FINAL REPORT
ROUND 7 DAM ASSESSMENT
DTE ENERGY MONROE POWER PLANT
FLY ASH BASIN AND BOTTOM ASH STORMWATER POND

June 2, 2011

PREPARED FOR:

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

PREPARED BY:

GZA GeoEnvironmental, Inc.
19500 Victor Parkway, Suite 300
Livonia, MI 48152
GZA File No. 01.0170142.20

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

June 2, 2011
File No. 01.0170142.20

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

Re: Round 7 Dam Assessment - Final Report
EPA Contract No. EP10W001313
DTE Energy Monroe Power Plant
Fly Ash Basin and Bottom Ash Stormwater Pond
Monroe, Michigan

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Dear Mr. Hoffman:

In accordance with our proposal 01.P000177.11, dated August 11, 2010, and U.S. Environmental Protection Agency (EPA) Contract No. EP10W001313, Order No. EP-CALL-0001, GZA GeoEnvironmental, Inc. (GZA) has completed our inspection of the Detroit Edison (DTE) Monroe Power Plant (MPP, Site) Fly Ash Basin and Bottom Ash Stormwater Pond located in Monroe, Michigan. The Site visit was conducted on September 23 and 24, 2010. 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 Section 104(e). We are submitting one hard copy and one CD-ROM copy of this Final Report directly to the EPA.

Based on our visual inspection, and in accordance with the EPA's criteria, the Fly Ash Basin and the Bottom Ash Stormwater Pond are currently in **SATISFACTORY** condition, in our opinion. Further discussion of our evaluation and recommended actions are presented in the Round 7 Dam Assessment Report. The report includes: (a) completed Field Assessment Checklists; (b) figures of the impoundments; 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 Round 7 Dam Assessment Report.

Sincerely,

GZA GEOENVIRONMENTAL, INC.

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EXECUTIVE SUMMARY

This Inspection Report presents the results of a visual inspection of the Detroit Edison (DTE, Owner) Monroe Power Plant (MPP, Site) Fly Ash Basin and Bottom Ash Stormwater Pond located in Monroe, Michigan. The inspection was performed on September 23 and 24, 2010 by representatives of GZA GeoEnvironmental, Inc (GZA), accompanied by representatives of DTE.

FLY ASH BASIN

The Fly Ash Basin, in its current configuration, has a maximum height of approximately 44 feet above the natural ground surface, and an original maximum storage volume of approximately 18,500 acre-feet at an elevation of 614 feet (NGVD 29). Under U.S. Army Corps of Engineers (COE) guidelines, the Fly Ash Basin is classified as an **Intermediate** size structure. It is noted that the State of Michigan regulates the Fly Ash Basin as a Type III landfill and thus does not provide a size classification rating for coal ash impoundments.

Since the Fly Ash Basin is regulated as a Type III landfill in Michigan and not a dam, the State of Michigan has not assigned a hazard potential rating. Under the EPA classification system, it is GZA's opinion that the Fly Ash Basin would be considered as having a **Significant** hazard potential based on the proximity of the residential houses located adjacent to the northern impoundment slope, the proximity of Interstate I-75 that abuts the western impoundment slope, and the potential environmental impacts and interruption of power generation due to a failure of the Fly Ash Basin and subsequent loss of impoundment capacity.

Based on the results of the visual inspection, discussions with DTE personnel, and a review of available design documentation, the following deficiencies were noted at the Fly Ash Basin:

1. Presence of heavy vegetation along the side slopes of the embankment from Stations 0+00 to 62+00 and 150+00 to 182+00. These areas are scheduled to undergo mitigation as part of the DNRE approved embankment mitigation plan;
2. No instrumentation to observe the elevation of the water within the impoundment;
3. Presence of vegetation in the channel downstream of the stilling wells;
4. Lack of an Emergency Action Plan (EAP), though this is not required by DNRE Part 115 regulations; and,
5. The discharge pipes from the outlet structure to the stilling wells have not been inspected internally since they were installed.

GZA recommends that the Owner arrange for the following to be performed at the Fly Ash Basin:

Studies and Analyses:

1. During execution of the embankment mitigation plan, it is our opinion DTE should further review potential areas of seepage along the downstream slope following vegetation removal and perform seepage analyses in those areas deemed necessary. Additionally, following construction, settlement analyses may be appropriate where reconstruction has occurred to confirm the settlement monitoring occurring at the Fly Ash Basin is adequate; and,

2. Although not required by DNRE Part 115 regulations, it is our opinion that DTE develop a formal EAP for the Fly Ash Basin and communicate that plan to Site personnel and the local emergency response agencies. This EAP could become a part of existing safety plans for the Site specifically addressing conditions of the Fly Ash Basin.

Operation & Maintenance Activities:

1. Clear vegetation from the channel downstream of the stilling wells;
2. Install a staff gauge near the discharge structure in order to take monthly measurements of the Fly Ash Basin water surface elevation;
3. If DTE has the opportunity to stop discharging from the Fly Ash Basin for a limited time period, inspect the discharge pipes from the discharge structure to the stilling wells to verify that they are operating correctly and are in good condition. This may be performed by video photograph.

Repair Recommendations:

1. Clear the areas of heavy vegetation from Stations 0+00 to 62+00 and 150+00 to 182+00 to facilitate visual observation of potential sloughs in accordance with the existing embankment mitigation plan. Continue to monitor construction progress and report to the DNRE on a routine basis.

BOTTOM ASH STORMWATER POND

According to COE and DNRE criteria, the Bottom Ash Stormwater Pond does not meet the definition of a dam because its barriers are less than 6 feet in height and thus, it was not assigned a size classification.

Bottom ash is stockpiled approximately 1,000 feet from the closest impoundment structure. The bottom ash is classified as inert and is stockpiled on-Site for either re-use on-Site or for potential off-Site sales. As such, failure of the impoundment structure would have no effect on the bottom ash stockpile area. If the Bottom Ash Stormwater Pond met the requirements of an impoundment, it is GZA's opinion that it would be considered as having a **Low** hazard potential, based on minimal economic or environmental losses that may occur in the event of failure or misoperation of the embankment.

No deficiencies were observed at the Bottom Ash Stormwater Pond with regard to the bottom ash. While there were numerous large trees growing on the upstream and downstream slopes, the height to width ratio of this embankment is small and this vegetation helps protect the impoundment from erosion damage caused by wind and wave action from Lake Erie. As such, GZA does not have recommendations for Bottom Ash Stormwater Pond improvements with the exception of continued daily monitoring as is currently being performed.

PREFACE

The assessment of the general condition of the embankments at the Detroit Edison Company's Monroe, Michigan Power Plant is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of this report.

In reviewing this report, it should be realized that the reported condition of the embankment is 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 embankment, 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 embankment 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 embankment will continue to represent the condition of the embankment 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.

Walter Kosinski, P.E.
Principal
Michigan License No.: 38731

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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 the Detroit Edison Company (DTE, Owner) Monroe Power Plant (MPP, Site) Fly Ash Basin and Bottom Ash Stormwater Pond in Monroe, Michigan. 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 draft report were performed in accordance with Round 7 of the Assessment of Dam Safety of Coal Combustion Surface Impoundments, RFQ-DC-13, dated August 5, 2010, and EPA Contract No. EP10W001313, Order No. EP-CALL-0001. The inspection generally conformed to the requirements of the Federal Guidelines for Dam Safety[1], and this report is subject to the limitations contained in **Appendix A** and the Terms and Conditions of our Contract Agreement. The EPA and DTE reviewed the draft report dated November 8, 2010, and provided comments to GZA on March 14, 2011. A copy of the EPA and DTE comments and GZA's response to their comments is included in **Appendix F**.

1.1.2 Purpose of Work

The purpose of this investigation was to visually inspect and evaluate the present condition of the Fly Ash Basin, Bottom Ash Stormwater Pond, and appurtenant structures 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 impoundments and appurtenant structures; 2) perform an on-Site review with the Owner of available design, inspection, and maintenance data and procedures for the management unit; 3) perform a visual inspection of the Site; 4) prepare and submit a field assessment checklist; and, 5) prepare and submit a draft and a final report presenting the evaluation of the structure, 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 within 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] FEMA/ICODS, April 2004: http://www.ferc.gov/industries/hydropower/safety/guidelines/fema-93.pdf

1.2 Description of Project

1.2.1 Location

The MPP is located about three miles east of the city of Monroe, Michigan, along the shores of Lake Erie, at the address 3500 East Front Street, Monroe, Michigan 48161. The MPP Fly Ash Basin is located about one mile southwest of the MPP at latitude 41˚ 53' 03" North and longitude 83˚ 22' 31" West. The MPP Bottom Ash Stormwater Basin is located less than one mile south of the MPP at latitude 41˚ 52' 50" North and longitude 83˚ 20' 58" West. A Site locus of the Fly Ash Basin, the Bottom Ash Stormwater Pond, and surrounding area is shown on **Figure 1**. An aerial photograph of the Fly Ash Basin, the Bottom Ash Stormwater Pond, and surrounding area is provided as **Figure 2**. The Fly Ash Basin can be accessed by vehicles from Dunbar Road. The Bottom Ash Stormwater Pond may be accessed by vehicles from the MPP or by boat from Plum Creek or Lake Erie.

1.2.2 Owner/Caretaker

The MPP is owned and operated by DTE, a wholly owned subsidiary of DTE Energy.

	Dam Owner/Caretaker
Name	The Detroit Edison Company, Monroe Power Plant
Mailing Address	3500 East Front Street
City, State, Zip	Monroe, MI 48161
Contact	Paul R. Tracy
Title	Plant Manager
E-Mail	tracyp@dteenergy.com
Phone Number	734-384-6812

1.2.3 Purpose of the Basin and Pond

The MPP is a four-unit coal-fired power plant with a maximum generating capacity of approximately 3,100 megawatts. Commercial operation of the MPP facility began in 1971. The Fly Ash Basin and the Bottom Ash Stormwater Pond were constructed in conjunction with the MPP facility for the purpose of storing and disposing coal combustion byproducts. Wastewater discharged from the Site, including from the Fly Ash Basin and the Bottom Ash Stormwater Pond, is regulated under the same National Pollution Discharge Elimination System (NPDES) permit[2]. Each discharge location has its own set of discharge requirements.

The Fly Ash Basin was constructed for the purpose of storing and disposing non-recyclable plant wastewater and fly ash from the MPP facility. Fly ash wastewater is pumped at an average rate of 12.2 million gallons per day[3] (MGD) from the MPP to the Fly Ash Basin via

[2] National Pollutant Discharge Elimination System (NPDES) Permit No. MI0001848, Monroe Power Plant, Michigan Department of Natural Resources and Environment, January 22, 2010.

[3] Based on 2009 average flows from a Water Balance Diagram provided by Dennis Leonard of DTE via email correspondence on September 30, 2010.

six, above ground, 12-inch diameter steel pipelines. Only two of the transport pipelines are in operation at a given time. Wastewater from the Fly Ash Basin is discharged to Plum Creek at an average rate of 12.2 MGD. The NPDES Permit allows a maximum flowrate of 19.4 MGD of fly ash transport water to be discharged. The overall Fly Ash Basin plan is shown on **Figure 3**. Refer to **Figure 4** for stationing locations of the Fly Ash Basin.

The Bottom Ash Stormwater Pond was constructed for the purpose of storing and disposing non-recyclable plant wastewater, bottom ash sluice water, excess stormwater, and coal pile runoff. Wastewater is discharged from the Bottom Ash Stormwater Pond to Plum Creek at an average rate of 10.5[4] MGD. The Bottom Ash Stormwater Pond wastewater is permitted to include bottom ash transport water, coal pile runoff, chemical and nonchemical metal cleaning wastes, treated flue gas desulfurization wastewater, flue gas desulfurization pre-treatment system backwash, fly ash transport water, miscellaneous low volume wastes, and storm water runoff at a maximum discharge rate of 38.4 MGD (60 cubic feet per second [cfs]). The overall Bottom Ash Stormwater Pond plan is shown on **Figure 5**.

1.2.4 Description of the Fly Ash Basin and Appurtenances

The following description of the Fly Ash Basin is based on the Owner interviews, design reports, as-built drawings, and field observations by GZA.

The Fly Ash Basin consists of an earthfill embankment with a crest length of approximately 18,200 feet and a general height (from the lowest toe elevation to the top of embankment) of approximately 40 feet, with a maximum height of 44 feet. A road along the top of the crest has a width of approximately 15 feet and an elevation of approximately 614 feet, National Geodetic Vertical Datum of 1929 (NGVD 29)[5]. The Fly Ash Basin base was reportedly keyed into the existing natural ground surface, which also forms the liner, at an elevation of 563.4 feet. As such, the Fly Ash Basin has a structural height of approximately 50.6 feet. The outer slope of the embankment has a slope ranging from approximately 1.8 horizontal to 1 vertical (1.8H:1V) to 2.5H:1V[6]. The inner slope of the embankment where the coal ash slurry is stored has a slope of approximately 2H:1V.

The Fly Ash Basin has not been expanded since its construction in the 1970's, but beginning in 2009, DTE implemented a four year embankment mitigation plan[6] for the Fly Ash Basin to repair surficial sloughs that had been occurring on the outer slopes of the embankment since the early 1990's. The proposed mitigation measures included repairing the embankment via one of two methods and implementing an inspection and monitoring program. Refer to Section 1.3.6 for further discussion of the embankment mitigation plan.

The Fly Ash Basin discharge structure is an over/under weir with wooden stoplogs located at the east part of the basin with a maximum crest elevation of approximately 611.1 feet NGVD 29. Flow is conveyed downstream by three, 3-foot diameter concrete encased steel pipes

[4] Based on 2009 average flows from a Water Balance Diagram provided by Dennis Leonard of DTE via email correspondence on September 30, 2010.

[5] Historically, datum at the MPP has included International Great Lakes Datum of 1955 (IGLD 55), United States Geological Services (USGS) datum, and plant datum. The datum was recently updated to NGVD 29. Unless otherwise stated, elevations in this report are given in the current datum, NGVD 29.

[6] Letter from Paul Tracy of DTE to EPA, dated March 8, 2011, that provided comments regarding the Draft Report for the Fly Ash Basin and Bottom Ash Stormwater Pond submitted to EPA.

within the embankment with each terminating at stilling wells located near the toe of the downstream slope. Water flows up and over the stilling wells and into a concrete channel, which terminates into a culvert beneath a gravel road that surrounds the basin. The culvert discharges the flow into a ditch cut into the natural ground surface, which discharges into Plum Creek via an outfall weir at NPDES Monitoring Point 001F. Further discussion of the hydrology and hydraulics of the Fly Ash Basin are provided in Section 2.5.

The original design drawings provided by the Owner indicate the three, 3-foot diameter steel discharge pipes are embedded within the embankment approximately 42 inches beneath the embankment surface at a slope of 0.3456 (i.e., parallel with the downstream slope as indicated on DTE Drawing No. 6C695W-56). Seepage collars are shown along the pipelines at a spacing of approximately 30 feet.

Instrumentation at the Fly Ash Basin includes twenty-five surface monuments and seven slope indicators installed along the top of the embankment, two surface monuments installed near the stilling wells, four temporary piezometers installed between Stations 15+50 and 41+00 at the toe of the outer slope, a staff gauge near the outfall weir, and a groundwater monitoring well near Station 32+00 near the toe of the outer slope. Refer to **Figures 6** and **7** for the locations of the surface monuments and slope indicators, respectively.

Additional information on the construction and performance history of the Fly Ash Basin is provided in Sections 1.3.6 and 1.3.8 of this report.

1.2.5 Description of the Bottom Ash Stormwater Pond and Appurtenances

Little information is available detailing the construction of the Bottom Ash Stormwater Pond. Based on the available information, the Bottom Ash Stormwater Pond consists of an embankment constructed primarily with rock fill and earth spoils generated during construction of the MPP, although no specific construction drawings were identified during our review. It was constructed on the existing natural ground surface, which also forms the liner and primarily used for shore protection. The height of the embankment (from the lowest toe elevation to the top of embankment) is approximately 4 feet. A road along the top of the crest has a minimum width of approximately 12 feet and is 20 or more feet wide along the eastern side abutting Lake Erie, which was constructed with additional rock armament for shoreline protection. The northern boundary of the Bottom Ash Stormwater Pond was formed by the natural ground surface and bottom ash is stored in this area.

The Bottom Ash Stormwater Pond discharge structure is an over/under weir constructed at a fixed elevation of 575 feet (datum not indicated on DTE Drawing No. 6C695-270) at the west part of the pond. The flow discharges into Plum Creek at NPDES Monitoring Point 001B.

Additional information on the construction and performance history of the Bottom Ash Stormwater Pond is provided in Section 1.3.7 of this report.

As further discussed in Sections 1.2.8, 1.3.7, and 3.0, it is GZA's opinion that the Bottom Ash Stormwater Pond should not be considered a coal combustion waste (CCW) impoundment because its barriers are less than 6 feet in height and thus it does not meet the definition of a dam. Additionally, bottom ash is stockpiled approximately 1,000 feet from the closest impoundment structure. The bottom ash is classified as inert and is stockpiled on-Site

for either re-use on-Site or for potential off-Site sales. As such, failure of the impoundment structure would have no effect on the bottom ash stockpile area. Lastly, DTE does not believe the Bottom Ash Stormwater Pond should be considered a coal combustion waste impoundment because, in addition to the previously mentioned reasons, its primary function is stormwater retention.

