RACER TRUST
LANSING PLANTS 2, 3, & 6

2021 Second Quarter Progress Report | July 15, 2021

More detailed reports are available on RACER's Webpage for this Site:
https://www.racertrust.org/properties/lansing-plant-2-industrial-land

Site Introduction

- Remediation at the RACER Lansing Site is being performed through the Resource Conservation and Recovery Act (RCRA) Corrective Action program under the oversight of the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Current activities include focused site characterization, interim remedial actions, and evaluation of remedial alternatives.

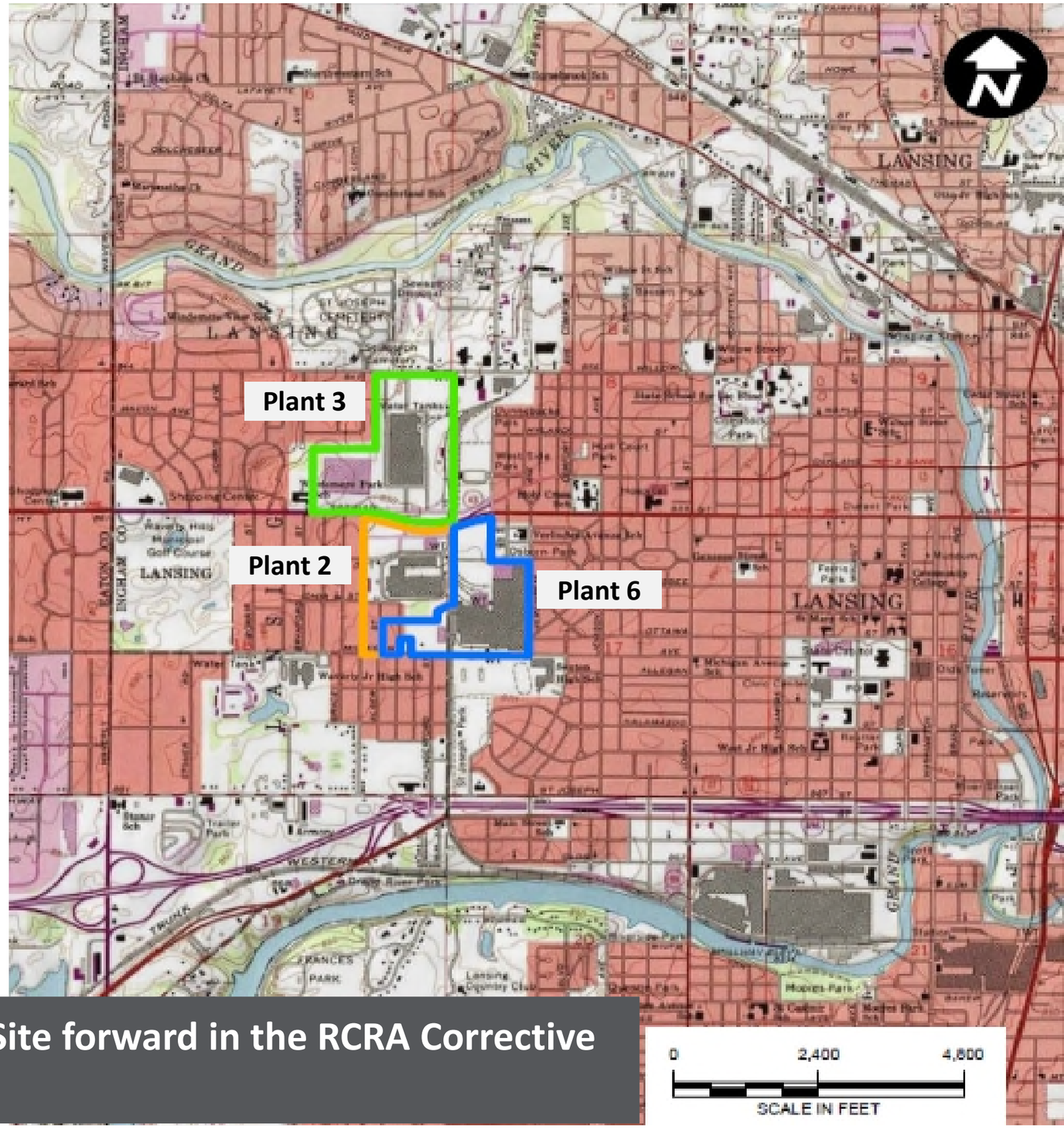
- There is currently no known exposure pathways for area residents associated with the site contaminants.

