Prepared by

HDR

Renew Harbor Island

Work today, protect tomorrow.

Response Action Plan

for Compliance with Michigan R 299.4442

March 8, 2024

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Response Action Plan Regulatory Checklist			
Michigan R 299.4442 Requirement - The owner and operator of a type II landfill unit that is required to prepare a response action plan shall identify all of the following:		**Inactive Units 1/2 Impoundment**	**Former Unit 3A/B Impoundments**
4442 (1)(a)	Possible sources of contamination	See Section 3.1	See Section 3.2
4442 (1)(b)	Interim response activities take or to be taken to control possible sources of contamination.	See Section 4.0	See Section 4.0
4442 (1)(c)	For units that the owner or operator concludes are probable sources of contamination, a schedule for terminating waste receipt, for initiating closure at units, and for redesigning and constructing new units that have leak detection systems. The schedule shall be based on all of the following: I. The concentration of hazardous substances. II. The rate of migration. III. Risks to human health and environment, including the proximity of drinking water supplies. IV. The practicality of initiating closure. V. The availability of other disposal locations. VI. Other relevant factors.	See Section 6.0 and Section 7.0	See Section 6.0 and Section 7.0

1.0 Introduction

This Response Action Plan (RAP) was prepared for the Former J.B. Sims Generating Station located on Harbor Island (Island or Site) to support compliance with Part 115 of the Michigan Natural Resources and Environmental Protection Act, Act 451 of 1984 (Part 115). The facility is located at 1231 North 3rd Street, on Harbor Island, in Grand Haven, Michigan. The former J.B. Sims Generating Station was a coal-fired, steam-generating power facility with a net capacity of approximately 70.5 megawatts operated by the Grand Haven Board of Light and Power (GHBLP). Coal Combustion Residuals (CCR) generated at the former Site was stored in two CCR units: (1) the inactive Units 1/2 Impoundment and (2) the former Unit 3A/B Impoundments.

According to Section 324.11519b(2) of Part 115, if detection monitoring confirms a statistically significant increase over background at a CCR unit, the owner shall develop a RAP. This RAP was prepared in compliance with Part 115 Rule R 299.4442. The proposed response activities set forth in the RAP are designed to address:

- Possible sources of contamination,
- Interim response activities taken or to be taken to control identified possible sources of contamination and,
- A schedule for terminating waste receipt and for initiating closure at units

2.0 Background

The initial groundwater monitoring system at the Site was installed by ERM in 2017. This well network was expanded by Golder & Associates (Golder) in 2021, and again by HDR in 2022 (HDR, 2023). Background water quality sampling, for the revised groundwater monitoring well network, was conducted over eight events from November 2022 through August 2023 and the first detection/assessment monitoring event was conducted in October 2023. Following the completion of background sampling as specified in R 299.4440(8), the *Background Water Quality Statistical Certification* was placed into the operating record (HDR, 2024). That document outlines the approach and selection of the statistical method for each Appendix III, Appendix IV, and Part 115 constituent of interest (COI) for each CCR unit. The water quality data collected from the monitoring wells located upgradient of the CCR units has been compiled and statistically analyzed to develop the background threshold values (BTVs) for the impoundments. The statistical method chosen to represent background water quality is the upper prediction limit (UPL) and is one of the methods described in Part 115 Section 324.11511a(3).

Following the submission of the *Background Water Quality Statistical Certification*, the memorandum *Former J.B. Sims Generating Station Determination of Statistically Significant Increases over Background per §257.93(h)(2) and R 299.4440(8) of the Michigan Part 115 Rules* was placed in the operating record (HDR, 2024a). That memorandum outlines the process undertaken to compare groundwater samples collected in October 2023 against UPLs where the resulting exceedances are considered Statistically Significant Increases (SSIs) (HDR,

2024a). The SSIs identified for the Units 1/2 Impoundment include boron, calcium, fluoride, sulfate, and total dissolved solids (TDS). SSIs identified for the Unit 3A/B Impoundments include boron, calcium, chloride, fluoride, sulfate, and TDS. Because there were SSIs for both CCR units following the well network update in 2022, both Units 1/2 Impoundment and Unit 3A/B Impoundments will maintain the status of assessment monitoring.

