DTE Energy

Geosyntec consultants

Prepared for

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2000 2nd Street
Detroit, Michigan 48226

MONROE ASH BASIN CLOSURE PLAN

For the

MONROE POWER PLANT

Monroe, Michigan

Prepared by

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engineers | scientists | innovators

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Project Number CHE8242R

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1. INTRODUCTION

This Closure Plan was prepared by Geosyntec Consultants (Geosyntec) for DTE Electric Company (DTE) to document the closure process for the Monroe Fly Ash Basin located at the DTE, Monroe Power Plant facility in Monroe, Michigan. The permitted Monroe Disposal Facility includes a 79-acre vertical extension (Vertical Extension) and 331-acre fly ash basin (Ash Basin), as shown on Attachment 1. The Closure Plan was developed for the Ash Basin in accordance with the United States Environmental Protection Agency (EPA) coal combustion residuals (CCR) rule ("CCR Rule") (40 CFR Part 257). The Ash Basin is considered to be a "surface impoundment" under the CCR Rule.

The purpose of this closure plan is to meet the requirements of rule [40 CFR § 257.102 (b)].

2. CLOSURE NARRATIVE [40 CFR § 257.102(b)(1)(i)]

This section is a narrative of how the Ash Basin will be closed by leaving most of the CCR in place and potentially closing by removal a small, mostly unfilled portion of the Ash Basin near the existing discharge weir, shown on Figure 1. This narrative meets the requirements of [40 CFR § 257.102(b)(1)(iii)], [40 CFR § 257.102(c)] and the final cover requirements of [40 CFR § 257.102(d)].

2.1. Site Description

The Ash Basin is a licensed Michigan Type III industrial waste landfill (Facility ID number 397800) located in Monroe, Michigan, and along Lake Erie. It is also operated to meet the requirements of NPDES permit No. MI001848. The Ash Basin is a manmade impoundment contained by an engineered compacted clay embankment, up to 46 feet tall, that was constructed by excavating 5 to 10 feet of clay from the center of the Ash Basin for use in building the perimeter embankment to contain ash. Ash has been deposited as shown on a site plan drawing (Attachment 1). The center of the Ash Basin and the discharge weir area remain largely unfilled, and the approximate limits of which are shown on Attachment 1. The Ash Basin is projected to receive sluiced ash until 2023.

2.2. Narrative [40 CFR § 257.102(b)(1)(iii)]

The Ash Basin will be closed by leaving CCR in place and potentially closing by removal a limited portion of the Ash Basin near the discharge weir which has only received a minimal depth of CCR. Key features of the closure include:

i) removing 45 feet of water from the Ash Basin;
ii) obtaining necessary construction and water discharge permits;

iii) establishing sedimentation/treatment ponds near future storm water runoff discharge points (note that the number of discharge points has not been finalized);
iv) allowing the ash to dewater until the ash will be dewatered sufficiently to allow regrading to final cover grades;
v) breaching the 40-foot-high, 200-foot-wide clay dike, likely in the vicinity of the present discharge weir, to accommodate gravity drainage of the entire site;
vi) regrading the existing ash as necessary to facilitate capping of most areas and closure by removal/relocation of an area to establish either one or two main discharge channels designed to promote stormwater drainage and discharge at NPDES permitted discharge points; and
vii) installing a cap designed to limit infiltration and erosion. The cap will tie in to the perimeter embankment of the Ash Basin.

Detailed discussion of each component of the closure to meet the requirements of 40 CFR § 257.102(c) and 257.102(d) are discussed in subsequent sections.

2.2.1. Closure by Removal of CCR [40 CFR § 257.102(c)]

A limited area of the Ash Basin near the weir may be closed by removal of CCR. Ash will be removed and relocated within the Ash Basin. Closure by removal requires that all CCR material and a demonstration that groundwater has not been impacted. Within the proposed limits of the closure by removal, existing ash and some of the foundation material below it would be moved to other areas of the Ash Basin.

The closure by removal area may include a sedimentation/treatment pond with a clay perimeter berm that would tie into the Ash Basin cover system. This pond would manage contact storm during construction of the cover system. This pond would be able to manage storm water runoff after closure. The groundwater monitoring program would reflect the monitoring necessary to demonstrate closure by removal in accordance with 257.95(h).

2.2.2. Closure Infiltration Mitigation [40 CFR § 257.102(d)(1)(i)]

The closure of the Ash Basin will be designed to control and minimize the potential for post closure infiltration of liquids in to the ash and releases of CCR, leachate, or contact run-off[11] to the ground or surface waters, or to the atmosphere. This will be accomplished by constructing a cover system with a low permeability infiltration layer, grading the site gravity drain, and managing all discharge water through sedimentation/treatment ponds.