- Characterization of the 1,4-dioxane plume in weathered bedrock at a depth of approximately 60 to 75 feet below the ground surface is complete. Remediation of 1,4-dioxane in the weathered bedrock includes operation of the Plant 2 and Plant 3 biosparge systems (Plant 2 system started operations during the third quarter of 2020). It is anticipated that portions of the Plant 2 biosparge system may need to operate for 10 to 15 years. See the appendix at the end of this report for more information on biosparging.

- Characterization of per and polyfluoroalkyl substances (PFAS) is ongoing to the north, east, and south of Plant 6. Interim actions for PFAS include storm sewer modifications on Plants 2, 3, and 6 to eliminate groundwater containing PFAS from infiltrating into and then discharging off-site through the storm sewers.

- Monitoring of potential soil vapor intrusion (VI) to indoor air is ongoing and will continue in the northeast portion of Plant 6 and the adjacent off-site area.

- Routine groundwater monitoring on Plants 2, 3, & 6 in the shallow (perched) zone, weathered bedrock, shallow bedrock, and deep bedrock is ongoing and is anticipated to continue for 25 to 30 years.

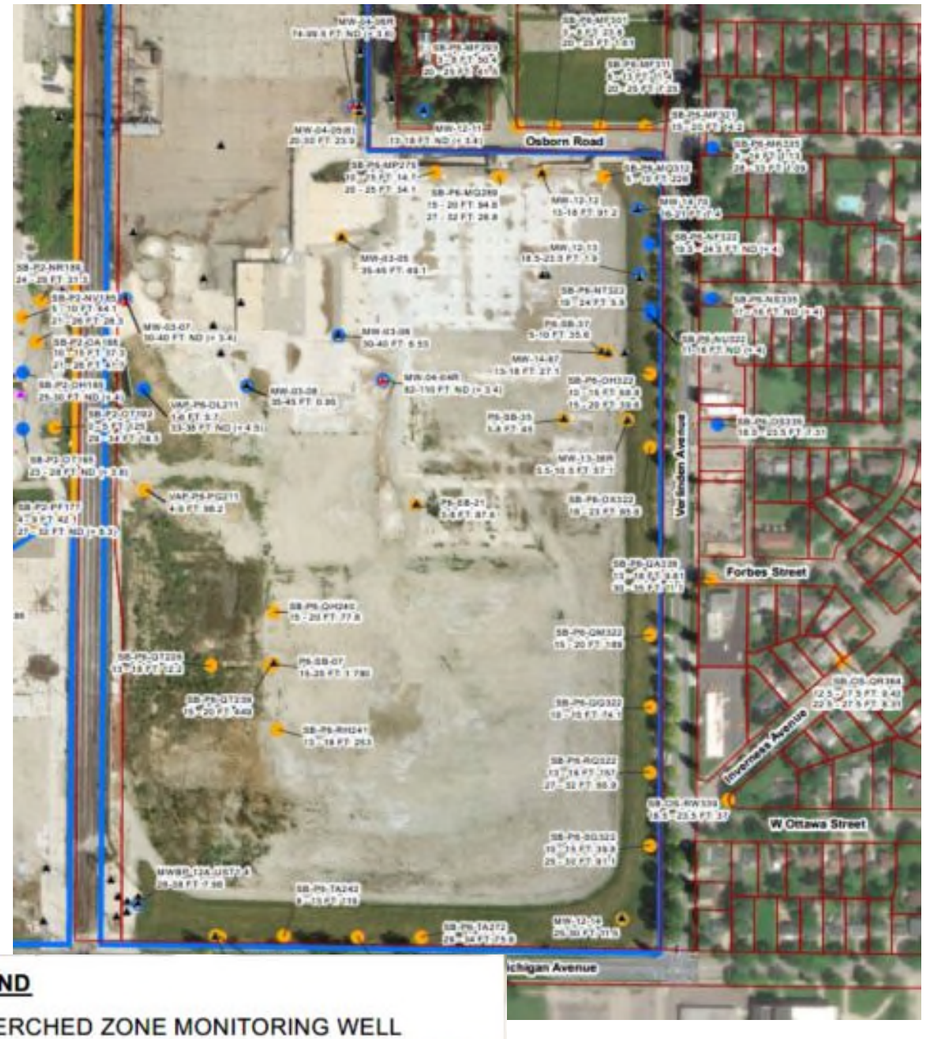


Activities completed during this period move the Site forward in the RCRA Corrective Action process

Notice of Migration (NOM) Submittal

As a result of PFAS groundwater cleanup criteria being updated in December 2020, RACER began working with EGLE to provide notices of migration resulting from the presence of PFAS (specifically perfluorooctanoic acid [PFOA]) in groundwater north and east of Plant 6

- 18 commercial and residential property owners were provided a notice (based on current available data) on May 10, 2021
- The property owners were provided the following information:
  - Cover Letter – why they are receiving the notice
  - Local Map – zoomed in, parcel ID, surrounding streets, surrounding data
  - PFAS Fact Sheet
- NOMs were also submitted to EGLE and the City of Lansing on May 10, 2021



Remediation of 1,4-Dioxane in Weathered Bedrock

- Biosparge systems at Plant 2 and Plant 3 are fully operational
  - Plant 2 - 97% uptime since start up in August 2020
  - Plant 3 - 95% uptime since compressor upgrade in July 2020