These SSIs trigger the assessment monitoring program for the impoundments. According to Section 324.11519b(2), if detection monitoring confirms an SSI over background at one of the impoundments for one or more of the constituents listed in Section 324.11511a(3), the owner shall develop an Assessment Monitoring Plan, a RAP, and initiate assessment monitoring at that impoundment. The Assessment Monitoring Plan is a section of the Hydrogeologic Monitoring Plan and will be submitted to EGLE in the first quarter of 2024.

3.0 Identification of Contamination Source

3.1 Units 1/2 Impoundment

Documented in the Golder report *Preliminary Groundwater Data Summary Through October 2020*, historical records indicate the Island operated as a municipal dump site in the 1950s and 1960s. During this period, waste was pushed into the low interior marshland (Golder, 2020a). When the J.B. Sims Generating Station began operation in the early 1960s, the CCR was disposed into the internal marshland which was later delineated as the Units 1/2 Impoundment. According to Golder's *2021 Annual Groundwater Monitoring and Corrective Action Report*, CCR waste streams into the units ceased in 2012 (Golder, 2022).

No formal historical documentation regarding the construction of the Units 1/2 Impoundment is available that could verify whether a liner may be present beneath the impoundment. However, the following reports document borings completed within the footprint of the units:

- Environmental Resources Management (ERM) - Coal Ash Delineation Sampling Results published February 8, 2016.
- Soils & Structures (S&S) - Grand Haven BLP – Ash Impoundment Evaluation published July 17, 2014.
- Superior Environmental Corp (Superior) - Ash Pond Assessment published August 1, 2014.

Borings from all three studies determined no liner is present beneath the Units 1/2 Impoundment, indicating the source of contamination is CCR and historical municipal solid waste.

3.2 Unit 3A/B Impoundments

Documented in the 1983 report, the Unit 3A/B Impoundments was constructed as an above-ground ash impoundment consisting of clay dikes and a minimum 3-foot compacted clay bottom (Black and Veatch, 1983). The liner was verified in the 2014 S&S report, in which borings were completed through the impoundment berms and sediment samples were tested for permeability.

According to Golder's *Documentation of Liner Construction*, however, no composite liner is present and thus the liner design criteria of 40 CFR 257.71 have not been met (Golder, 2017).

The GHBLP ceased all waste disposal into Unit 3A/B Impoundments on July 30, 2020. The GHBLP commenced removal of CCR from Unit 3A/B in July 2020. On December 10, 2020, Golder considered the unit at final closure to 95 percent confidence of CCR removal (Golder, 2020). Following the submission of closure documentation on January 27, 2021, EGLE denied the closure certification for the following reasons:

- GHBLP did not have a groundwater monitoring system that represented background water quality. The monitoring well network has since been expanded to accurately represent the background water quality and address groundwater exiting the waste boundary.
- GHBLP only utilized one of six total soil samples to verify ash removal using colorimetric methods. EGLE stated no demonstration had been made that would justify how one sample could represent all liner areas accurately.
- The methodology for microscopy did not include preprocessing of samples to ensure bottom ash could properly be identified.
- GHBLP did not address the contamination of the clay liner beneath Unit 3A/B. Soil sample analysis showed elevated concentrations of lithium and selenium have impacted the liner, consistent with coal ash or coal ash leachate.
- GHBLP did not provide sufficient demonstration that the horizontal extent of coal ash had been defined, noting a 2014 EPA report showing photographic evidence that coal ash was present outside the Unit 3A/B boundary (e.g. on roadways).
- Photographic evidence collected during the ash removal showed a large amount of cracking observed in the clay liner, which could indicate contaminated water was able to enter groundwater beneath the impoundment.

Based on the information provided above, the likely sources of contamination from the Unit 3A/B Impoundments is remaining CCR material within the unit footprint, CCR on areas adjacent to the impoundment, and the contaminated clay liner left in place following the impoundment cleanout.

4.0 Interim Response Activities

This section describes the tasks being initiated to further evaluate the potential for impact to groundwater and to characterize the extent of possible groundwater contamination.