1.2.6 Operations and Maintenance of the Fly Ash Basin

Industrial waste in Michigan is regulated under the provisions of Part 115, Solid Waste Management, of Michigan's Natural Resources Environmental Protection Act (NREPA), Public Act 451 of 1994, as amended. Coal ash impoundments in Michigan are exempt from regulation under the Michigan Dam Safety Rules, Part 315 of the NREPA, because they contain Type III wastes. The Fly Ash Basin operates under Department of Natural Resources (DNRE) Solid Waste Disposal Operating License No. 9201 (Operating License). The original Operating License was issued to DTE on September 4, 1974. The current Operating License expires on February 20, 2014.

Operation and maintenance of the Fly Ash Basin is regulated by the EPA and the DNRE under the NPDES Permit. DTE is required to submit a monthly report to the DNRE that includes NPDES monitoring data. Specifically, at Monitoring Point 001F, DTE is required to record the flow weekly, collect a grab sample for total suspended solids weekly, and collect a grab sample for oil and grease on a bimonthly basis.

The Fly Ash Basin and the surrounding area are operated and maintained by DTE personnel. A short term (approximately four years) inspection and monitoring program was implemented in 2009 while the embankment mitigation program is ongoing. Refer to Section 1.3.6 for further discussion of the embankment mitigation plan. The short-term monitoring program includes:

- Daily monitoring of the items associated with the NPDES Permit, including visual confirmation of wastewater outfall at Plum Creek;
- Weekly visual observations of the condition of the Fly Ash Basin, including monitoring the basin, roadway, discharge structure, weir, and coal ash discharge;
- Quarterly inspections of the embankment crest, slope, and toe including photo documentation by a geotechnical consultant, with annual reports submitted to the DNRE; and,
- Quarterly monitoring of the surface monuments and slope indicators for movement of the surface and subsurface.

Upon the expected completion of the embankment mitigation measures in 2013, a long-term monitoring program will be implemented. The long-term monitoring program will include the same elements as the short-term monitoring program except that the frequency of inspections and monitoring will be reduced from quarterly to annual.

The Fly Ash Basin is also inspected quarterly by DNRE Waste and Hazardous Material Division (WHMD) and Monroe County Health Department (MCHD) personnel. A report of the DNRE WHMD and MCHD visual inspections, including recommended actions to correct any deficiencies, is sent to DTE personnel following each inspection. In order to maintain the Operating License, DTE is required to address any deficiencies noted in the inspection, and provide the DNRE with documentation that the noted deficiencies have been addressed.

According to the Operating License, an interim vegetative cover has been approved by the DNRE that may be placed on any filled areas that will be exposed for a period of three months or more before additional waste ash is placed in the Fly Ash Basin. A ninety percent or better vegetative cover is required within three years of planting.

Based on GZA's discussions with DTE personnel and a review of the DNRE quarterly inspection reports from March 21, 2008 through August 27, 2010 (refer to Section 1.3.9), the operations and maintenance of the Fly Ash Basin is consistent with the performance requirements under the current Operating License.

1.2.7 Operations and Maintenance of the Bottom Ash Stormwater Pond

Operations and maintenance of the Bottom Ash Stormwater Pond is regulated by the EPA and the DNRE under the same NPDES Permit as the Fly Ash Basin. The Bottom Ash Stormwater Pond embankment height is less than 6 feet. As such, it is exempt from regulation under Michigan's Part 315 Rules and it is not inspected by DNRE personnel. Additionally, the bottom ash is classified as an inert material by the DNRE WHMD and is not regulated as a Type III waste.

DTE personnel visually inspect the Bottom Ash Stormwater Pond on a daily basis in accordance with the NPDES Permit. Field notes are maintained and any unusual observations are brought to the attention of the shift supervisor. DTE is required to submit a monthly report to the DNRE that includes NPDES monitoring data. Specifically, at Monitoring Point 001B, DTE is required to monitor the following parameters:

- Record the flow on a weekly basis;
- Collect a grab sample for total suspended solids on a weekly basis;
- Collect a grab sample for oil and grease on a bimonthly basis;
- Collect a grab sample for total copper and total iron on a daily basis only during the discharge of chemical metal cleaning wastes at a location prior to mixing with other waste streams in the Bottom Ash Stormwater Pond;
- Collect a grab sample for total mercury on a monthly basis; and,
- Collect a grab sample for Total Residual Chlorine three times weekly during periods of chlorination of the low pressure service water system.

1.2.8 Size Classification

For the purposes of this EPA-mandated inspection, the size classifications will be based on United States Army Corps of Engineers (COE) criteria. According to guidelines established by the COE, dams with a storage volume between 1,000 and 50,000 acre-feet and/or a height between 40 and 100 feet are classified as Intermediate sized structures. Based on the maximum height of 44 feet and a storage volume of approximately 18,500 acre-feet (at the maximum elevation of approximately 614 feet), the Fly Ash Basin is classified as an **Intermediate** sized structure. It is noted that the State of Michigan regulates the Fly Ash Basin as a Type III landfill and thus does not provide a size classification rating for coal ash impoundments.

The maximum height of approximately 44 feet is based on the height of the Fly Ash Basin above the natural ground surface. The maximum height of 44 feet does not include the depth of the Fly Ash Basin that was excavated into natural ground. Including the depth below the natural ground surface, the maximum structural height of the dam is approximately 50.6 feet.

According to COE and DNRE criteria, the Bottom Ash Stormwater Pond does not meet the definition of a dam because its barriers are less than 6 feet in height and thus, it shall not be assigned a size classification.

1.2.9 Hazard Potential Classification

Since the Fly Ash Basin is regulated as a Type III landfill in Michigan and not a dam, the DNRE has not assigned it a hazard potential rating. Under the EPA classification system, as presented on page 2 of the EPA checklist (**Appendix C**) and Definitions section (**Appendix B**), it is GZA's opinion that the Fly Ash Basin would be considered as having a **Significant** hazard potential. The hazard potential rating is based on the proximity of the residential houses located adjacent to the northern impoundment slope, the proximity of Interstate I-75 that abuts the western impoundment slope, and the potential environmental impacts and interruption of power generation due to a failure of the Fly Ash Basin and subsequent loss of impoundment capacity. The overall Fly Ash Basin plan is shown on **Figure 3**.

According to COE and DNRE criteria, the Bottom Ash Stormwater Pond does not meet the definition of a dam because its barriers are less than 6 feet in height. Additionally, bottom ash is stockpiled approximately 1,000 feet from the closest impoundment structure. The bottom ash is stockpiled on-Site for either re-use on-Site or for potential off-Site sales. As such, failure of the impoundment structure would have no effect on the bottom ash stockpile area. If the Bottom Ash Stormwater Pond met the requirements of an impoundment, it is GZA's opinion that it would be considered as having a **Low** hazard potential, based on minimal economic or environmental losses that may occur in the event of failure or misoperation of the embankment.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The Fly Ash Basin is an enclosed embankment built up from the natural ground surface. As such, the contributory drainage area is the surface area of the impoundment, approximately 410 acres. The embankment is highlighted on **Figure 3**.

The Bottom Ash Stormwater Pond receives surface stormwater runoff from the adjacent Coal Pile. It also receives surface stormwater runoff when the on-Site stormwater collection ponds reach capacity during a significant rain event and discharge to the Bottom Ash Stormwater Pond. In this instance, the drainage area for the Bottom Ash Stormwater Pond is the area of the MPP which is approximately 500 acres[7]. The stormwater collection ponds were not visited by GZA during the Bottom Ash Stormwater Pond inspection. The overall Bottom Ash Stormwater Pond plan is shown on **Figure 5**.

1.3.2 Fly Ash Basin

The Fly Ash Basin is located near Lake Erie and is approximately bordered by I-75 to the west, Plum Creek to the north, Plum Creek and Lake Erie to the east, and a low lying farm field to the south. It was reportedly constructed on lacustrine clays and silts that are underlain by the Salina Group Formation. Lacustrine clays and silts are typically found chiefly underlying extensive, flat, low lying areas formerly inundated by glacial Great Lakes[8]. The low permeability of the underlying clays and silts minimizes the potential for wastewater to migrate into the surrounding groundwater. An additional geological feature that minimizes the migration of the wastewater to the groundwater is that the groundwater in the area appears to be confined and is reportedly under artesian conditions in the Site area.

Based on a geotechnical investigation[9] conducted in 1995, the soil within the embankment consisted of a clay fill underlain by hard natural clay, which was underlain by weathered shale and limestone. The hydraulic conductivity of the clay fill and the hard natural clay ranged from 1.9E-7 centimeters per second (cm/sec) to 7.4E-8 cm/sec.

Based on the results of a hydrographic survey conducted in 2003 and an aerial photography survey conducted in 2008, at the crest elevation of 614 feet, the Fly Ash Basin was estimated to have a surface area of approximately 410 acres and a storage volume of approximately 18,500 acre-feet. DTE estimates that approximately 12,300 acre-feet of fly ash are stored within the impoundment.

1.3.3 Bottom Ash Stormwater Pond

The Bottom Ash Stormwater Pond is located near Lake Erie and is enclosed by Plum Creek to the west, the MPP facility to the north, and Lake Erie to the east and south. The Bottom Ash Stormwater Pond has a surface area of approximately 100 acres. According to

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[7] Letter from Paul Tracy of DTE to EPA, dated March 8, 2011, that provided comments regarding the Draft Report for the Fly Ash Basin and Bottom Ash Stormwater Pond submitted to EPA.

[8] Quaternary Geology of Michigan, University of Michigan and the MDEQ, Geological Survey Division, 1982.

[9] Geotechnical Investigation. Verification of Natural Soil Barrier, Ash Basin – Monroe Power Plant, Soil and Material Engineers, Inc., January 30, 1995.

DTE, the volume of the Bottom Ash Stormwater Pond is approximately 620 acre-feet, of which half is currently filled with sediment from coal pile runoff, spoil from COE dredge material[10], and a limited amount of bottom ash. The Bottom Ash Stormwater Pond embankment was constructed primarily with rock fill and earth spoils generated during construction of the MPP, although no specific construction drawings were identified.

1.3.4 Discharges at the Site

Discharges at the Site are regulated under the previously noted NPDES Permit. Under normal operating conditions, wastewater outflow from the Fly Ash Basin is discharged continuously at an average rate 12.2 MGD, based on 2009 data. The discharge flowrate is based on the inflow rate to the Fly Ash Basin from the MPP. The NPDES Permit allows for a maximum discharge of 19.4 MGD from this location. Wastewater is discharged continuously from the Bottom Ash Stormwater basin at an average rate of 10.5 MGD, based on 2009 data. The NPDES Permit allows for a maximum discharge flowrate of 38.4 MGD from this location. Based on discussions with DTE personnel, the water level is not measured in either the Fly Ash Basin or the Bottom Ash Stormwater Pond; however, DTE personnel make daily visual observations of the outfall at each basin to verify that wastewater is flowing.

1.3.5 General Elevations

Fly Ash Basin elevations presented in this report are taken from design drawings, reports, and survey monument monitoring data provided by DTE. Elevations are based upon the NGVD 29 vertical datum.

A. Top of Embankment	± 614.0 feet
B. Minimum Operating Pool	± 607.5 feet
C. Maximum Operating Pool	± 611.1 feet
D. Top of Stilling Wells	± 583.2 feet

According to as built Drawing No. 6C695-270 provided by DTE, the ground surface elevation near the over/under weir at the Bottom Ash Stormwater Pond is 578 feet and the top of the weir is 575 feet (datum not provided).

1.3.6 Design and Construction Records and History of the Fly Ash Basin

According to the information provided by DTE, the Fly Ash Basin was designed by DTE engineers. Construction of the Fly Ash Basin was completed in the 1970's. The embankment was constructed to its full height prior to filling it with coal ash wastewater. The clay fill used to construct the embankment was obtained by excavating the existing ground inside the perimeter of the embankment.[11]

[10] Letter from Paul Tracy of DTE to EPA, dated March 26, 2009, in response to EPA's Request for Information Under Section 104 (e) of the CERCLA, 42 U.S.C. 9604(e) – Monroe Power Plant.

[11] Geotechnical Site Characterization Report for the Monroe Power Plant, Geosyntec Consultants, October 14, 2010, Rev. 1.

The following paragraphs of Section 1.3.6 summarize information from the report Ash Basin Embankment Mitigation for the Monroe Power Plant, dated June 29, 2009, prepared by Geosyntec, which was submitted to and approved by the DNRE.

In the mid 1990's, DTE performed repairs along portions of the north, west, and southeast sides of the outer embankment slopes and installed geocells to stabilize the surface. This approach did not completely mitigate the sloughing problem and surficial sloughs continued to occur in several areas of the Fly Ash Basin exterior slopes.

In 2005, the DNRE noted in their quarterly inspection reports that the sloughing on certain portions of the embankment needed to be repaired. As a result, DTE retained Soils and Materials Engineers, Inc. (SME), a geotechnical consulting firm, to evaluate the sloughing problems on the north embankment and propose mitigation measures for it.

In 2008, DTE received a letter from the DNRE discussing the necessary repairs and replied to this letter indicating that DTE concurred with the DNRE and would begin a repair program in 2009. DTE indicated that the geocells installed in the mid 1990's would be removed from the western half of the northern embankment.

In 2009, DTE retained Geosyntec Consultants (Geosyntec) to perform a Fly Ash Basin inspection and propose mitigation measures for repair. Geosyntec estimated that 25 to 30 percent of the perimeter embankment exterior slope surface had surficial sloughs. Geosyntec noted that some of the sloughed areas occurred in areas where geocells had been placed to improve surface slope stability. According to Geosyntec, the geocells were not perforated and were filled with clayey soils and underlain by clay soils. As a result, the water that infiltrated the geocells became trapped and created saturated soil conditions between the base of the geocell and the underlying clay. The excess weight of the water within the saturated soil decreased the shear strength of the near surface (top 2 to 3 feet) soils, particularly during rainfall events and during freeze-thaw cycles. The reduction in shear strength likely caused the surface sloughs. Geosyntec did not observe evidence of deep-seated rotational failure mechanisms during their Site reconnaissance.

DTE and Geosyntec met with the DNRE in May 2009 and subsequently submitted an embankment mitigation plan for their review. The proposed mitigation measures included repairing the embankment via one of two methods and implementing an inspection and monitoring program. The first repair method, Repair Method 1, was based on excavating the top 2.5 feet of the slope soils, removing the geocells, flattening the side slopes to 2.5H:1V, and constructing a lined ditch in the middle area of the slope, running parallel with the crest, to control surface water runoff and to minimize infiltration. Repair Method 1 was developed for the areas between Stations 60+00 to 88+00 and between Stations 139+00 to 160+00.

The second repair method, Repair Method 2, was based on excavating the top 2.5 feet of the slope soils, removing the geocells, preparing the subgrade, then replacing the excavated soils with compacted clay soil. Both repair methods included turf reinforcement and hydroseeding. Repair Method 2 was developed for the remainder of the areas along the north and east embankment not repaired by Repair Method 1. The proposed inspection and monitoring program is further discussed in Section 1.2.6.

The proposed mitigation measures excluded the south side of the Fly Ash Basin because, according to Geosyntec, no surface sloughs were observed on this side of the embankment during the 2009 Site inspection and no sloughs had been reported on this side of the embankment since it was constructed in the 1970s.

The DNRE approved the proposed mitigation measures and the embankment reconstruction began in 2009. The reconstruction is expected to continue through 2013.

1.3.7 Design and Construction Records and History of the Bottom Ash Stormwater Pond

Since this embankment was primarily constructed for stormwater runoff control for the MPP and shoreline protection from Lake Erie, the embankment has significant rip rap protection along the exterior face. Design and construction records were not available for review by GZA.

1.3.8 Operating Records

Operations records were provided to GZA by DTE. The most recent Discharge Monitoring Reports (DMRs) for the NPDES Permit indicated that both the Fly Ash Basin and Bottom Ash Stormwater Pond were operated in accordance with the NPDES Permit (i.e. no reported exceedances).

According to a 2006 report[12] prepared by SME, horizontal and vertical controls were established on top of the Fly Ash Basin embankment. The eight control points were surveyed every two years from 1983 through at least 2006 to monitor outward creep in the top of the embankment. The outward creep varied at the control points from 3.5 to 7.0 inches over the 23 year period.

Initial readings were collected at the Fly Ash Basin in December 2009 for twenty-three surface monuments and in March 2010 for five slope indicators. Four additional surface monuments were installed in June 2010 and readings from the surface monuments and slope indicators were collected in June 2010. According to Geosyntec[13], a comparison of June 2010 surface monument and slope indicator readings to the baseline readings (refer to **Appendix D)** did not indicate any movement between the first and second quarter of 2010. **Figure 6** shows the location of the surface monuments and **Figure 7** shows the location of the slope indicators.

One monitoring well, MW-1R, exists at the Fly Ash Basin near the toe of the slope on the north embankment. Groundwater monitoring at monitoring well MW-1R is conducted on a semi-annual basis in accordance with a DNRE approved hydrogeological monitoring plan dated June 18, 1999. MW-1 was replaced in August 2009 after it was found to be damaged. Replacement monitoring well MW-1R was completed to a depth of 26 feet below the ground surface (bgs) with the screen set from 21 to 26 feet bgs[14]. Groundwater conditions in the Site area are reportedly artesian and groundwater flows out of the top of MW-1R.