[11] "Contact run-off" is surface water that has contacted CCR and will be managed in accordance with regulatory requirements.

2.2.3. Water Impoundment Mitigation [40 CFR § 257.102(d)(1)(ii)]

The design of the cover system will preclude the probability of future impoundment of water, slurry, or sediment. This will be accomplished by breaching the impoundment embankment to discharge all impounded water, and constructing a cover system with discharge channels and side slopes that maintain gravity drainage designed to preclude surface water ponding.

The Ash Basin will be regraded to develop a topography where surface water drains towards feeder channels that then drain to central discharge channel that discharges to a breach in the embankment. At least one breach to the impoundment embankment will be implemented. Water would pass through sedimentation/treatment ponds before being discharged to surface water.

Storm water diversion berms may be necessary to divert runoff water and channel it towards the feeder channels to prevent sheet flow. These grades would allow the cover system to accommodate subsidence and settlement, thus preventing low spots and ponding.

2.2.4. Cap Stability [40 CFR § 257.102(d)(1)(iii)]

The cover system will include measures to provide slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period. This will be accomplished by: (i) dewatering the ash and improving the subgrade strength; and (ii) installing a drainage layer below the low permeability infiltration control layer at specified collection areas to reduce pore pressure buildup under the cover and increase the stability of the cover system.

2.2.5. Maintenance [40 CFR § 257.102(d)(1)(iv)]

The cover system and closure will include measures to limit future maintenance. This will be accomplished with a cover system designed with: (i) an erosion protection layer; (ii) gravity draining channels; and (iii) storm water berms.

The erosion protection layer will include vegetative layer vegetated with local vegetation as further discussed in Section 2.2.9.

2.2.6. Constructability [40 CFR § 257.102(d)(1)(v)]

The design and construction of the cover system will be completed in the shortest time consistent with recognized and generally accepted good engineering practices. Closure activities are estimated to begin in 2023.

2.2.7. Management of Free Liquids [40 CFR § 257.102(d)(2)(i)]

Free liquids will be managed by removing the liquids that separate from the remaining waste. The Ash Basin will be dewatered by gravity draining or pumping/siphoning water to create a stable base for the cover system.

2.2.8. Ash Stabilization [40 CFR § 257.102(d)(2)(ii)]

The remaining ash will be stabilized to support the cover system. The ash will be dewatered thereby improving the internal strength of the material allowing it to support the cover system and will be graded to stable slopes.

2.2.9. Cover System Components [40 CFR § 257.102(d)(3)]

The final cover system will be designed to minimize infiltration and erosion and meet the CCR Rule. To meet these requirements, the cover system will include three distinct components, including, from top to bottom: (i) an erosion protection layer, (ii) an infiltration layer; and (iii) cover system drainage features.

Infiltration Layer [40 CFR § 257.102(d)(3)(i)(A)], [40 CFR § 257.102(d)(3)(i)(B)], [40 CFR § 257.102(d)(3)(ii)]

The CCR Rule requires that the permeability of the final cover system to be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1 x 10^{-5} cm/sec., whichever is less.

The final cover will include a minimum of 18 inches of compacted earthen material or comparable alternative system with a permeability equal to or less than the permeability of the foundation native clay subsoils present and no greater than 1 x 10^{-5} cm/sec.

Erosion Protection Layer [40 CFR § 257.102(d)(3)(i)(C)]

The CCR Rule requires that the erosion protection layer consist of six inches of soil capable of sustaining native plant growth. To meet these requirements, the erosion protection layer will be either:

(i) a minimum 6-inch thick earthen material capable of supporting native plant growth; or
(ii) an approved alternative material, such as artificial turf designed to provide equivalent erosion protection [40 CFR § 257.102(d)(3)(ii)].

Cover System Drainage Features [40 CFR § 257.102(d)(3)(i)(D)]

The cover system will be designed with features that avoid disruption to its integrity and can accommodate settling and subsidence. This will be accomplished by design of drainage features within and below the cover system. An ash pore pressure relief system will be constructed below the cover system over select regions of the ash to maintain slope stability and manage free liquids. Along steep sections of the cover system, a drainage layer may be placed below the erosion protection or protective soil layer to prevent softening and destabilization of the cover system. The requirements of the drainage layer will be defined after selection of the type of infiltration layer and the final cover grades.

The final grading of the cover system will limit the potential for differential settlement and subsidence of the cover system to avoid deformation of the cover system and protect its integrity.