4.1 Groundwater Flow Direction

Since July 2018, 59 groundwater monitoring events have been conducted and continue on a quarterly schedule. However, due to low the hydraulic gradient and proximity to the Grand River, the observed flow direction is highly variable. Variations in flow direction complicate the remedial approach in the following ways:

- Additional flow paths for contamination to travel
- Irregularities in plume size and shape
- Variable volume of contaminated water
- Instances of reverse flow (groundwater flowing from the river into the Island vs. groundwater flowing from the Island to the river)
- Groundwater discharging to surface water or surface water draining into groundwater

In December 2023, 16 pressure transducers were deployed at the locations shown on **Figure 1** to address the issues noted above. Groundwater level measurements are being monitored on an hourly basis and recorded on the transducers. The recorded data is collected during each quarterly groundwater monitoring event. Understanding groundwater flow direction is vital in selecting an effective remedial alternative as it allows for targeting areas in which contamination is or will be present.

4.2 Assessment Monitoring

Groundwater samples collected during quarterly monitoring events will continue to be analyzed for the list of assessment monitoring COIs required by Section 324.11519b. This groundwater monitoring program is described in detail in the HMP that will be submitted to EGLE in the first quarter of 2024. The first assessment monitoring sampling event with the updated monitoring well network was performed in October 2023 and will continue on a quarterly basis (HDR, 2024).

4.3 Nature and Extent of Contamination

As GPS exceedances have been identified at the current nature and extent monitoring wells for both CCR units (see **Figure 2**), additional monitoring wells are being added to each well network. Due to the proximity of the Units 1/2 Impoundment and the Unit 3A/B Impoundments to the edges of Harbor Island, and limiting features such as wetlands and surface water bodies, expansion of the monitoring well network is not possible in certain areas. **Table 1** contains the current and additional nature and extent wells that have been added to each monitoring well network. The additional nature and extent wells have been selected due to their location being further from the CCR unit boundary allowing for the delineation of the contaminant plume, shown in **Figure 1**. The wells will be sampled during the second quarter 2024 monitoring event for assessment monitoring constituents.

Table 1. Nature and Extent Monitoring Wells for Units 1/2 and Unit 3A/B	
Units 1/2 Impoundment	**Unit 3A/B Impoundments**
Existing Nature and Extent Monitoring Wells	
• MW-07 • MW-10 • MW-28 • MW-32	• MW-01R • MW-09 • MW-10
Additional Nature and Extent Monitoring Wells	
• MW-16 • MW-17 • MW-36 • MW-37	• MW-38

4.4 Site-Specific Data Collection for Remediation

The following tasks are being written into a work plan designed to further the investigation of the sources of groundwater contamination, study the nature and extent of groundwater exceedances, and collect the data required to evaluate remediation alternatives. Tasks related to the CCR program include the following:

- Unit 3A/B Ash Delineation – Due to EGLE's previous denial of the closure of the Unit 3A/B Impoundments, further ash delineation is required to identify any remaining ash on/near the roads adjacent to the impoundment.
- Aquifer Test – The data collected from the aquifer test is needed to accurately estimate the hydrologic properties of the Island. As the groundwater is at or near the surface on most of the Island, dewatering likely will be required to remove source material for both impoundments.
- Nested Wells – The interaction between the clay unit and glacial aquifer is unknow. Nested wells will be utilized to measure the vertical hydraulic gradient between the Grand River and South Channel.
- Clay Characterization – Sediment samples will be collected during the nested well installation and analyzed for hydraulic conductivity and permeability.

The tasks below are being conducted as part of the Non-CCR data collection work plan, but the resulting data also will be utilized in the remedy alternative selection process.

- Limited wetland sediment sampling – This data will be used to evaluate the need for additional investigation to identify areas where sediment may be acting as a secondary source of PFAS in surface water and/or groundwater. This data will also be used to assess the need for an ecological risk assessment.