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[12] Embankment Evaluation Report, DTE Monroe Power Plant Plum Creek Ash Basin, Distress on North Embankment, SME, May 18, 2006.

[13] June 2010 Quarterly Inspection Report – Ash Basin Embankment, Monroe Power Plant, Geosyntec Consultants, September 17, 2010.

[14] Letter from DTE to DNRE, dated November 13, 2009. Subject: First 2009 Semi-Annual Sampling Event.

In 2010, two temporary piezometers were installed from Stations 15+50 to 19+00 and two temporary piezometers were installed from Stations 31+00 to 41+00 to characterize standing water observed at the toe of the outer slope of the north embankment. The water appeared to be ponded as a result of surface runoff and the lack of sunlight to aid with evaporation. Water was collected from the four piezometers although recharge was very slow. Results from the water analysis will be compared to the water quality results of the Fly Ash Basin wastewater to evaluate if seepage is occurring. The results of this analysis were not available at the time of GZA's inspection.

According to DTE, no monitoring wells, piezometers, surface monuments, or slope indicators exist or are required at the Bottom Ash Stormwater Pond for the following reasons:

- The underlying aquifer has artesian groundwater flow which reduces the likelihood of a discharge from the Bottom Ash Stormwater Pond to groundwater; and,
- The dike of the Bottom Ash Stormwater Pond is less than 6 feet in height and thus is exempt from regulation by the DNRE.

1.3.9 Previous Inspection Reports

Visual inspections of the Fly Ash Basin are conducted by the DNRE WHMD and the MCHD on a quarterly basis. Detailed visual inspections including photographic documentation have been conducted by either Geosyntec or DTE personnel on a quarterly basis since 2009. The Bottom Ash Stormwater Pond is not regulated by a governing body and thus is not inspected by the DNRE or MCHD.

Quarterly inspection reports for the Fly Ash Basin prepared by the DNRE from March 21, 2008 through August 27, 2010 were reviewed by GZA. In general, the DNRE concluded that the Fly Ash Basin was in compliance with the operational requirements of Part 115 of the NREPA. Key highlights and recommendations from the quarterly inspection reports include the following (the first date noted is the date of the quarterly inspection report):

- March 21, 2008: On March 14, 2008, slumps on the west side of the Fly Ash Basin were inspected. DNRE recommended examining the use of a geocomposite drainage net and toe drain to enhance soil drainage and prevent slumping;
- June 17, 2008: On June 5, 2008, soil slumps were inspected on the east and northwest sides of the Fly Ash Basin. Additional slumps were noted on the west side. The DNRE expected at a minimum, weekly inspections of the embankment areas by DTE staff;
- August 1, 2008: On July 31, 2008, no deficiencies noted;
- December 22, 2008: On December 17, 2008, soil slumps were inspected on the Fly Ash Basin embankments. The DNRE expected at a minimum, weekly inspections of the embankment areas by DTE staff. The DNRE requested a written schedule for the repair of the embankments;
- February 23, 2009: On February 23, 2009, no deficiencies noted;
- May 13, 2009: On May 11, 2009, DNRE staff observed the repairs made to the embankment and piping following a release of ash slurry from the fly ash sluice pipeline near Station 10+00 on May 4, 2009. Prior to the inspection, the DNRE

met with DTE and Geosyntec to discuss the embankment mitigation recommendations. The DNRE agreed with the conceptual approach which included the repair methods detailed in Section 1.3.6;

- August 4, 2009: On July 22, 2009, DNRE staff inspected soil slumps on the Fly Ash Basin embankment. The DNRE agreed with the July 28, 2009 plan to replace monitoring well MW-1;
- December 1, 2009: On November 6, 2009, DNRE staff observed repairs made to the western embankment;
- March 1, 2010: On February 24, 2010, no deficiencies noted. Approximately 6 inches of snow was on the ground during the inspection;
- June 29, 2010: On June 25, 2010, DNRE staff noted a slump near Station 75+00 that prompted DTE to barricade the perimeter road from traffic. This area was scheduled for 2010 reconstruction. The DNRE requested that construction drawings and a construction quality assurance plan be submitted by July 15, 2010; and,
- August 27, 2010: On August 25, 2010, no deficiencies noted.

The most recent quarterly inspection was performed at the Fly Ash Basin by DTE in June 2010. Geosyntec wrote a report[15] based on DTE's observations. Key observations and recommendations resulting from the June 2010 quarterly inspection included:

- The inspection of the overall outer slope conditions between Stations 0+00 and 30+50 was considered to be incomplete due to excessive vegetation;
- Animal trails were found at Stations 02+00 and 10+00;
- The west edge of the perimeter dike road showed signs of movement (up to 8 inch crack) between Stations 75+00 and 77+50;
- A slough was observed at Station 66+50 with a drop off of approximately 5 feet;
- A 6 inch deep puddle of standing water was observed at the toe of the embankment between Stations 15+50 and 19+00;
- An unknown pipe was discovered sticking out of the ground at Station 42+00 near the top of the embankment;
- Standing water was observed along the toe of the embankment between Stations 31+00 and 41+00; and,
- The discharge structure required the following maintenance:
  - The discharge screens across the timber logs needed to be cleaned to allow water to freely discharge,
  - Vegetation should be removed from the shoreline along the discharge structure,
  - Vegetation in the forebay should be removed and,
  - Vegetation clogging the ditch downstream from the stilling wells should be removed.

[15] June 2010 Quarterly Inspection Report – Ash Basin Embankment, Monroe Power Plant, Geosyntec Consultants, September 17, 2010.

2.0 INSPECTION

2.1 Visual Inspection

The MPP Fly Ash Basin and Bottom Ash Stormwater Pond were inspected on September 23 and 24, 2010 by Walter Kosinski, P.E., and Thomas Boom, P.E. of GZA. For both days, the weather was partly cloudy with temperatures in the 70°s to 80°s Fahrenheit. Photographs to document the current conditions of the embankments were taken during the inspection and are included in **Appendix E**. Underwater areas were not inspected, as this level of investigation was beyond GZA's scope of services. A copy of the EPA Checklist and a copy of the GZA inspection checklist are included in **Appendix C**.

With respect to our visual inspection, there was no evidence of prior releases, failures, or patchwork observed by GZA. Reconstruction of the downstream slope, in accordance with the DNRE approved embankment mitigation plan, was on-going between Station 62+00 to 88+00 and Station 138+00 to 150+00. Areas of heavy vegetation between Station 0+00 to 62+00 and Station 150+00 to 182+00 could not be viewed with the exception of pathways cut at approximate 500-foot intervals. This heavy vegetation will be removed and any sloughs will be corrected as part of the mitigation plan.

2.1.1 General Findings

In general, the MPP Fly Ash Basin was found to be in **SATISFACTORY** condition and the Bottom Ash Stormwater Pond was found to be in **SATISFACTORY** condition. Specific concerns are identified in more detail in the sections below.

2.1.2 Fly Ash Basin (Photos 1 through 44)

An overall Fly Ash Basin plan showing the pertinent features is provided as **Figure 3**. A Site plan showing observations made at the Fly Ash Basin during the current inspection, including the location and orientation of photographs provided in **Appendix E**, is detailed on **Figure 4**.

2.1.2.1 Outer Embankment Slope (Photos 1, 2, 3, 6, 9, 12, 13, 15, 19, 20, 22, 33, 35, 37, 40, and 42 through 44)

The outer embankment slope generally appeared to be in good condition. As shown on **Figure 4**, significant vegetation from Station 0+00 to 62+00 and from Station 150+00 to 182+00 obscured the slope and a visual inspection could not be performed in these areas (Photos 2, 22, 33, 37, 40, and 42). The embankment mitigation reconstruction began in 2009 and was occurring from Station 62+00 to 88+00 and from Station 138+00 to 150+00 during the time of the inspection (Photos 1, 3, 6, 9, 19, and 20). No unusual movement or sloughing was observed in the slope and the overall mitigation measures appeared to be progressing satisfactorily. It appeared that some excess construction debris was placed on the slope near Station 144+00 (Photo 20). Small animal burrows were noted near Station 132+00 along the toe of the slope (Photo 43). Standing water was observed in the ditch at the toe of the slope near Station 139+00 (Photo 44).

2.1.2.2 Crest (Photos 2, 3, 4, 6 through 10, 12, 13, 15, 20, 22, 41)

The crest of the Fly Ash Basin has a gravel cover. The alignment of the top of the embankment appeared generally level, with no depressions or irregularities observed. Several small, manmade holes were observed in the location of the surface monuments due to a surveyor digging to locate the surface monument (Photo 10).

2.1.2.3 Interior of Embankment (Photos 5, 8, 11, and 24)

According to DTE, approximately sixty-six percent of the interior of the Fly Ash Basin has been filled with coal ash deposits. DTE has achieved ninety percent[16] or better vegetative cover within three years of planting in areas that are filled with coal ash deposits in accordance with the Operating License.

2.1.2.4 Appurtenant Structures (Photos 23 through 32)

The water level in the Fly Ash Basin is controlled by a 50-foot long discharge structure at Station 179+00 that has three 7.0-foot long stoplog-controlled weirs. This structure was observed to be in good condition with previously reported vegetation removed from the stoplogs. Although there is not a specific method to measure the water level within the Fly Ash Basin, the stoplogs are designed to control the water level within the impoundment between elevations 607.5 feet to 611.1 feet, maintaining a freeboard ranging from approximately 3 to 6.5 feet.

The discharge structure is inspected daily by DTE personnel to ensure that blockage of the discharge structure has not occurred. The concrete appeared intact with little to no vegetation growth, which was noted in the June 2010 Geosyntec Quarterly Inspection Report. Three 3.0-foot diameter steel pipes encased in concrete convey water downstream through the embankment to three stilling wells located at the toe of the downstream slope. The three discharge pipes and the stilling wells could not be visually inspected as water was discharging during the inspection. DTE reportedly has never had an issue with any of the discharge pipes since original construction.

Downstream of the stilling wells is an area of vegetative growth including thick brush (Photos 27, 28 and 29). The presence of this vegetation was noted in the June 2010 Geosyntec Quarterly Inspection Report, which recommended that the vegetation be removed. The vegetation observed during the current inspection appears to be consistent to that described in the June 2010 Geosyntec Quarterly Inspection Report photos. The original design drawing for this area, Drawing No. 6C695W-56, includes an 8-inch layer of rip rap placed on top of 6 inches of gravel fill.

2.1.3 Bottom Ash Stormwater Pond (Photos 45 through 54)

A Site plan showing the key features of the Bottom Ash Stormwater Pond, including the location and orientation of photographs provided in **Appendix D**, is provided as **Figure 5**.

[16] Letter from DTE to DNRE, dated July 28, 2010, Subject: First 2010 Semi-Annual Monitoring Event.

2.1.3.1 Outer Embankment Slope (Photos 48 through 50)

The outer embankment slope and crest generally appeared to be in good condition. The crest of the Bottom Ash Stormwater Pond also functions as a road, part of which has a gravel cover and the other part is asphalt. No unusual movement or sloughing was observed in the slope. The alignment of the top of the embankment appeared generally level, with no depressions or irregularities observed. Numerous trees and heavy vegetation were noted along the embankment, including trees up to 24-inch diameter.

The northern shoreline of the Bottom Ash Stormwater Pond is natural ground surface and was not included as part of the inspection. This is also the area where bottom ash is stored following sluicing to the perimeter of the impoundment.

2.1.3.2 Appurtenant Structures (Photos 51 through 54)

The water level in the Bottom Ash Stormwater Pond is controlled by an over/under weir along its west side. This weir was observed to be in good condition. The elevation of the water within the Bottom Ash Stormwater Pond is controlled by the elevation of the rip rap embankment downstream of the over/under weir (Photos 53 and 54).

2.2 Caretaker Interview

Maintenance of the dam is the responsibility of DTE personnel. As detailed in previous sections, GZA met with DTE personnel and discussed the current operations and maintenance procedures, regulatory requirements, and the history of the Fly Ash Basin and Bottom Ash Stormwater Pond since their construction.

2.3 Operation and Maintenance Procedures

As discussed in Section 1.2.6, DTE personnel are responsible for the regular operation and maintenance of the Fly Ash Basin and Bottom Ash Stormwater Pond. DTE has developed Job Instructional Training Units (JITs) that provide operators with instructions for performing day to day tasks. Routine maintenance procedures include daily visits to the outfall of the Fly Ash Basin and Bottom Ash Stormwater Pond and weekly visual inspections to look for signs of deterioration or damage. DTE personnel perform a quarterly detailed visual inspection of the Fly Ash Basin including photo documentation. Currently, the DTE Survey Department visits the Fly Ash Basin on a quarterly basis to take position and elevation readings of the survey monuments and slope indicators. This frequency will be reduced to an annual basis following the expected completion of the embankment mitigation measures in 2013.

2.4 Emergency Action Plan

There is no Emergency Action Plan (EAP) developed for the Fly Ash Basin or the Bottom Ash Stormwater Pond. An EAP is not required by the DNRE Part 115 Rules.

2.5 Hydrologic/Hydraulic Data

GZA did not perform an independent assessment of the hydraulics and hydrology for the embankments as this was beyond our scope of services. However, we did review available

design documentation for the Fly Ash Basin. No design documentation was available for the Bottom Ash Stormwater Pond.

According to an as-built drawing provided by DTE, the maximum elevation of the wastewater within the Fly Ash Basin is 609.66 feet (USGS)[17]. However, the reference vertical datum has changed to NGVD since the as-built drawing was created. Converting the historical elevation to the currently used standard results in a maximum elevation of 611.06 feet (NGVD), which results in a minimum freeboard of approximately 3 feet. Rule 299.4309 of the Part 115 Rules requires a minimum freeboard of no less than 2 feet.

2.6 Structural and Seepage Stability

The original structural and seepage stability analyses, if any, were not available to GZA at the time of inspection. SME evaluated the global slope stability of the north embankment of the Fly Ash Basin as part of their May 18, 2006 Embankment Evaluation Report. Geosyntec evaluated the hydrostatic uplift and slope stability factors of safety at the Fly Ash Basin as part of their February 25, 2010 Stability Analysis Report. The following sections summarize this work. Seepage analyses, foundation liquefaction analyses, and settlement analyses reports were not available. No information regarding the structural and seepage stability for the Bottom Ash Stormwater Pond was available to GZA.

2.6.1 Slope Stability Analyses

For the north embankment global stability analyses of the Fly Ash Basin, SME analyzed the embankment failure planes extending through the base of the embankment and through the toe of the embankment. For both conditions, the embankment was found to have acceptable factors of safety. SME recommended improving the global stability since some portions of the slope were near the lower end of the typical acceptable factors of safety. SME concluded that the face slides along the slope were likely a fairly shallow face slide and was most likely due to saturated, loose soil conditions occurring in the top few feet of the embankment.

The purpose of the Geosyntec February 25, 2010 Stability Analysis Report was twofold:

1. Evaluate the factor of safety against hydrostatic uplift for the existing and design conditions; and,
2. Evaluate the static and seismic slope stability factors of safety for shallow and deep seated potential slip surfaces for six scenarios, from existing conditions through a time where steady state conditions are established under post construction activities.

The factor of safety against hydrostatic uplift considered four scenarios to evaluate the existing and design conditions: two considered an interior section and two considered an exterior section of the embankment. The scenarios were performed with two different sets of parameters. The first set of parameters assumed that the confined groundwater was not in hydraulic communication with the upper reaches of the existing ground, and the second set of parameters assumed that the confined groundwater was in hydraulic communication with the

[17] Drawing No. 6C695W-57, Concrete Details – On Site Fly Ash Disposal Facility Discharge Structure Wastewater Treatment Facility, Monroe Power Plant, Last Revision, dated May 18, 1980.

upper reaches of the existing ground. The target factor of safety was 1.40 based on Geosyntec's experience at similar projects. The reported results indicated a factor of safety ranging from 1.37 to 66.86 for the interior sections. For the exterior section, the factor of safety reported for the existing condition ranged from 1.18 to 4.22, and for the design condition, the reported factor of safety ranged from 1.40 to 4.80.

The overall stability analyses evaluated six different scenarios at three different cross sections of the Fly Ash Basin embankment that were considered representative of the embankment. The local stability analyses evaluated three scenarios with an applied surcharge load at a certain distance from the embankment crest. The water elevation in the Fly Ash Basin was assumed to be 610.4 feet. The reported factor of safety values for the overall stability analyses exceeded the targeted factor of safety of 1.4. For the local stability analyses, the reported factor of safety values ranged from 1.16 to 1.87.

As a result of these analyses and discussions with DTE and DNRE, an embankment mitigation plan was prepared to resolve issues with the shallow stability issues including flattening of the slopes and incorporation of a drainage swale at mid slope to help drain surface runoff, particularly during freeze/thaw cycles.

