream slope of the Polishing Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
17	6/14/11

Direction Photo Taken:
Northeast

Description:
Upstream slope and Crest of the Polishing Basin.

Photo No.	Date:
18	6/14/11

Direction Photo Taken:
Southeast

Description:
Polishing Basin training dike.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
19	6/14/11

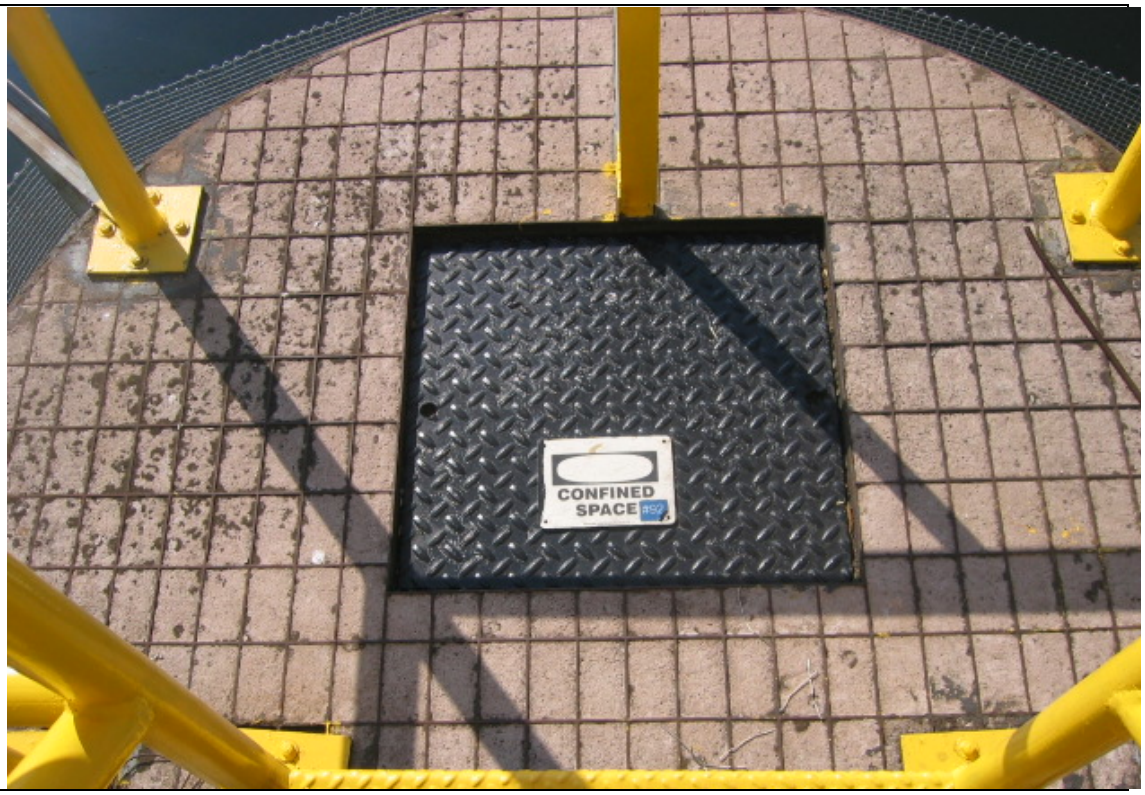
Direction Photo Taken:
East

Description:
Polishing Basin Outfall structure.

Photo No.	Date:
20	6/14/11

Direction Photo Taken:
Southeast

Description:
Polishing Basin Outfall structure.



GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
21	6/14/11

Direction Photo Taken:
Southeast

Description:
Flow into the Polishing Basin Outfall structure.

Photo No.	Date:
22	6/14/11

Direction Photo Taken:
Southeast

Description:
Flow into the Polishing Basin Outfall structure.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
23	6/14/11

Direction Photo Taken:
Northwest

Description:
Polishing Basin Water Quality structure

Photo No.	Date:
24	6/14/11

Direction Photo Taken:
Southeast

Description:
Polishing Basin Outflow Discharge pipe

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No.	Date:
25	6/14/11

Direction Photo Taken:
Northwest

Description:
Flow from Polishing Basin Outflow Discharge pipe toward Lake Superior

Photo No.	Date:
26	6/14/11

Direction Photo Taken:
Northwest

Description:
Flow from Polishing Basin Outflow Discharge pipe into Lake Superior

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. EPA	Site Location: Bay Front Generating Station Ashland, Wisconsin	Project No. 01.0170142.30

Photo No. 27	Date: 6/14/11

Direction Photo Taken:
Southwest

Description:
Downstream slope of the Surge and Polishing Basin.

Photo No. 28	Date: 6/14/11

Direction Photo Taken:
Northwest

Description:
Downstream slope of the Polishing Basin.