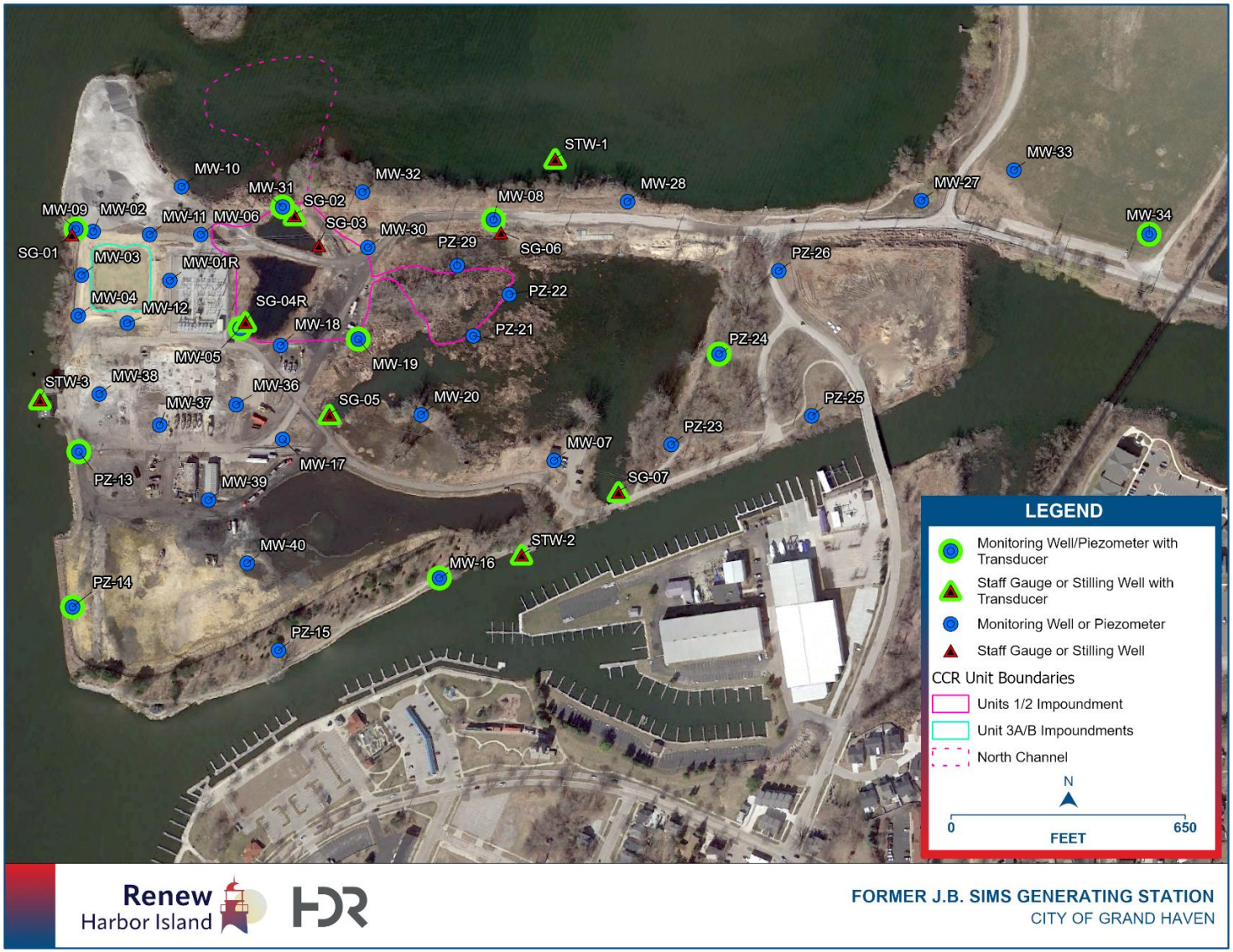

Figure 1. Transducer Deployment Map

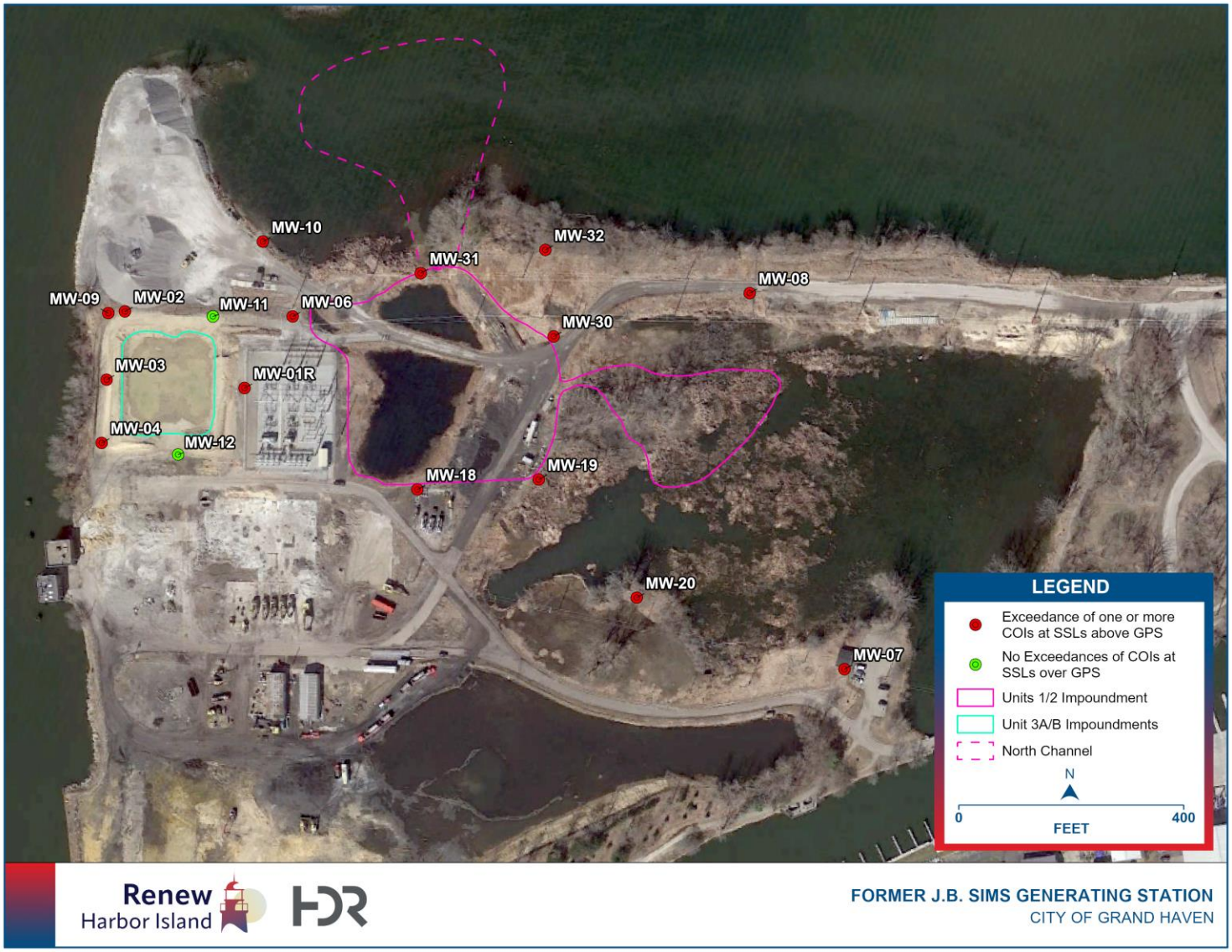

Figure 2. Monitoring Well Exceedance Map

- Installation of two permanent monitoring wells in the former locations of vertical aquifer sampling (VAS) location 07 and VAS 10 - near the groundwater-surface water interface (GSI) of wetlands interior to Harbor Island. The purpose of these wells is to confirm the groundwater sampling results from the two VAS locations.
- Subsurface Utility Exploration (SUE) – The purpose of the SUE is to identify any preferential pathways for migration of impacted groundwater to surface water.
- Resample surface water at the SW-06 location that was sampled in May 2023 – This sampling will be conducted to verify previous sampling results.

5.0 Reporting

The results of the well installation and groundwater and surface water monitoring described herein will be provided in the quarterly groundwater monitoring reporting already scheduled as part of the assessment monitoring program. Groundwater sampling is being conducted quarterly, therefore a quarterly groundwater monitoring report will be submitted to EGLE by April 30, July 31, October 31, and January 31 of each year in compliance with Part 115 R 299.4907(11). Each quarterly report will include an evaluation and discussion of all completed Site investigation activities; an evaluation of the nature and extent of the potential groundwater plume, if appropriate, based on available information; and recommendations for additional investigation activities, if necessary.

6.0 Termination of Waste Schedule

According to Part 115 R 299.4442(c), for any units that the owner concludes are probable sources of contamination, the RAP must include “a schedule for terminating waste receipt, for initiating closure at units, and for redesigning and constructing new units that have leak detection systems.”

The GHBLP ceased all waste disposal into the Unit 3A/B Impoundments on July 30, 2020. The GHBLP commenced removal of CCR from Unit 3A/B in July 2020. Removal of CCR and CCR containing materials from the Impoundments was considered completed by GHBLP on December 10, 2020. EGLE stated on January 21, 2021, that additional ash removal is needed on the roads adjacent to the Impoundment. An investigation regarding the extent of CCR that may be present on the roads adjacent to the Impoundment will occur in the fourth quarter 2024. Any required removal of ash located above the water table will occur following the ash delineation. Finally, any additional soils removal that requires dewatering will occur following the remedial investigation. Additionally, as the site is confined by surface water on the north, south, and west, a fence and gates were installed to prevent unintended contact with potentially contaminated soil and surface water.