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, based upon the completion of the embankment mitigation plan and our observations, the overall condition of MPP Fly Ash Basin is judged to be **SATISFACTORY.** Similarly, due to its low relative height, its low height to width ratio, and overall satisfactory performance regarding shoreline protection, the overall condition of MPP Bottom Ash Stormwater Pond is judged to be **SATISFACTORY.**

The Fly Ash Basin was found to have the following deficiencies:

1. Presence of heavy vegetation along the side slopes of the embankment from Stations 0+00 to 62+00 and 150+00 to 182+00. These areas are scheduled to undergo mitigation as part of the DNRE approved embankment mitigation plan;
2. No instrumentation to observe the elevation of the water within the impoundment;
3. Presence of vegetation in the channel downstream of the stilling wells;
4. Lack of an Emergency Action Plan (EAP), though this is not required by DNRE Part 115 regulations; and,
5. The discharge pipes from the outlet structure to the stilling wells have not been inspected internally since they were installed.

No deficiencies were observed at the Bottom Ash Stormwater Pond with regard to the bottom ash. While there were numerous large trees growing on the upstream and downstream slopes, the height to width ratio of this embankment is small and this vegetation helps protect the impoundment from erosion damage caused by wind and wave action from Lake Erie.

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies at the Fly Ash Basin. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of environmental permits needs to be determined for activities that may occur within resource areas under the jurisdiction of the appropriate regulatory agencies.

3.2 Studies and Analyses

GZA recommends the following studies and analyses:

1. During execution of the embankment mitigation plan, it is our opinion DTE should further review potential areas of seepage along the downstream slope following vegetation removal and perform seepage analyses in those areas deemed necessary. Additionally, following construction, settlement analyses may be appropriate where reconstruction has occurred to confirm the settlement monitoring occurring at the Fly Ash Basin is adequate; and,
2. Although not required by DNRE Part 115 regulations, it is our opinion that DTE develop a formal EAP for the Fly Ash Basin and communicate that plan to Site personnel and the local emergency response agencies. This EAP could become a part of existing safety plans for the Site specifically addressing conditions of the Fly Ash Basin.

3.3 Recurrent Operation & Maintenance Recommendations

GZA recommends the following operation and maintenance level activities:

1. Clear vegetation from the channel downstream of the stilling wells;
2. Install a staff gauge near the discharge structure in order to take monthly measurements of the Fly Ash Basin water surface elevation; and,
3. If DTE has the opportunity to stop discharging from the Fly Ash Basin for a limited time period, inspect the discharge pipes from the discharge structure to the stilling wells to verify that they are operating correctly and are in good condition. This may be performed by video photograph.

3.4 Repair Recommendations

GZA recommends the following repairs which may improve the overall condition of the Fly Ash Basin, but do not alter the current design of the embankment. The recommendations may require design by a professional engineer and construction contractor experienced in embankment construction.

1. Clear the areas of heavy vegetation from Stations 0+00 to 62+00 and 150+00 to 182+00 to facilitate visual observation of potential sloughs in accordance with the existing embankment mitigation plan.

3.5 Alternatives

There are no practical alternatives to the repairs itemized above.

4.0 ENGINEER'S CERTIFICATION

I acknowledge that the management units referenced herein, the Monroe Power Plant Fly Ash Basin and Bottom Ash Stormwater Pond, have been assessed to be in **SATISFACTORY** condition on September 24, 2010.

Walter Kosinski, P.E.
Principal

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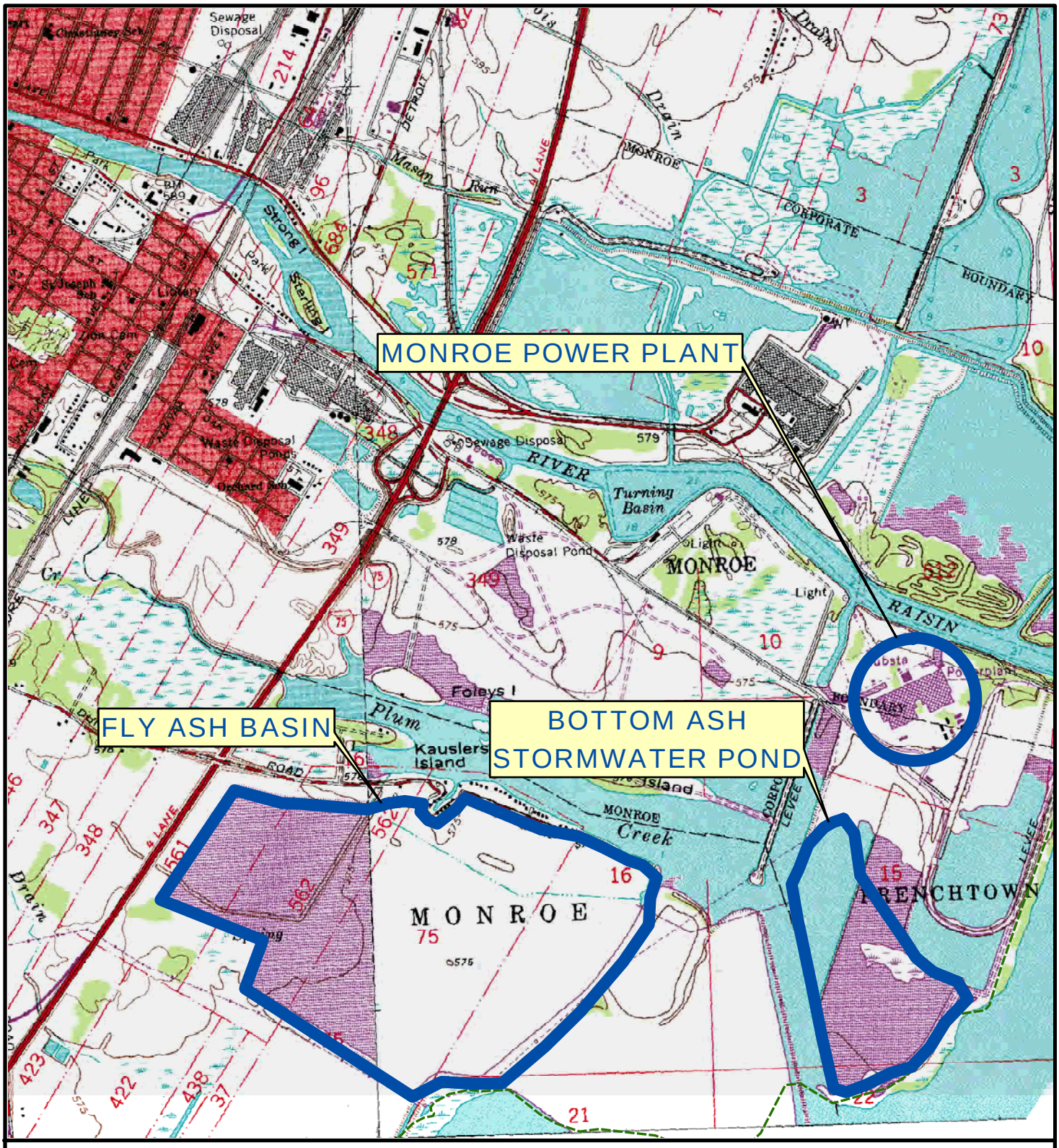
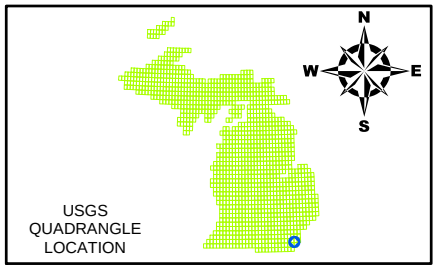
Figures





SOURCE: SCANNED USGS TOPOGRAPHIC QUADRANGLE PROVIDED BY THE MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION, MICHIGAN DEPARTMENT OF INFORMATION TECHNOLOGY DATA ACCESSED OCTOBER 2010

0 500 1,000 2,000 3,000
Feet

Data Supplied by :

MCGI

GZA

PROJ. MGR.: TRB
DESIGNED BY: TRB
REVIEWED BY: PHB
OPERATOR: NAM

DATE: 10-25-2010

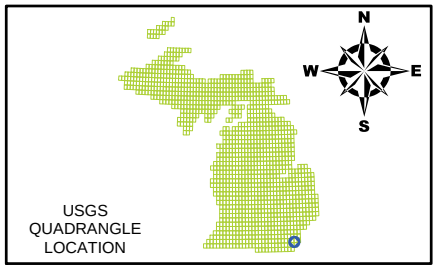
LOCUS PLAN
(USGS 7.5-MINUTE TOPOGRAPHIC QUAD)

DTE ENERGY - MONROE POWER PLANT
MONROE, MICHIGAN

JOB NO.
01.0170142.20

FIGURE NO.
1

J:\01.xx Norwood\01.0170142.20 CCW Dams Round 7\GIS\DTE-MONROE MI\Figure 1 - Locus Map - Quad.mxd



SOURCE: DIGITAL ORTHOPHOTO/AERIAL IMAGERY PROVIDED BY THE MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION, MICHIGAN DEPARTMENT OF INFORMATION TECHNOLOGY
DATA ACCESSED OCTOBER 2010

0 500 1,000 2,000 3,000
Feet

Data Supplied by :

MCGI

GZA

PROJ. MGR.: TRB
DESIGNED BY: TRB
REVIEWED BY: PHB
OPERATOR: NAM

DATE: 10-25-2010

LOCUS PLAN
(DIGITAL ORTHOPHOTO/AERIAL IMAGERY)

DTE ENERGY - MONROE POWER PLANT
MONROE, MICHIGAN

JOB NO.
01.0170142.20

FIGURE NO.
2

J:\01.xx Norwood\01.0170142.20 CCW Dams Round 7\GIS\DTE-MONROE MI\Figure 2 - Locus Map - Ortho.mxd

SOURCE: DIGITAL ORTHOPHOTO/AERIAL IMAGERY
PROVIDED BY THE MICHIGAN CENTER FOR
GEOGRAPHIC INFORMATION, MICHIGAN DEPARTMENT
OF INFORMATION TECHNOLOGY
DATA ACCESSED OCTOBER 2010

ORIGINAL SCALE: 1" = 2,000'

N
W E
S

600 300 0 600 Feet

Plum Creek

Dunbar Road

I-75

Residential Houses

Discharge Canal

Sluice Pipes from Monroe Power Plant

Weir Outlet Structure

Outlet Weir

Stilling Wells

Farm Field

Current Coal Ash Filling Area

Lake Erie

LEGEND

ASH-FILLED AREA

EMBANKMENT

GZA GeoEnvironmental, Inc.
19500 Victor Parkway, Suite 300
Livonia, Michigan 48152
Phone: (734) 462-0207 Fax: (734) 462-0508

DTE ENERGY
MONROE POWER PLANT
MONROE, MICHIGAN

OVERALL FLY ASH BASIN PLAN

Proj. Mgr.: TRB
Designed By: TRB
Reviewed By: PHB
Operator: NAM

Dwg. Date: 10-25-2010

Job No.: 01.0170142.20

Figure No.: 3

J:\01.xx Norwood\01.0170142.20 CCW Dams Round 7\GIS\DTE-MONROE MI\Figure 3 - Overall FAB Plan - Ortho.mxd

SOURCE: DIGITAL ORTHOPHOTO/AERIAL IMAGERY
PROVIDED BY THE MICHIGAN CENTER FOR
GEOGRAPHIC INFORMATION, MICHIGAN DEPARTMENT
OF INFORMATION TECHNOLOGY
DATA ACCESSED OCTOBER 2010

ORIGINAL SCALE: 1" = 2,000'

N
W E
S

600 300 0 600 Feet

Dunbar Road

Plum Creek

Discharge Canal

I-75

Small Hole in Crest

Heavy Vegetation at Outlet of Stilling Wells

Small Animal Burrows at Toe of Slope

Standing Water in Ditch at Toe of Slope

Lake Erie

LEGEND

- Heavy Vegetation along Embankment
- Area Currently Under Construction
- 150+00 500-Foot Station
- 40 September 2010 GZA Photo Location/Direction

GZA GeoEnvironmental, Inc.
19500 Victor Parkway, Suite 300
Livonia, Michigan 48152
Phone: (734) 462-0207 Fax: (734) 462-0508

DTE ENERGY
MONROE POWER PLANT
MONROE, MICHIGAN

FLY ASH BASIN
OBSERVATIONS AND PHOTOLOG

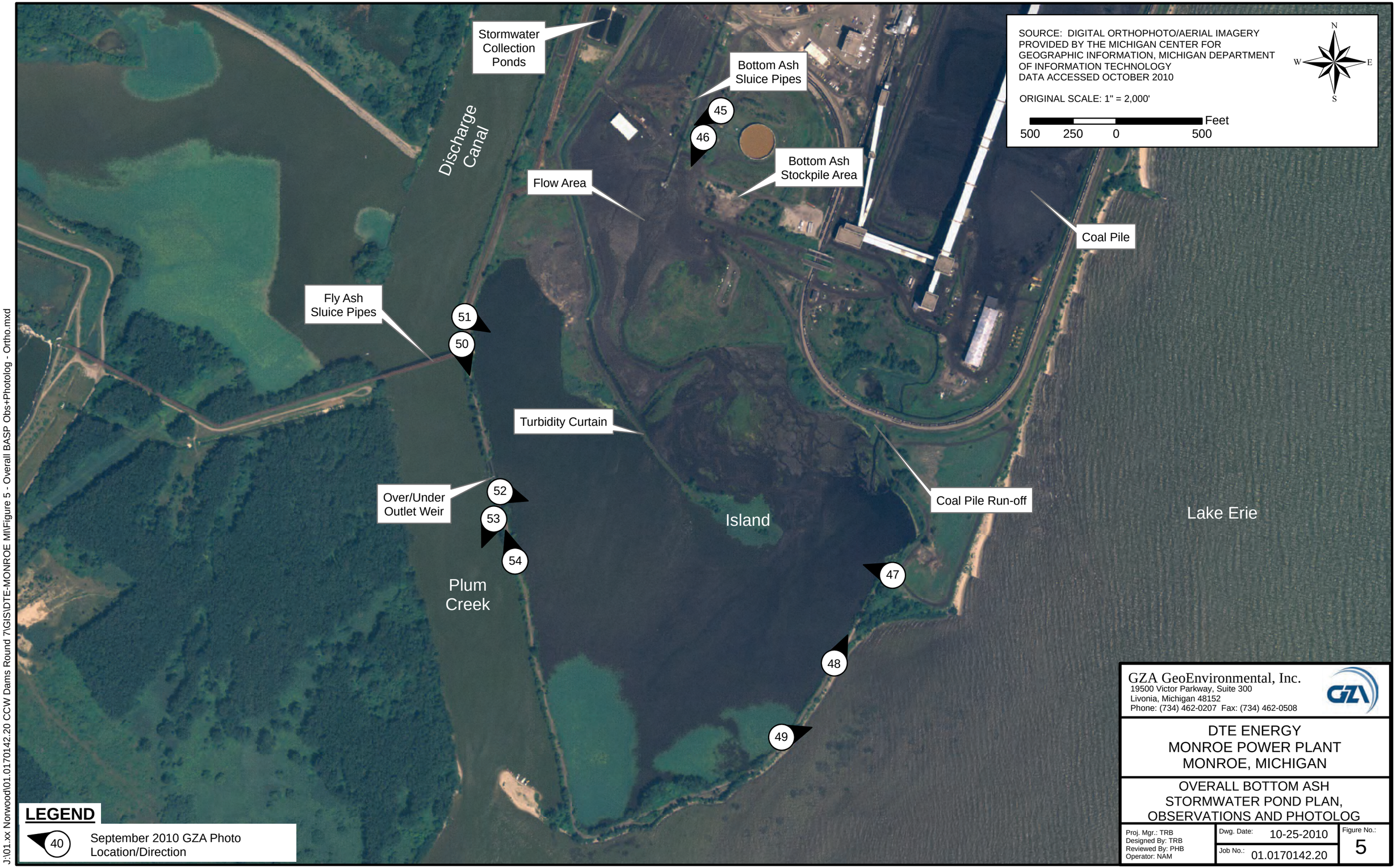
Proj. Mgr.: TRB
Designed By: TRB
Reviewed By: PHB
Operator: NAM

Dwg. Date: 10-25-2010

Job No.: 01.0170142.20

Figure No.: 4

J:\01.xx Norwood\01.0170142.20 CCW Dams Round 7\GIS\DTE-MONROE MI\Figure 4 - Overall FAB Obs+Photolog - Ortho.mxd



J:\01.xx Norwood\01.0170142.20 CCW Dams Round 7\GIS\DTE-MONROE MI\Figure 5 - Overall BASP Obs+Photolog - Ortho.mxd

GZA GeoEnvironmental, Inc.
19500 Victor Parkway, Suite 300
Livonia, Michigan 48152
Phone: (734) 462-0207 Fax: (734) 462-0508