2.3. CCR Inventory [40 CFR § 257.102(b)(1)(iv)]

An estimate of the maximum expected volume of CCR to be impounded within the Ash Basin is estimated to be 19,900,000 cubic yards.

2.4. CCR Area [40 CFR § 257.102(b)(1)(v)]

An estimate of the largest area of the CCR unit to require final cover is approximately 320 acres.

2.5. Permitting

General construction associated with the closure will require permits such as MDEQ Part 31 construction permit, and Part 91 soil erosion and sediment control (SESC) permit. To construct the sedimentation ponds and channels outside of the limits of the Ash Basin may require excavation and fill placement below the Lake Erie Ordinary High Water Mark (OHWM) and therefore require permits such as MDEQ Park 325 for Great Lakes Submerged Lands, US Army Corp. of Engineering (USACE) Section 10 permit, and USACE Clean Water Act Section 404 Permit. Discharging water towards wetlands to the south of the site will require a MDEQ Part 303 permit for Wetlands Protection. The closure will require modifications to the National Pollutant Discharge Elimination System (NPDES) Industrial Permit.

2.6. Closure Schedule [40 CFR § 257.102(b)(1)(vi)]

An initial estimated schedule for engineering, permitting, and construction of the closure is presented in Table 1. Some of the activities associated with milestones that are dependent on site characteristics and timeframes will be revised as more information becomes available.

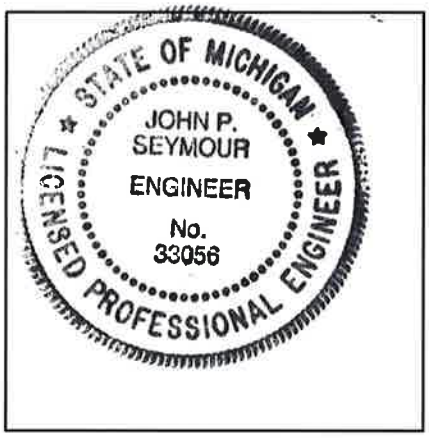
Table 1: Estimated Closure Schedule

Activity	Approximate Period
Post Closure Plan to Public Website	Oct 17, 2016
Continue Sluicing	Present -2023
Detailed Design	2023
Permitting	2023
Dewatering	2024
Ash Stabilization/Breaching of Dike	2025
Ash Grading	2026
Final Cover /Clean Closure	2027
Completion	2028

3. CERTIFICATION STATEMENT

3.1. Initial Written Closure Plan [40 CFR § 257.102(b)(4)]

I, John Seymour, being a Licensed Professional Engineer in good standing in the State of Michigan, do hereby certify, to the best of my knowledge, information, and belief that the information contained in the certification has been prepared in accordance with the accepted practice of engineering. I certify, for the DTE Monroe Basin CCR unit, that the information contained in this closure plan, dated October 14, 2016, meets the requirements of 40 CFR § 257.102.



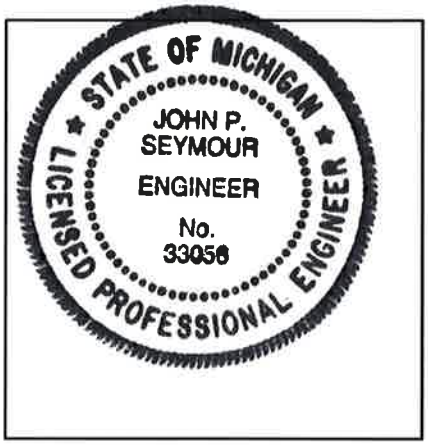
Signature

JOHN SEYMOUR
Printed Name

10/14/2016
Date

3.2. Design of the Final Cover System [40 CFR § 257.102(d)(3)(iii)]

I, John Seymour, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify, to the best of my knowledge, information, and belief that the information contained in the certification has been prepared in accordance with the accepted practice of engineering. I certify, for the DTE Monroe Basin CCR unit, that the design of the final cover system as included in the initial written closure plan, dated October 14, 2016, meets the requirements of 40 CFR § 257.102.