7.0 Response Action Schedule

The following sets forth the proposed schedule for the investigation of the sources of groundwater contamination, the study of the nature and extent of groundwater exceedances at Harbor Island, and for the data collection required to evaluate remediation alternatives. All of these steps are required before remediation alternatives can be evaluated and selected.

Table 2. Response Action Schedule

Task	Completion Date[1]
Background Sampling*	November 30, 2022 – August 30, 2023
Initial Assessment/Detection Monitoring Event*	October 24, 2024
Background Statistical Memorandum*	January 24, 2024
SSI Memo submitted to EGLE*	January 24, 2024
Response Action Plan	March 8, 2024
Hydrogeologic Monitoring Plan	March 22, 2024
Initiation of Assessment of Corrective Measures - Placement into Operating Record	May 5, 2024
Site Specific Data Collection Work Plan for Remediation – CCR	July 2024
Site Specific Data Collection Work Plan for Remediation – Non-CCR (aka Remedial Investigation Work Plan)	July 2024
Implementation of Data Collection Tasks CCR	2024 - 2025
Unit 3A/B Impoundments Ash Delineation and Removal (above water table)	2024 - 2025
Implementation of Data Collection Tasks Non-CCR	2024-2025
Non-CCR Remedial Investigation Report	2025
Assessment of Corrective Measures Development	March 2024 – July 2024
Assessment of Corrective Measures (ACM) Deadline	August 3, 2024
Additional Data Collection required for Remediation Conceptual Design	2025 - 2026
Evaluation of Remediation Alternatives	2025 -2026
Public Meeting of Remediation Alternatives	30 Days before Remedy Selection
Remedy Selection Report and Remedial Action Plan	2026
Closure Plan – Units 1/2 Impoundment	2026
Closure Plan – Unit 3A/B Impoundments	2026
Remediation Final Design and Remedy Implementation	2026 +

Footnotes:
*Indicates item has been completed
1. Schedule may be affected by the following items: Additional investigations that may become required by EPA regarding historical ash, significant involvement by the public, City Council and Community Action Group, or entry of an Administrative Consent Order (ACO) that provides an alternative schedule.

8.0 References

Black and Veatch, 1983. City of Grand Haven, Michigan Board of Light and Power J.B. Sims Station, Unit 3 Ash Pond Construction. August 19, 1983.

Environmental Resources Management., 2016. Coal Ash Delineation Sampling Results. February 8, 2016.

Golder Associates, Inc., 2017. J.B. Sims Generating Station Document of Liner Construction. April 10, 2017. Revised January 24, 2018

Golder Associates, Inc., 2020. 2019 Annual Groundwater Monitoring & Corrective Action Report. January 31, 2020.

Golder Associates, Inc., 2020a. Preliminary Groundwater Data Summary Through October 2020. November 17, 2020.

Golder Associates, Inc., 2020b. J.B. Sims Generating Station Unit 3 Impoundments – CCR Removal Documentation Report. December 11, 2020.

Golder Associates, Inc., 2022. 2021 Annual Groundwater Monitoring & Corrective Action Report. January 28, 2022.

HDR, 2023., Monitoring Well Installation Report. November 27, 2023.

HDR, 2024., Background Statistical Certification Report. December 11, 2023. Revised January 24, 2024.

HDR, 2024a., Former J.B. Sims Generating Station Determination of Statistically Significant Increases over Background per §257.93(h)(2) and R 299.4440(8) of the Michigan Part 115 Rules. January 24, 2024.

HDR, 2024b., 4th Quarter 2023 Annual Groundwater Monitoring Report for Michigan Part 115 Solid Waste Regulations. January 31, 2024.

HDR, 2024c., Determination of Statistically Significant Levels over Groundwater Protection Standards per §257.95(g) and Michigan Rule R 299.4441. February 5, 2024.

Soils & Structures, 2014., Grand Haven BLP – Ash Impoundment Evaluation. July 17, 2014.

Superior Environmental Corp., 2014., Ash Pond Assessment. August 1, 2014.