DTE ENERGY
MONROE POWER PLANT
MONROE, MICHIGAN

OVERALL BOTTOM ASH STORMWATER POND PLAN, OBSERVATIONS AND PHOTOLOG

Proj. Mgr.: TRB
Designed By: TRB
Reviewed By: PHB
Operator: NAM

Dwg. Date: 10-25-2010

Job No.: 01.0170142.20

Figure No.: 5

Figure 6
Bench Mark and Surface Monument Locations

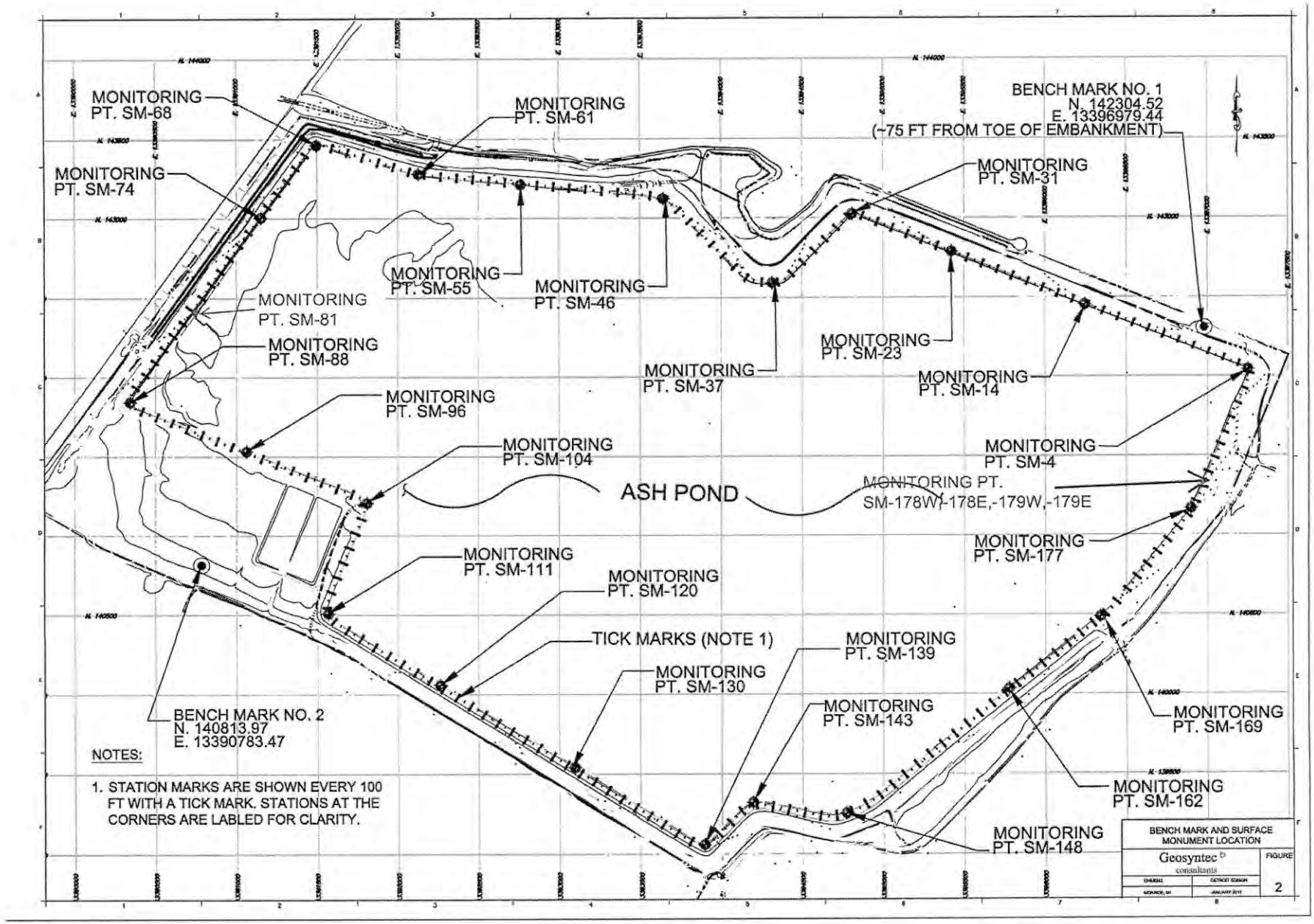
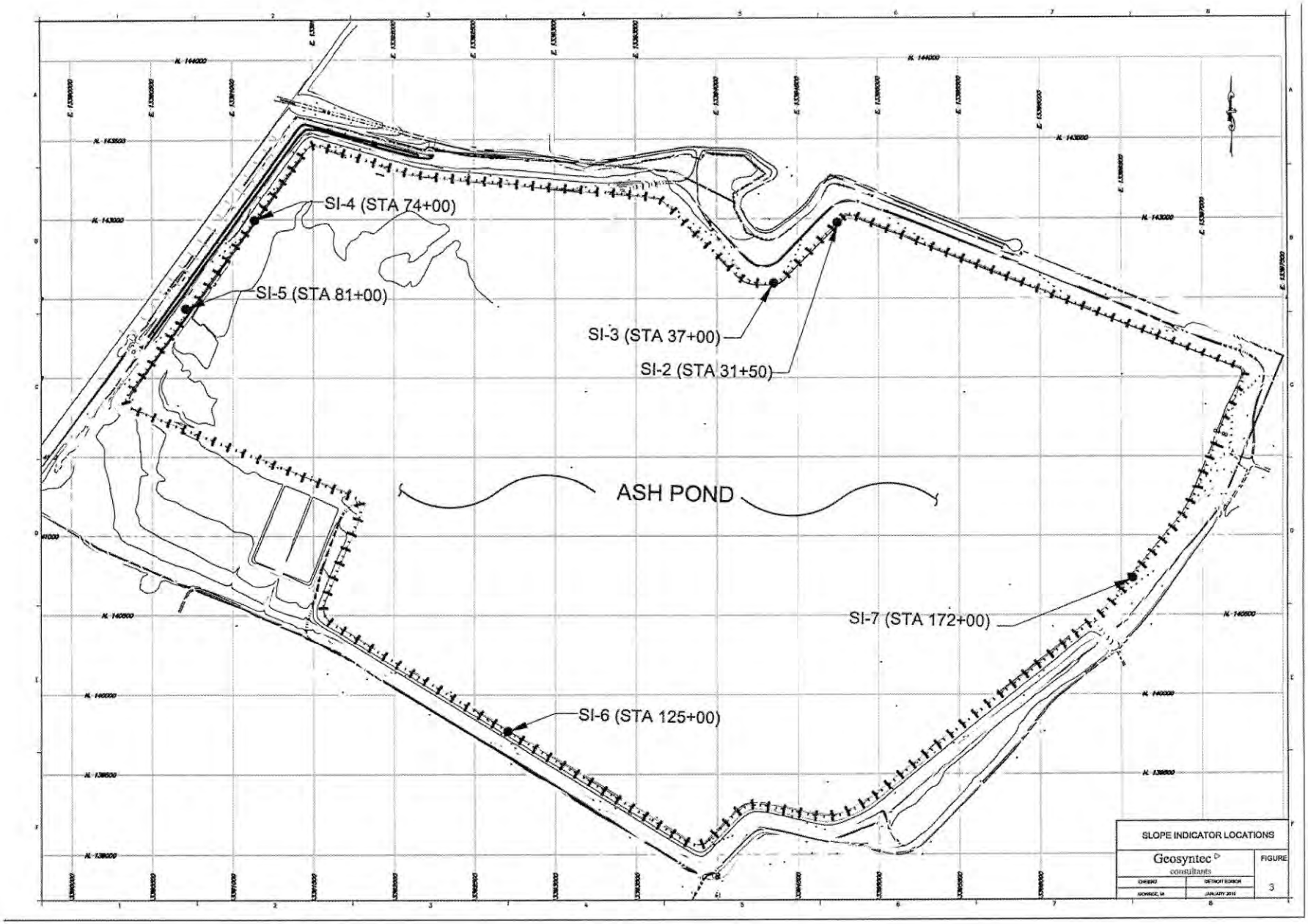

MONITORING PT. SM-68
MONITORING PT. SM-61
BENCH MARK NO. 1
N. 142304.52
E. 13396979.44
(~75 FT FROM TOE OF EMBANKMENT)
MONITORING PT. SM-74
MONITORING PT. SM-31
MONITORING PT. SM-55
MONITORING PT. SM-46
MONITORING PT. SM-81
MONITORING PT. SM-88
MONITORING PT. SM-37
MONITORING PT. SM-23
MONITORING PT. SM-14
MONITORING PT. SM-96
MONITORING PT. SM-104
MONITORING PT. SM-4
ASH POND
MONITORING PT. SM-178W,-178E,-179W,-179E
MONITORING PT. SM-177
MONITORING PT. SM-111
MONITORING PT. SM-120
TICK MARKS (NOTE 1)
MONITORING PT. SM-139
MONITORING PT. SM-130
MONITORING PT. SM-143
MONITORING PT. SM-169
BENCH MARK NO. 2
N. 140813.97
E. 13390783.47
MONITORING PT. SM-162
MONITORING PT. SM-148
NOTES:
1. STATION MARKS ARE SHOWN EVERY 100 FT WITH A TICK MARK. STATIONS AT THE CORNERS ARE LABLED FOR CLARITY.
BENCH MARK AND SURFACE MONUMENT LOCATION
Geosyntec consultants
FIGURE
2

Figure 7
Slope Indicator Locations


SI-4 (STA 74+00)
SI-5 (STA 81+00)
SI-3 (STA 37+00)
SI-2 (STA 31+50)
ASH POND
SI-7 (STA 172+00)
SI-6 (STA 125+00)
SLOPE INDICATOR LOCATIONS
Geosyntec consultants
FIGURE
3

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 or the time and budgetary constraints imposed by the United States Environmental Protection Agency (EPA).

2. In preparing this report, GZA GeoEnvironmental, Inc. (GZA) has relied on certain information provided by Detroit Edison (DTE) (and their affiliates) as well as Federal, state, and local officials and other parties referenced therein. GZA has also relied on certain information contained on the State of Michigan's website as well as Federal, state, and local officials and 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 Fly Ash Basin and Bottom Ash Stormwater Pond 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 Fly Ash Basin and Bottom Ash Stormwater Pond 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 or embankment 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 or embankment will continue to represent the condition of the dam or embankment 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 history, hydrology, hydraulics, and embankment stability for the Fly Ash Basin and Bottom Ash Stormwater Pond are based on a limited review of available design documentation for the Monroe Power Plant. 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 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:	Monroe Power Plant	Date:	September 23 & 24, 2010
Unit Name:	Fly Ash Basin	Operator's Name:	Detroit Edison Company
Unit I.D.:	MI DNRE Facility ID #397800	Hazard Potential Classification:	High (Significant) Low
Inspector's Name:	Walter Kosinski, P.E. & Thomas Boom, 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?	Weekly		18. Sloughing or bulging on slopes?		✔
2. Pool elevation (operator records)?	606.2 ft +/-		19. Major erosion or slope deterioration?		✔
3. Decant inlet elevation (operator records)?	605.5 ft +/-		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?	N/A	
5. Lowest dam crest elevation (operator records)?	613 ft		Is water exiting outlet, but not entering inlet?	N/A	
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

1) Plant environmental personnel perform weekly inspections. Plant operations staff perform daily inspections primarily focused on discharge for NPDES reporting. Outside consultant (Geosyntec) currently performing quarterly inspections with reports submitted to state agency (MI DNRE).
2) Elevations controlled at discharge weir with use of stop logs. Summer elevation typically set at 606'-2" and winter elevation set at 609'-8". Elevations referenced to plant datum which is currently under review.
5) Lowest dam crest elevation at 613 ft plant datum; new datum reference will be 614 ft. Plant indicated minimum 3 ft freeboard at all times; MI DNRE Part 115 rules specify minimum of 2 ft.
6) Instrumentation currently read quarterly by Geosyntec and included in quarterly report to MI DNRE.
7) Portions of impoundment undergoing rehab construction due to historical shallow sloughing issue. Construction planned through 2012.
8) Original construction plans indicated foundation was stripped prior to embankment construction. Embankment is constructed of clay and keyed into clay foundation.
9) Removal of trees included in rehab construction plan. Tree diameters on the order of <1 to 4 inches max.
12) Decant pipe grating generally clear; some minor amounts of vegetation cleared by plant personnel during daily inspections.
16) Vegetative growth along discharge channel but does not appear to impede flow.
18) Could not view all slope areas. Previous inspection report noted shallow sloughing in some areas currently being repaired or scheduled for repair.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # MI0001848 INSPECTOR Walter Kosinski, P.E. & Thomas Boom, P.E.

Date September 23 & 24, 2010

Impoundment Name Monroe Power Plant Fly Ash Basin

Impoundment Company Detroit Edison Company

EPA Region 5

State Agency (Field Office) Addresss MI Dept of Nat'l Resources & Environment
301 E. Louis Glick Hwy - Jackson, MI 49201

Name of Impoundment Fly Ash Basin

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

New _____ Update X

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

IMPOUNDMENT FUNCTION: Containment of coal combustion waste (fly ash)

Nearest Downstream Town : Name N/A; Downstream discharge to Lake Erie

Distance from the impoundment N/A

Impoundment Location:
Longitude 41 Degrees 53 Minutes 03 Seconds
Latitude 83 Degrees 22 Minutes 31 Seconds
State MI County Monroe

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

If So Which State Agency? MI Dept of Natural Resources & Environment

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.

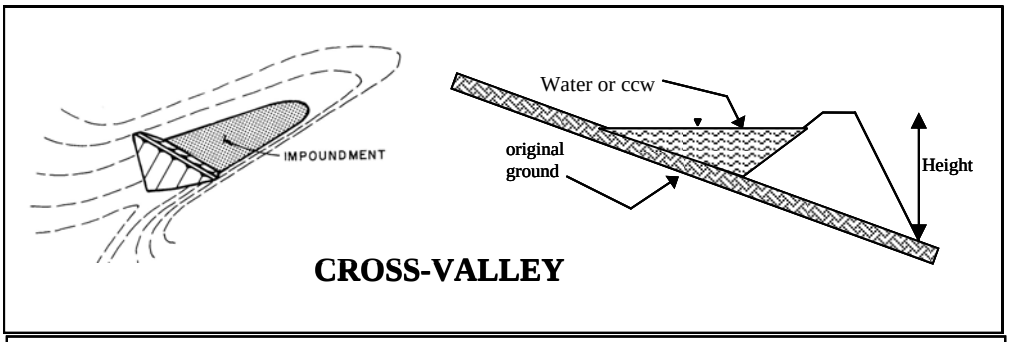
__X__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

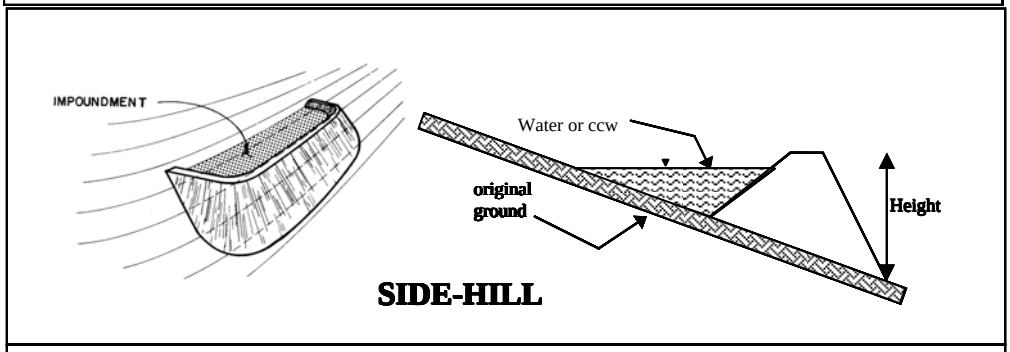
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

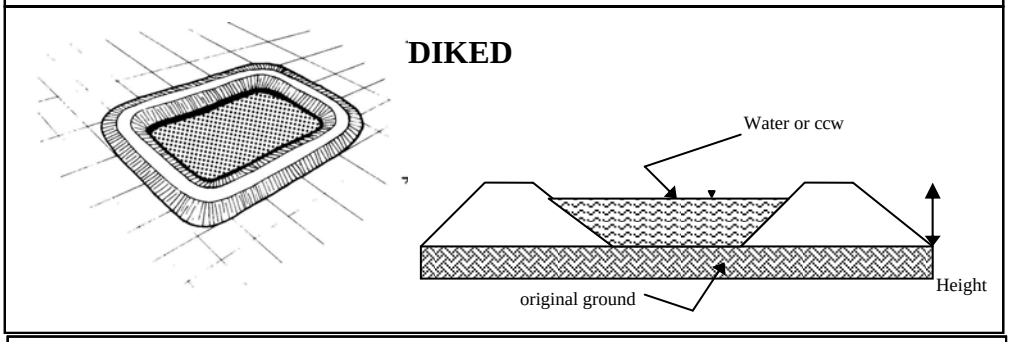
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

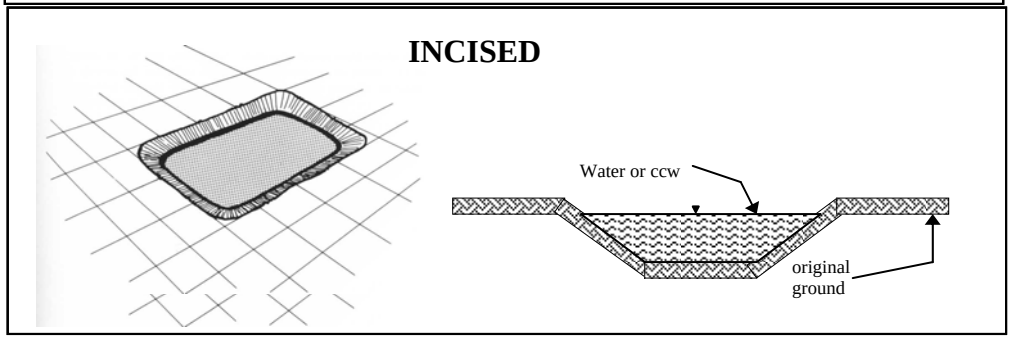
Several residences are located adjacent northern impoundment slope; western impoundment slope abuts Interstate I-75 and traffic could be disrupted. These areas are no longer receiving ash fill and failure potential appears to be low. Entire impoundment has undergone slope stability analysis and several portions of impoundment undergoing remedial construction to flatten downstream slopes and removal of heavy vegetation and small trees. Construction is phased during the next three to four years.
Potential failure could result in economic loss, environmental damage, and disruption of lifeline facilities however, mostly on site. Loss of human life not anticipated.