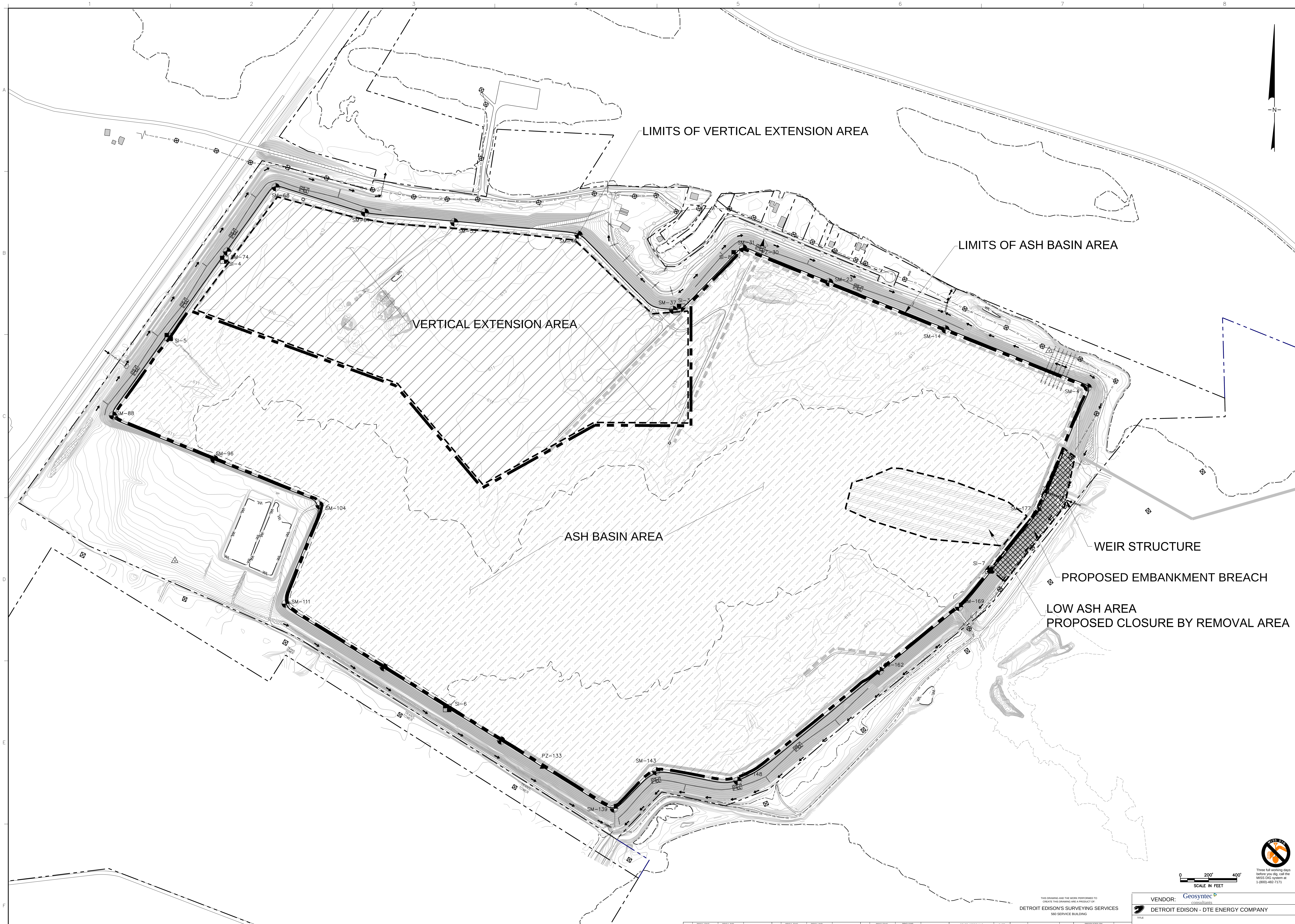
Signature

JOHN SEYMOUR
Printed Name

10/14/2016
Date

ATTACHMENT 1

Monroe Disposal Facility Site Plan



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VENDOR: Geosyntec consultants

DETROIT EDISON - DTE ENERGY COMPANY

TITLE
MONROE DISPOSAL FACILITY SITE PLAN

LOCATION NAME	MONROE COUNTY, MICHIGAN		
	MONROE POWER PLANT	UNIT NUMBER	
ORIGINATING SOURCE	ENGINEERING SUPPORT ORGANIZATION	SCALE	USE DIMENSIONS ONLY DO NOT SCALE
DRAWING NUMBER	1 OF 1	JOB NUMBER	CHE8242R

OTHER APPROVALS	DATE	DIVISION	SUPERVISOR	DATE	PRODUCED ON AUTOCAD BY	DATE
		ARCH-CIVIL			SURVEYED BY	DATE
		CONTROL & ELECT.			CHECKED BY	DATE
REF.DWGS.	REF.BMS.				SURVEY ENGINEER	DATE
		MECH.			SUPERVISING ENGINEER	DATE
		STATIONS ENG.			DIVISION DIRECTOR	DATE