CONFIGURATION:









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

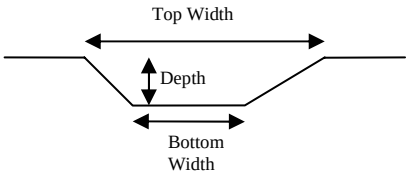
Embankment Height 35 to 40 feet
Embankment Material Clay
Pool Area 410.576 acres
Liner Natural clay formation under impoundment
Current Freeboard 5 to 6 feet*
Liner Permeability 1×10^{-8} cm/sec remolded permeability

* Dependent upon stop log configuration.

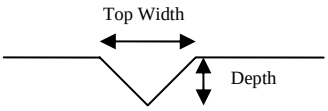
TYPE OF OUTLET (Mark all that apply)

__N/A__ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

TRAPEZOIDAL

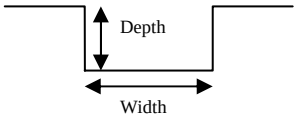


TRIANGULAR

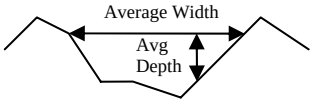


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

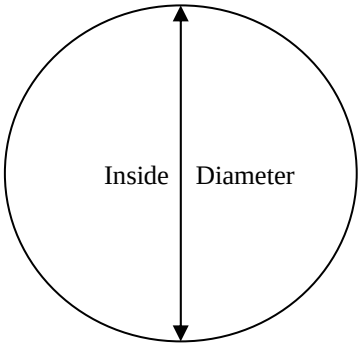


IRREGULAR



__X__ **Outlet** (3 total)

__3 ft__ inside diameter (each)



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 __Detroit Edison Civil Engineering Group__

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 ___X____

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:	Monroe Power Plant	Date:	September 23 & 24, 2010
Unit Name:	Bottom Ash Stormwater Pond	Operator's Name:	Detroit Edison Company
Unit I.D.:	MI DNRE Facility ID #397800	Hazard Potential Classification:	**High** **Significant** **Low**
Inspector's Name:	Walter Kosinski, P.E. & Thomas Boom, 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?	Daily		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	575 ft +/-		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	N/A		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?	N/A	
5. Lowest dam crest elevation (operator records)?	578 ft +/-		Is water exiting outlet, but not entering inlet?	N/A	
6. If instrumentation is present, are readings recorded (operator records)?		✓	Is water exiting outlet flowing clear?	N/A	
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?	N/A		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
1)	Plant environmental personnel perform weekly inspections. Plant operations staff perform daily inspections primarily focused on discharge for NPDES reporting. The Bottom Ash Stormwater Pond is exempt from regulation under Michigan's Part 315 Rules.
9)	While there were numerous large trees growing on the upstream and downstream slopes, the height to width ratio of this embankment is small and this vegetation helps protect the impoundment from erosion damage caused by wind and wave action from Lake Erie.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # MI0001848 INSPECTOR Walter Kosinski, P.E. & Thomas Boom, P.E.

Date September 23 & 24, 2010

Impoundment Name Monroe Power Plant Bottom Ash Stormwater Pond

Impoundment Company Detroit Edison Company

EPA Region 5

State Agency (Field Office) Addresss MI Dept of Nat'l Resources & Environment
301 E. Louis Glick Hwy - Jackson, MI 49201

Name of Impoundment Bottom Ash Stormwater Pond

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

New _____ Update X

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

IMPOUNDMENT FUNCTION: Primarily stormwater detention, but also detention of bottom ash sluice water

Nearest Downstream Town : Name N/A; Downstream discharge to Lake Erie

Distance from the impoundment N/A

Impoundment Location:
Longitude 41 Degrees 52 Minutes 50 Seconds
Latitude 83 Degrees 20 Minutes 58 Seconds
State MI County Monroe

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

If So Which State Agency?_____

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.

__X__ **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.

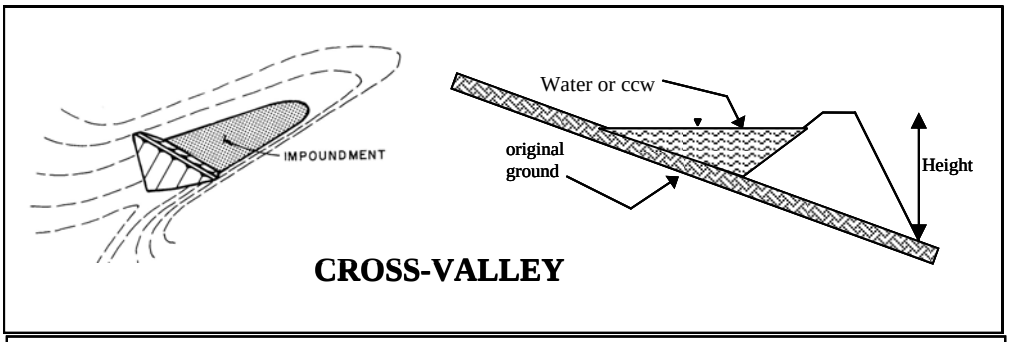
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

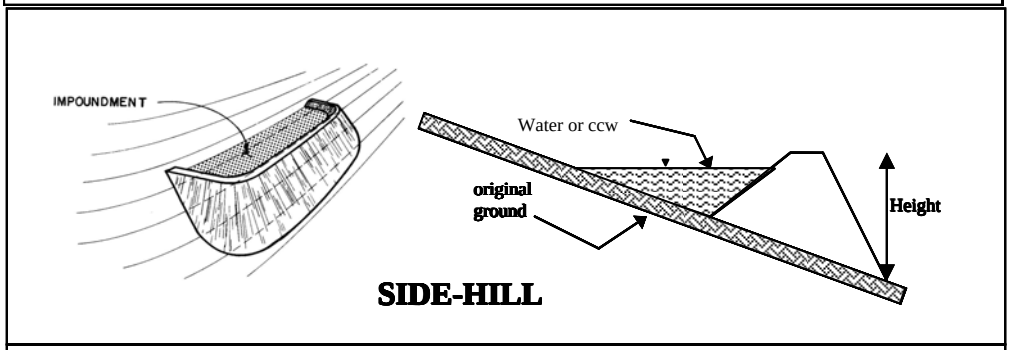
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

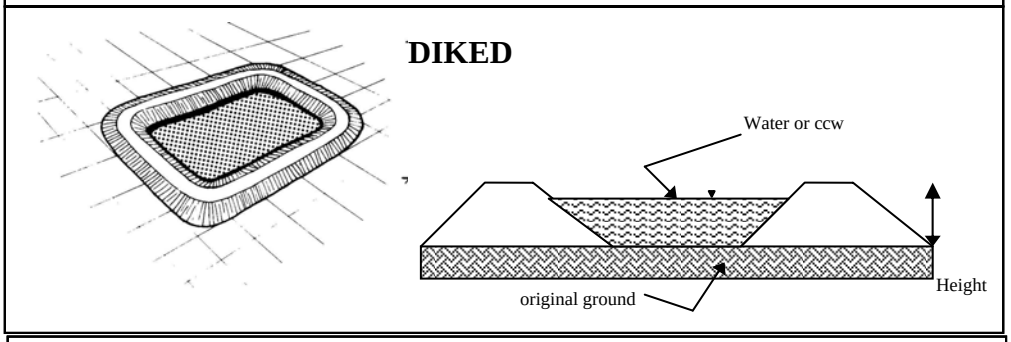
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

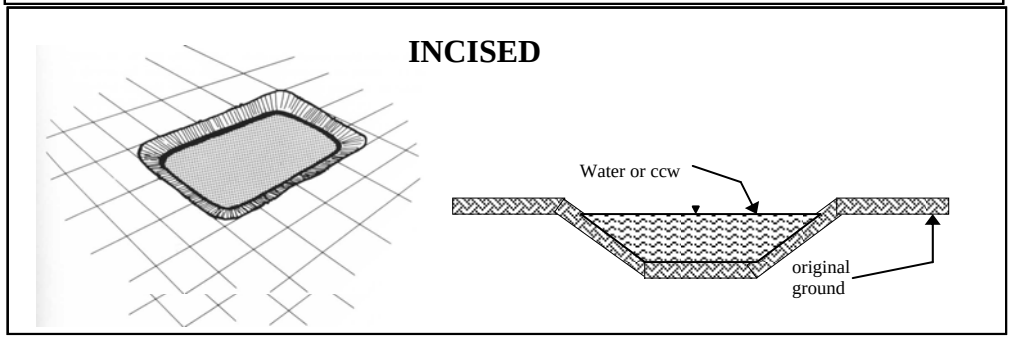
It is GZA's opinion that the Bottom Ash Stormwater Pond should not be assigned a hazard rating as it does not meet the definition of a dam because its barriers are less than 6 feet in height. Additionally, bottom ash is stockpiled approximately 1,000 feet from the closest impoundment structure. The bottom ash is classified as inert and is stockpiled on-Site for either re-use on Site or for potential off-Site sales. As such, failure of the impoundment structure would have no effect on the bottom ash stockpile area. However, if the Bottom Ash Stormwater Pond met the requirements to be classified as a dam, it is GZA's opinion that the Bottom Ash Stormwater Pond would be rated as having a Low Hazard Potential because potential failure would likely result in no loss of human life, and minimal economic loss and enviromental damage.

CONFIGURATION:









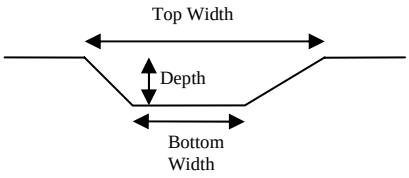
_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
__X__ Combination Incised/Diked

Embankment Height Up to 4 feet
Embankment Material Rock fill and earth spoils
Pool Area 100 +/- acres
Liner Natural ground
Current Freeboard 3 +/- feet
Liner Permeability Unknown

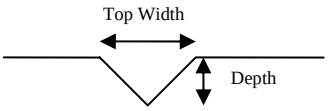
TYPE OF OUTLET (Mark all that apply)

__N/A__ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

TRAPEZOIDAL

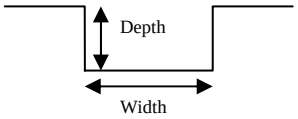


TRIANGULAR

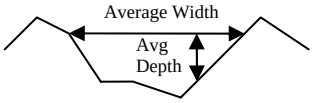


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

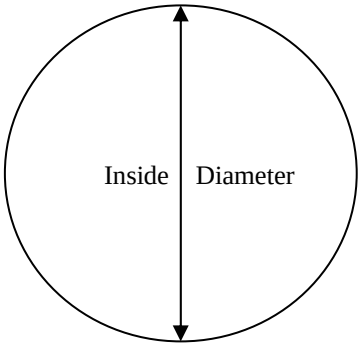


IRREGULAR



__N/A__ **Outlet**

_____ inside diameter



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

Is water flowing through the outlet? YES __X__ NO _____

_____ **No Outlet**

__X__ **Other Type of Outlet** (specify) Over/under weir

The Impoundment was Designed By Detroit Edison Civil Engineering Group

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 ___X____

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

If so Please Describe : _____

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM:	Monroe Power Plant Fly Ash Basin	STATE ID #:	MI DNRE Facilty ID# 397800
REGISTERED:	☐ YES ☑ NO	NID ID #:	Not applicable
STATE SIZE CLASSIFICATION:	None given	STATE HAZARD CLASSIFICATION:	None given
		CHANGE IN HAZARD CLASSIFICATION REQUESTED?:	

DAM LOCATION INFORMATION

CITY/TOWN:	Essexville, Michigan	COUNTY:	Monroe
DAM LOCATION: (street address if known)	3500 East Front Street	ALTERNATE DAM NAME:	Not applicable
USGS QUAD.:	Monroe, Michigan	LAT.: 41º 53' 03" North	LONG.: 83º 22' 31" West
DRAINAGE BASIN:	The Fly Ash Basin	RIVER:	River Raisin
IMPOUNDMENT NAME(S):	Fly Ash Basin		

GENERAL DAM INFORMATION

TYPE OF DAM:	Embankment/Impoundment	OVERALL LENGTH (FT):	18,200
PURPOSE OF DAM:	Containment of coal combustion waste (fly ash)	NORMAL POOL STORAGE (ACRE-FT):	17,270
YEAR BUILT:	1970's	MAXIMUM POOL STORAGE (ACRE-FT):	18,500
STRUCTURAL HEIGHT (FT):	50.6	EL. NORMAL POOL (FT):	607.5 (NGVD29)
HYDRAULIC HEIGHT (FT):	47.6	EL. MAXIMUM POOL (FT):	611.1 (NGVD29)

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

INSPECTION SUMMARY

DATE OF INSPECTION: September 23 and 24, 2010 DATE OF PREVIOUS INSPECTION: June 8-11 2010 by DTE

TEMPERATURE/WEATHER: 80s F, Partly cloudy. ARMY CORPS PHASE I: ☐ YES ☑ NO If YES, date

CONSULTANT: GZA GeoEnvironmental Previous DNRE Inspection: ☑ YES ☐ NO If YES, date 8/25/2010

BENCHMARK/DATUM: National Geodetic Vertical Datum of 1929 currently, but IGLD 1955 and Plant datum jave been used historically.

OVERALL PHYSICAL CONDITION OF DAM: Satisfactory DATE OF LAST REHABILITATION: Currently ongoing

SPILLWAY CAPACITY: No spillway

EL. POOL DURING INSP.: 607.5 ft NGVD29 EL. TAILWATER DURING INSP.: +/- 578 ft NGVD29

PERSONS PRESENT AT INSPECTION

NAME	TITLE/POSITION	REPRESENTING
Thomas Boom, P.E.	Project Manager	GZA GeoEnvironmental
Walter Kosinski, P.E.	Principal	GZA GeoEnvironmental
Dennis Leonard, P.E.	Principal Engineer	DTE Energy
William Neal, P.E.	Technological Specialist	DTE Energy
Paul Tracy	Plant Manager	DTE Energy
Claire Jennings, P.E.	Environmental Compliance S	DTE Energy
John Seymour, P.E.	Associate	Geosyntec Consultants

NAME OF INSPECTING ENGINEER: SIGNATURE:

NAME OF DAM: Monroe Power Plant Fly Ash Basin

STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010

NID ID #: Not applicable

OWNER:		CARETAKER:	
ORGANIZATION	DTE Energy	ORGANIZATION	DTE Energy
NAME/TITLE	Dennis Leonard, Principal Engineer	NAME/TITLE	Paul Tracy, Plant Manager
STREET	2000 Second Avenue, 655 GO	STREET	3500 East Front Street
TOWN, STATE, ZIP	Detroit, Michigan 48226	TOWN, STATE, ZIP	Monroe, MI 48161
PHONE	313-235-8714	PHONE	734-384-6812
EMAIL	leonardd@dteenergy.com	EMAIL	tracyp@dteenergy.com
OWNER TYPE	Private		

PRIMARY SPILLWAY TYPE: None

SPILLWAY LENGTH (FT): N/A

SPILLWAY CAPACITY (CFS): N/A

AUXILIARY SPILLWAY TYPE: None

AUX. SPILLWAY CAPACITY (CFS): N/A

NUMBER OF OUTLETS: 3

OUTLET(S) CAPACITY (CFS): Unknown

TYPE OF OUTLETS: Stilling wells

TOTAL DISCHARGE CAPACITY (CFS): Unknown

DRAINAGE AREA (SQ MI): 0.64

SPILLWAY DESIGN FLOOD (PERIOD/CFS): N/A

HAS DAM BEEN BREACHED OR OVERTOPPED ☐ YES ☑ NO IF YES, PROVIDE DATE(S)

FISH LADDER (LIST TYPE IF PRESENT): None

DOES CREST SUPPORT PUBLIC ROAD? ☐ YES ☑ NO IF YES, ROAD NAME:

PUBLIC BRIDGE WITHIN 50' OF DAM? ☐ YES ☑ NO IF YES, ROAD/BRIDGE NAME:

MHD BRIDGE NO. (IF APPLICABLE)

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Gravel	X		
	2. SURFACE CRACKING	None observed	X		
	3. SINKHOLES, ANIMAL BURROWS	None observed	X		
	4. VERTICAL ALIGNMENT (DEPRESSIONS)	Appears level, no depressions observed	X		
	5. HORIZONTAL ALIGNMENT	Alignment appears true	X		
	6. RUTS AND/OR PUDDLES	Small manmade holes observed at various locations			X
	7. VEGETATION (PRESENCE/CONDITION)	Minimal vegetation observed on crest	X		
	8. ABUTMENT CONTACT	N/A			

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	No wet areas observed but four temporary piezometers were installed previously 1)		X	
	2. SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	None observed	X		
	5. SINKHOLE/ANIMAL BURROWS	Small animal burrows noted near Station 132+00 on south embankment slope.			X
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. VEGETATION (PRESENCE/CONDITION)	Significant vegetation from Station 0+00 to 62+00 and 148+00 to 182+00			X

ADDITIONAL COMMENTS: 1) in 2010 to monitor wet areas along the toe of the slope on the north embankment.

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

EMBANKMENT (U/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	N/A			
	2. SLOPE PROTECTION TYPE AND COND.				
	3. SINKHOLE/ANIMAL BURROWS				
	4. EMB.-ABUTMENT CONTACT				
	5. EROSION				
	6. UNUSUAL MOVEMENT				
	7. VEGETATION (PRESENCE/CONDITION)				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	Four temporary piezometers were installed to monitor water observed 1)		X	
	2. OBSERVATION WELLS	One observation well near the toe of the slope of the north embankment. 2)		X	
	3. STAFF GAGE AND RECORDER	One staff gage near the discharge outlet by Plum Creek. No recorder.		X	
	4. WEIRS	Two weirs - one at embankment discharge and one near Plum Creek discharge	X		
	5. INCLINOMETERS	Seven slope inclinometers along the top of the embankment. 3)		X	
	6. SURVEY MONUMENTS	Twenty three survey monuments along the top of the embankment. 3)		X	
	7. DRAINS	None	X		
	8. FREQUENCY OF READINGS	Occasional readings of flow rate for NPDES permit.		X	
	9. LOCATION OF READINGS	Discharge outlet near Plum Creek		X	

ADDITIONAL COMMENTS: 1) near the toe of the slope of the north embankment.

2) Groundwater is sampled on a semiannual basis.

3) Inclinometers and Survey Monuments are currently surveyed quarterly. Quarterly surveying is planned through the end of the embankment mitigation project in 2013, whereby annual surveying will commence.

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

DOWNSTREAM MASONRY WALLS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S WALLS	1. WALL TYPE				
	2. WALL ALIGNMENT				
	3. WALL CONDITION				
	4. HEIGHT: TOP OF WALL TO MUDLINE	min:			
	5. SEEPAGE OR LEAKAGE				
	6. ABUTMENT CONTACT				
	7. EROSION/SINKHOLES BEHIND WALL				
	8. ANIMAL BURROWS				
	9. UNUSUAL MOVEMENT				
	10. WET AREAS AT TOE OF WALL				

N/A

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

UPSTREAM MASONRY WALLS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S WALLS	1. WALL TYPE				
	2. WALL ALIGNMENT				
	3. WALL CONDITION				
	4. HEIGHT: TOP OF WALL TO MUDLINE	min:			
	5. ABUTMENT CONTACT				
	6. EROSION/SINKHOLES BEHIND WALL				
	7. ANIMAL BURROWS				
	8. UNUSUAL MOVEMENT				

N/A

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	N/A - no abutments.	X		
	2. FOUNDATION SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. WEIRS	One weir near the wastewater outlet at Plum Creek.		X	
	5. DRAINAGE SYSTEM	N/A	X		
	6. INSTRUMENTATION	One staff gage near the outlet weir at Plum Creek.		X	
	7. VEGETATION	Heavy vegetation in the discharge canal.		X	
	8. ACCESSIBILITY	Limited due to heavy vegetation.		X	
	9. DOWNSTREAM HAZARD DESCRIPTION	The Fly Ash Basin abuts interstate I-75 to the west and residential houses to the north. Plum Creek and Lake Erie are located downstream of the discharge canal.		X	
	10. DATE OF LAST EAP UPDATE	No written EAP.			X

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

MISCELLANEOUS

AREA INSPECTED	CONDITION	OBSERVATIONS
MISC.	1. RESERVOIR DEPTH (AVG)	Varies based on depth of coal ash. Maximum depth is approximately 47 feet.
	2. RESERVOIR SHORELINE	The shoreline is the crest of the embankment.
	3. RESERVOIR SLOPES	Average outer side slopes range from 1.5H:1V to 2.3H:1V. Currently undergoing reconstruction 1)
	4. ACCESS ROADS	One access road to the embankment from Dunbar Road
	5. SECURITY DEVICES	Locked gate at access road, facility is surrounded by chain link fence topped with barbed wire.
	6. VANDALISM OR TRESPASS	☐ YES ☑ NO WHAT:
	7. AVAILABILITY OF PLANS	☑ YES ☐ NO DATE: Various as built figures available.
	8. AVAILABILITY OF DESIGN CALCS	☐ YES ☑ NO DATE:
	9. AVAILABILITY OF EAP/LAST UPDATE	☐ YES ☑ NO DATE:
	10. AVAILABILITY OF O&M MANUAL	☐ YES ☑ NO DATE:
	11. CARETAKER/OWNER AVAILABLE	☑ YES ☐ NO DATE: 9/23/10 - 9/24/10
	12. CONFINED SPACE ENTRY REQUIRED	☐ YES ☑ NO PURPOSE:

ADDITIONAL COMMENTS: 1) along the west and northern embankment.

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	N/A			
	WEIR TYPE				
	SPILLWAY CONDITION				
	TRAINING WALLS				
	SPILLWAY CONTROLS AND CONDITION				
	UNUSUAL MOVEMENT				
	APPROACH AREA				
	DISCHARGE AREA				
	DEBRIS				
	WATER LEVEL AT TIME OF INSPECTION				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

AUXILIARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	N/A			
	WEIR TYPE				
	SPILLWAY CONDITION				
	TRAINING WALLS				
	SPILLWAY CONTROLS AND CONDITION				
	UNUSUAL MOVEMENT				
	APPROACH AREA				
	DISCHARGE AREA				
	DEBRIS				
	WATER LEVEL AT TIME OF INSPECTION				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	N/A			
	INTAKE STRUCTURE				
	TRASHRACK				
	PRIMARY CLOSURE				
	SECONDARY CLOSURE				
	CONDUIT				
	OUTLET STRUCTURE/HEADWALL				
	EROSION ALONG TOE OF DAM				
	SEEPAGE/LEAKAGE				
	DEBRIS/BLOCKAGE				
	UNUSUAL MOVEMENT				
	DOWNSTREAM AREA				
	MISCELLANEOUS				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin

STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010

NID ID #: Not applicable

CONCRETE/MASONRY DAMS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
GENERAL	TYPE	N/A			
	AVAILABILITY OF PLANS				
	AVAILABILITY OF DESIGN CALCS				
	PIEZOMETERS				
	OBSERVATION WELLS				
	INCLINOMETERS				
	SEEPAGE GALLERY				
	UNUSUAL MOVEMENT				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin

STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010

NID ID #: Not applicable

CONCRETE/MASONRY DAMS (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	HORIZONTAL ALIGNMENT				
	VERTICAL ALIGNMENT				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin

STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010

NID ID #: Not applicable

CONCRETE/MASONRY DAMS (DOWNSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S FACE	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACT				
	LEAKAGE				

ADDITIONAL COMMENTS:

NAME OF DAM: Monroe Power Plant Fly Ash Basin STATE ID #: MI DNRE Facilty ID# 397800

INSPECTION DATE: September 23 and 24, 2010 NID ID #: Not applicable

CONCRETE/MASONRY DAMS (UPSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S FACE	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACTS				

ADDITIONAL COMMENTS:

Appendix D

Comparison of June 2010 Surface Monument and
Slope Indicator Readings to Baseline Readings

Job No.: 201003037

Date: March 24, 2010
Revision "A": June 24, 2010 - 2nd Quarter Data

MONROE POWER PLANT
ASH BASIN MONITORING
PROGRAM
2nd Quarter - 2010

Prepared By:
DETROIT EDISON'S
SURVEYING SERVICES
560 SERVICE BLDG.

				2010 ASH BASIN MONITORING											
INITIAL BASE READINGS (DEC 2009)				1RST QUARTER			2ND QUARTER			3RD QUARTER			4TH QUARTER		
POINT NAME	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
BENCH MARK 1	142304.52	13396979.44	589.44	142304.52	13396979.44	589.44	142304.52	13396979.44	589.44						
BENCH MARK 2	140813.97	13390783.47	589.55	140813.96	13390783.47	589.56	140813.96	13390783.47	589.56						
SM-4	142042.18	13397251.38	614.71	142042.19	13397251.37	614.70	142042.18	13397251.37	614.70						
SM-14	142453.61	13396243.44	614.13	142453.61	13396243.43	614.15	142453.60	13396243.44	614.15						
SM-23	142785.66	13395419.55	614.51	142785.66	13395419.54	614.51	142785.67	13395419.55	614.51						
SM-31	143027.38	13394810.20	614.23	143027.40	13394810.19	614.22	143027.38	13394810.21	614.22						
SM-37	142591.28	13394313.84	614.55	142591.28	13394313.84	614.57	142591.29	13394313.83	614.57						
SM-46	143123.48	13393643.29	614.52	143123.48	13393643.28	614.54	143123.47	13393643.29	614.54						
SM-55	143212.56	13392762.22	614.50	143212.56	13392762.21	614.51	143212.57	13392762.20	614.51						
SM-61	143281.55	13392128.70	614.15	143281.54	13392128.70	614.15	143281.56	13392128.69	614.16						
SM-68	143460.86	13391496.99	615.45	143460.85	13391496.99	615.46	143460.85	13391496.98	615.47						
SM-74	143005.08	13391152.69	613.89	143005.10	13391152.68	613.89	143005.10	13391152.68	613.90						
SM-81	*DESTROYED*	*DESTROYED*	*DESTROYED*	142400.40	13390742.07	614.53	142400.40	13390742.08	614.54						
SM-88	141843.61	13390344.08	614.81	141843.62	13390344.09	614.83	141843.60	13390344.09	614.83						
SM-96	141533.62	13391062.31	614.56	141533.63	13391062.32	614.59	141533.63	13391062.32	614.58						
SM-104	141206.76	13391807.93	614.41	141206.77	13391807.93	614.42	141206.77	13391807.92	614.43						
SM-111	140509.30	13391567.37	614.37	140509.31	13391567.39	614.39	140509.30	13391567.39	614.39						
SM-120	140059.74	13392262.74	614.54	140059.76	13392262.74	614.56	140059.75	13392262.74	614.56						
SM-130	139540.46	13393094.68	614.06	139540.47	13393094.69	614.07	139540.46	13393094.68	614.07						
SM-139	139058.19	13393893.61	613.82	139058.21	13393893.62	613.84	139058.20	13393893.61	613.84						
SM-143	139322.46	13394193.46	613.98	139322.47	13394193.46	613.99	139322.47	13394193.46	613.99						
SM-148	139254.56	13394770.05	613.56	139254.57	13394770.04	613.57	139254.55	13394770.04	613.57						
SM-162	140033.83	13395777.55	613.86	140033.84	13395777.54	613.87	140033.84	13395777.54	613.87						
SM-169	140486.45	13396339.54	614.09	140486.46	13396339.53	614.10	140486.45	13396339.54	614.10						
SM-177	141167.54	13396896.76	613.90	141167.54	13396896.75	613.92	141167.55	13396896.74	613.91						

The Horizontal Datum is to "NAD 83 (2007)" Michigan State Plane-South Zone (International Foot)

The Vertical Datum is to "NGVD 29".

Job No.: 20103037

Date: 7/16/2010
Revision:

MONROE POWER PLANT
ASH BASIN MONITORING
PROGRAM
2nd Quarter - 2010

Prepared By:
DETROIT EDISON'S
SURVEYING SERVICES
560 SERVICE BLDG.

				2011 ASH BASIN MONITORING - DISCHARGE STRUCTURE											
INITIAL BASE READINGS (JUNE 2010)				1RST QUARTER			2ND QUARTER (BASE READINGS)			3RD QUARTER			4TH QUARTER		
POINT NAME	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
SM-178W	141289.79	13396924.72	611.15				141289.79	13396924.72	611.15						
SM-179W	141331.56	13396940.90	611.20				141331.56	13396940.90	611.20						
SM-178E	141250.13	13397062.18	582.24				141250.13	13397062.18	582.24						
SM-179E	141268.64	13397069.39	582.38				141268.64	13397069.39	582.38						

The Horizontal Datum is to "NAD 83 (2007)" Michigan State Plane-South Zone (International Foot).

The Vertical Datum is to "NGVD 29".

SUMMARY OF SURFACE MOVEMENTS RECORDED BY SURFACE MONUMENTS IN JUNE 2010

SM-#	Relative Movement (ft)				
	North	South	East	West	Elevation
4	0.00	0.00	-	0.01	-0.01
14	-	0.01	0.00	0.00	0.02
23	0.01	-	0.00	0.00	0.00
31	0.00	0.00	0.01	-	-0.01
37	0.01	-	-	0.01	0.02
46	-	0.01	0.00	0.00	0.02
55	0.01	-	-	0.02	0.01
61	0.01	-	-	0.01	0.01
68	-	0.01	-	0.01	0.02
74	0.02	-	-	0.01	0.01
81	0.00	0.00	0.01	-	0.01
88	-	0.01	0.01	-	0.02
96	0.01	-	0.01	-	0.02
104	0.01	-	-	0.01	0.02
111	0.00	0.00	0.02	-	0.02
120	0.01	-	0.00	0.00	0.02
130	0.00	0.00	0.00	0.00	0.01
139	0.01	-	0.00	0.00	0.02
143	0.01	-	0.00	0.00	0.01
148	-	0.01	-	0.01	0.01
162	0.01	-	-	0.01	0.01
169	0.00	0.00	0.00	0.00	0.01
177	0.01	-	-	0.02	0.01

Note: Negative sign under "Elevation" column indicates that instrument moved downward relative to baseline reading.

SI #	Incremental Displacement for June, 2010 (in.)		Depth (ft)	Acceptable/Expected Variation in Surveying Accuracy Based on ASTM 2005 (in.)	Acceptable/Expected Variation in Surveying Accuracy Based on Slope Indicator Co. (in.)
	A-Axis	B-Axis			
2	0.01 to 0.05	-0.02 to 0.00	37	±0.11	0.11 to 0.18
4	-0.01 to 0.01	-0.01 to 0.00	49	±0.15	0.14 to 0.24
5	-0.02 to 0 .00	0.00 to 0.03	49	±0.15	0.14 to 0.24
6	-0.04 to 0 .00	-0.02 to 0.00	45	±0.14	0.13 to 0.22
7	0.00 to 0.01	-0.01 to 0.03	45	±0.14	0.13 to 0.22

NOTES:

1) Based on ASTM (2005) 0.3 inches of variation is expected in every 100 ft depth.

2) Based on Slope Indicator Company Inc., 0.01 inches per reading and 0.3 inches per 50 readings are expected.

Appendix E

Photographs

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
1	9/23/10

Direction Photo Taken:
North

Description:
Reconstruction on west embankment from approximately Station 88 + 00 to Station 68+00.

Photo No.	Date:
2	9/23/10

Direction Photo Taken:
West

Description:
Vegetation on embankment near Station 50+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
3	9/23/10

Direction Photo Taken:
West

Description:
Embankment reconstruction from approximately Station 62+00 to Station 68+00.

Photo No.	Date:
4	9/23/10

Direction Photo Taken:
West

Description:
New road construction along the crest near Station 64+00. Note the variation in gravel color to distinguish between the existing and new crest road.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
5	9/23/10

Direction Photo Taken:
South

Description:
Interior of the Fly Ash Basin near Station 50+00.

Photo No.	Date:
6	9/23/10

Direction Photo Taken:
South

Description:
Reconstruction of the embankment near Station 69+00. The construction of a ditch in mid slope is also shown.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
7	9/23/10

Direction Photo Taken:
West

Description:
Survey Monument near Station 81+00.

Photo No.	Date:
8	9/23/10

Direction Photo Taken:
North

Description:
New road construction along the crest near Station 88+00 and the interior of the Fly Ash Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
9	9/23/10

Direction Photo Taken:
East

Description:
Crest, embankment, and toe near Station 92+00.

Photo No.	Date:
10	9/23/10

Direction Photo Taken:
East

Description:
Shallow hole in crest road due to a surveyor attempting to locate surface monument.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
11	9/23/10

Direction Photo Taken:
East

Description:
Coal ash wastewater retained within the Fly Ash Basin.

Photo No.	Date:
12	9/23/10

Direction Photo Taken:
South

Description:
Crest and embankment near Station 104+00. The shallow hole on the right of the photo was caused by a surveyor attempting to locate a surface monument.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
13	9/23/10

Direction Photo Taken:
East

Description:
Crest and embankment near Station 115+00.

Photo No.	Date:
14	9/23/10

Direction Photo Taken:
North

Description:
Slope Indicator 6 near Station 125+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No. 15	Date: 9/23/10

Direction Photo Taken:
West

Description:
Crest and embankment at approximately Station 139+00.

Photo No. 16	Date: 9/23/10

Direction Photo Taken:
Southeast

Description:
Construction of the new pump house at Station 139+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
17	9/23/10

Direction Photo Taken:
North

Description:
Fly ash sluice outlet near Station 143+00.

Photo No.	Date:
18	9/23/10

Direction Photo Taken:
West

Description:
Four sluice pipes that discharge coal ash slurry into the Fly Ash Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
19	9/23/10

Direction Photo Taken:
Southwest

Description:
Embankment reconstruction from approximately Station 140+00 to 145+00.

Photo No.	Date:
20	9/23/10

Direction Photo Taken:
Northeast

Description:
Excess road construction material placed on the embankment near Station 144+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
21	9/23/10

Direction Photo Taken:
East

Description:
Lake Erie near Station 148+00.

Photo No.	Date:
22	9/23/10

Direction Photo Taken:
Southwest

Description:
Heavy vegetation along eastern embankment near Station 170+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
23	9/23/10

Direction Photo Taken:
East

Description:
Trash inlet screens at Station 179+00.

Photo No.	Date:
24	9/23/10

Direction Photo Taken:
South

Description:
Wier outlet structure and overview of impounded water.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
25	9/23/10

Direction Photo Taken:
North

Description:
North and center stop log structures.

Photo No.	Date:
26	9/23/10

Direction Photo Taken:
West

Description:
South stop log structure.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
27	9/23/10

Direction Photo Taken:
East

Description:
Vegetation growing near stilling wells near Station 177+00.

Photo No.	Date:
28	9/23/10

Direction Photo Taken:
North

Description:
Stilling wells outlet into discharge channel.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
29	9/23/10

Direction Photo Taken:
East

Description:
Vegetation downstream of the stilling wells in the discharge channel.

Photo No.	Date:
30	9/23/10

Direction Photo Taken:
East

Description:
Vegetation in the discharge channel.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
31	9/23/10

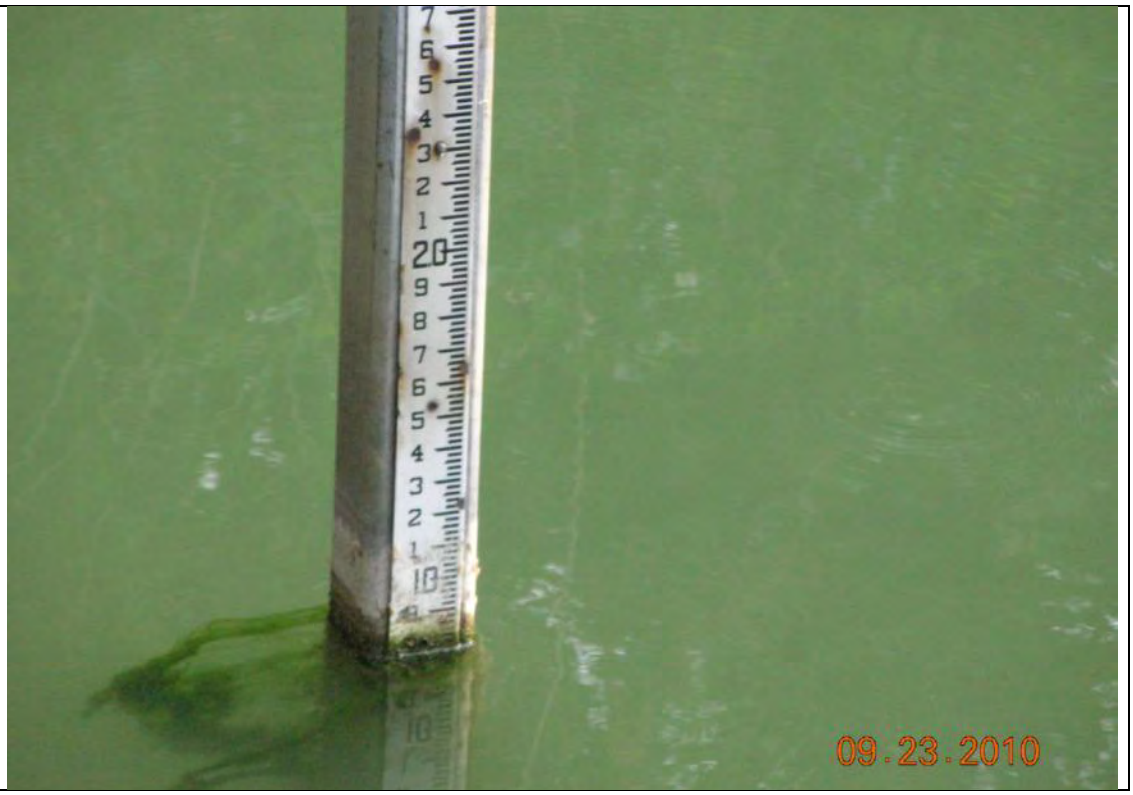
Direction Photo Taken:
South

Description:
Outlet weir near discharge into Plum Creek.

Photo No.	Date:
32	9/23/10

Direction Photo Taken:
Southwest

Description:
Staff gate upstream of outlet weir.



GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
33	9/24/10

Direction Photo Taken:
Southwest

Description:
Vegetation on embankment near Station 37+00.

Photo No.	Date:
34	9/24/10

Direction Photo Taken:
Northwest

Description:
Monitoring well MW-1 near Station 31+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
35	9/24/10

Direction Photo Taken:
Southwest

Description:
Temporary well installed at the toe of the embankment near Station 30+00. Also shows the heavy vegetation along the embankment.

Photo No.	Date:
36	9/24/10

Direction Photo Taken:
North

Description:
Houses along the north side of the Fly Ash Basin.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
37	9/24/10

Direction Photo Taken:
East

Description:
Vegetation along the embankment at approximately Station 24+00.

Photo No.	Date:
38	9/24/10

Direction Photo Taken:
South

Description:
Temporary well at the toe of the embankment near Station 21+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
39	9/24/10

Direction Photo Taken:
North

Description:
Unidentified pipe near Station 16+00.

Photo No.	Date:
40	9/24/10

Direction Photo Taken:
Southwest

Description:
Vegetation along the embankment near Station 1+00. The bridge depicted supports the fly ash sluice transfer pipes.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
41	9/24/10

Direction Photo Taken:
West

Description:
Crest of the embankment near Station 6+00 and the fly ash sluice pipe support system.

Photo No.	Date:
42	9/24/10

Direction Photo Taken:
Northeast

Description:
View of the vegetation on the embankment near Station 44+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Fly Ash Basin Monroe, MI	Project No. 01.0170142.20

Photo No. 43 | **Date:** 9/23/10

Direction Photo Taken:
North

Description:
Small animal burrow at the toe of the slope near Station 132+00.

Photo No. 44 | **Date:** 9/23/10

Direction Photo Taken:
West

Description:
Standing water in ditch at toe of slope near Station 139+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Bottom Ash Stormwater Pond Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
45	9/23/10

Direction Photo Taken:
Southwest

Description:
Bottom ash sluice outfall area.

Photo No.	Date:
46	9/23/10

Direction Photo Taken:
South

Description:
Bottom ash sluice outfall area. Bottom ash is bulldozed into piles at this location prior to off site transport.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Bottom Ash Stormwater Pond Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
47	9/24/10

Direction Photo Taken:
West

Description:
Overview of the Bottom Ash Stormwater Pond. The island shown on Figure 5 is in the center of the picture.

Photo No.	Date:
48	9/24/10

Direction Photo Taken:
North

Description:
Road constructed on embankment.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	**Site Location:** Monroe Power Plant Bottom Ash Stormwater Pond Monroe, MI	**Project No.** 01.0170142.20

Photo No.	Date:
49	9/24/10

Direction Photo Taken:
East

Description:
Armor placed on the Lake Erie shoreline side of the embankment.

Photo No.	Date:
50	9/24/10

Direction Photo Taken:
Southeast

Description:
The embankment separating the Bottom Ash Stormwater Pond from Plum Creek. Plum Creek and Lake Erie are on the right side of the picture.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Bottom Ash Stormwater Pond Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
51	9/24/10

Direction Photo Taken:
East

Description:
Overview of the Bottom Ash Stormwater Pond.

Photo No.	Date:
52	9/23/10

Direction Photo Taken:
Southeast

Description:
Overview of the Bottom Ash Stormwater Pond. The wastewater flows under the sheet piling shown in the picture.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Monroe Power Plant Bottom Ash Stormwater Pond Monroe, MI	Project No. 01.0170142.20

Photo No.	Date:
53	9/23/10

Direction Photo Taken:
Southeast

Description:
Outfall of the Bottom Ash Stormwater Basin to Plum Creek.

Photo No.	Date:
54	9/23/10

Direction Photo Taken:
Northwest

Description:
The weir and walkway separating the Bottom Ash Stormwater Basin from Plum Creek. The fly ash sluice pipe support bridge is visible in the background.

Appendix F

GZA Response to Comments Received on Draft Report

EPA Comments Received on Draft Report

Comments on DTE's Monroe Plant

EPA:

Could not find EPA Inspection Checklist for Bottom Ash Stormwater Pond.

State:

Company:

DTE Comments Received on Draft Report

The Detroit Edison Company
Monroe Power Plant, Monroe Michigan

Detroit Edison

A DTE Energy Company

PAUL TRACY
Plant Manager
(734)384-6812

March 8, 2011

Mr. Stephen Hoffman
US Environmental Protection Agency (5304P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: GZA GeoEnvironmental, Inc. Round 7 Dam Assessment – Draft Report
Detroit Edison Monroe Power Plant Fly Ash Basin and Bottom Ash Pond

The Detroit Edison Company (Detroit Edison) appreciates the opportunity to review and provide comments, clarifications and/or corrections to the draft report Round 7 Dam Assessment DTE Energy Monroe Power Plant Fly Ash Basin and Bottom Ash Stormwater Pond.

Detroit Edison understands that the draft report was prepared by GZA GeoEnvironmental, Inc. (GZA) at the request of the U.S. Environmental Protection Agency (EPA) under Contract No. EP10W001313, Order No. EP-CALL-0001 and that the purpose of the draft report was to provide EPA with the details of the 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 Section 104(e).

Detroit Edison also understands that based on GZA's visual inspection, and in accordance with the EPA's criteria, the Fly Ash Basin and the Bottom Ash Stormwater Pond were found to be in **SATISFACTORY** condition, and that these comments will be provided so that EPA can assess the factual correctness and completeness of the draft report.

COMMENTS:

Page 3, section 1.2.4: The steepest exterior slope is 1.8H:1V, not the stated 1.5H:1V. Additionally, since this slope only occurs along the drier, southern embankment, and not along the highest portions of the embankment; a clarifying comment to that effect would seem appropriate. Furthermore, while the 2009 Geosyntec report, referenced by GZA, did state that the flattest sections of the embankment were 2.3H:1V, this was a condition that existed in 2009 and not when the GZA inspection was done. The maintenance work done in 2010, and prior to the GZA inspection, changed the flattest section to 2.5:1H:1 V. Since the draft GZA report uses the present tense when it states that "...the embankment has a slope ranging from approximately...to 2.3H:1V, it does not factually describe the flattest slope that existed at the time of the 9/23/2010 inspection. The draft report should therefore both 1.) change the maximum

slope from 1:5H:1V to 1:8H to 1:V and 2.) and describe how the flattest slopes changed from 2:3H:1V to 2:5H:1V during 2010.
The above slopes are obtained by dividing the overall width of any given length of the embankment by the associated overall height. As GZA has noted elsewhere in the draft, locally steeper slopes, associated with surficial sloughs and only occurring for a few foot distance, are being corrected by the ongoing dike maintenance.

Page 7, section 1.2.9: The Bottom Ash Stormwater Pond is improperly rated as a "Low Hazard Potential". According to the rating procedure provided in the Appendix, the Pond should instead be given a "Less than Low Hazard Potential" for the following reasons.

The dikes forming two of the sides of the pond are only retaining, on average, an approximate height of 3 feet of water. The height of water behind the dike, relative to Lake Erie is provided as an average, because the elevation of Lake Erie fluctuates slightly. The approximate acreage of open water in the Bottom Ash Stormwater Pond is 50 acres, consequently, even in the improbable event of a breach of the massively armored dike (the dike is armored with rip rap to protect it against wind and storm damage), only about 150 acre- feet or about 50 million gallons of water would be released to the plant's cooling canal. Over 1,000 million (one billion) gallons of cooling water from the power plant are discharged through this canal every day and an incremental flow of 50 million gallons would indeed be inconsequential.

Additionally, the fill in the pond is neither high, nor close to the waters edge and is composed largely of granular bottom ash. GZA remarked during their site tour of the Bottom Ash Stormwater Pond that even if the dike failed, there would be no offsite movement of pond sediment.

Considering the above, there would be neither a water nor solids related impact from loss of the bottom ash dike. Accordingly, Detroit Edison suggests that this pond should be rated as "Less than Low Hazard Potential".

Page 7, Section 1.3.1: The drainage area for the Bottom Ash Stormwater Pond should be changed from the draft's 1200 acres to the actual 500 acres. While the draft report correctly cited the "Welcome to Detroit Edison's Monroe Power Plant" pamphlet as stating that the entire plant occupies 1200 acres; a portion of this 1200 acres includes the 400 acre fly ash pond, which does not drain to the Bottom Ash Stormwater Pond, as well as other areas south and west of the main power plant block that drain elsewhere.

Page 8, Section 1.3.2: Detroit Edison recommends that the phrase "Is approximately bordered" may be a better choice of words than "is enclosed" to describe the relationship of the Fly Ash Basin to I-75, Plum Creek and Lake Erie. None of these features are next to the basin. On all sides of the basin, Detroit Edison owns hundreds of feet of additional land between the toe of the

dike and these geographic features. None of these features "enclose" the basin or form any sort of physical wall or barrier.

Page 11, Section1.3.8: After the language "According to DTE, no monitoring wells, piezometers, surface monuments, or slope indicators exist or are required at the Bottom Ash Stormwater Pond" please add "because the underlying aquifer has artesian groundwater flow, preventing a discharge to groundwater from the basin and because the basin dike is less than the 6 feet in height and exempt from state regulation". These additional statements, offered at the time of the GZA September 23rd,2010 inspection, provide both important site specific information and the basis for the company's beliefs. Without this information, the uninformed reader might wrongly conclude that Detroit Edison did not have a basis for making its informed decision.

Page 18, Section 3.1: Detroit Edison contends that the statement that "No deficiencies were observed at the Bottom Ash Stormwater Pond …with the exception of the large tree growth…" is incorrectly considered a deficiency. The following sentence of the draft GZA report correctly states: "However, the height to width ratio of this embankment is small and this vegetation helps protect the impoundment from erosion damage caused by wind and wave action". These trees also have aesthetic value. Detroit Edison suspects that neither GZA nor EPA actually considered the presence of these trees to be a deficiency, but a literal reading of the report may reach that conclusion. Agency and contractor intent could be misinterpreted by some readers, unless this section of the report is revised. The presence of the trees on the Bottom Ash Stormwater Pond should not identified as a deficiency.

ADDITIONAL STUDIES AND MAINTENANCE PERFORMED SINCE THE 9/23/2010 GZA REPORT

Detroit Edison has already implemented most of the GZA recommendations and otherwise further improved the design and operation of the basin. Rather than describe those activities now, Detroit Edison will more formally describe all of these efforts when it provides EPA with its response to the Recommendations that will be contained in the final report.

In closing, the Detroit Edison Company again appreciates this opportunity to review the draft report and looks forward to offering its formal response to the recommendations that will be contained in the final report.

Very truly yours,

Paul Tracy

cc: Dennis Leonard
Michael Solo

GZA Response to Comments Received on Draft Report

APPENDIX F

GZA Response to Comments Received on Draft Report

GZA has reviewed the comments provided by the EPA and DTE for the draft report submitted to the EPA on November 9, 2010 for the Fly Ash Basin and Bottom Ash Stormwater Pond. GZA has addressed the comments, undated from the EPA, and dated March 8, 2011 from DTE, as follows:

EPA Comments:

The EPA Inspection Checklist for the Bottom Ash Stormwater Pond has been completed and included with the Final Report. This EPA Checklist was not included previously because, as noted in the report, the Bottom Ash Stormwater Pond does not meet the definition of a dam because its barriers are less than 6 feet in height. Additionally, bottom ash, which is classified as inert, is stockpiled approximately 1,000 feet from the closest impoundment structure. As such, failure of the dike would have no effect on the bottom ash stockpile area.

DTE Comments:

GZA has modified the Final Report in accordance with the comments provided by DTE, with the exception of the first comment on Page 2 regarding the hazard rating of the Bottom Ash Stormwater Pond. It should be noted that, as discussed in the report, it is GZA's opinion that the Bottom Ash Stormwater Pond does not meet the definition of a dam.

However, if the Bottom Ash Stormwater Pond met the requirements to be classified as a dam, it is GZA's opinion that the Bottom Ash Stormwater Pond was correctly rated as having a "Low Hazard Potential" and not a "Less than Low Hazard Potential." According to the EPA definition, failure or misoperation of an impoundment with a Less than Low Hazard Potential would result in no probable loss of human life or economic or environmental losses. While GZA believes that economic or environmental losses in the event of dike failure would be minimal, the losses or damage would still be greater than zero, which means that the Bottom Ash Stormwater Pond does not meet the definition for a Less than Low Hazard Potential. Therefore, in GZA's opinion, the Bottom Ash Stormwater Pond is appropriately rated as having a "Low Hazard Potential."