  - Downtime related to either equipment upgrades/replacement or weather-related power outages
- Results from the First Quarter 2021 performance monitoring show that concentrations of 1,4-Dioxane at Plant 2 and Plant 3 continue to reduce
- 2021 Second Quarter performance monitoring was conducted in June 2021 and the results will be summarized in the 2021 Third Quarter Progress Report
- Nutrient injections for the system were completed in April 2021
- Results from the 2021 quarterly sampling results will be presented in a Lower 1,4-Dioxane Biosparge Update Report, submitted annually to EGLE (proposed submittal of March 2022). The initial Update Report was submitted to EGLE in March 2021 and summarized results from start up of the biosparge systems through December 2020.
- Results show that the biosparge systems are achieving the short-term objective of reducing 1,4-dioxane concentrations along the core of the weathered bedrock plume

Plant 2 – 1,4-Dioxane Concentrations

	Well 1,4-Dioxane (µg/L)				
Date	MW-14-61	MW-19-120	MW-20-128	MW-16-84	MW-17-86
12/3/2020	18	28	20	81	106
3/2/2021	21	73	9	66	79

Plant 3 – 1,4-Dioxane Concentrations

	Well 1,4-Dioxane (µg/L)			
Date	TW-14-06	TW-15-11	PW-14-03	MW-13-34
12/3/2020	1	51	71	106
3/2/2021	1	48	27	127

PFAS Investigation

Plant 6 Well Installation

- Work completed in March 2021
- Installed three on-site monitoring wells on Plant 6 along the eastern property boundary to facilitate monitoring of PFAS identified in previous investigations
- Installed three off-site monitoring wells within the southern right of way of Michigan Avenue to provide delineation of impacts identified along the southern boundary of Plant 6
- The investigation details and results are summarized in the Plant 6 PFAS Monitoring Well Installation Summary and Off-site Investigation Work Plan submitted to EGLE in May 2021 and available on RACER's website for Lansing Plant 2
- Groundwater collected from the monitoring wells installed along the eastern portion of Plant 6 contained PFOA above EGLE drinking water criteria of 8 ng/L (parts per trillion); however, results of the wells installed along Michigan Avenue did not contain concentrations above criteria
- Further off-site delineation to the east is needed, and proposed locations were presented in the May 2021 Work Plan discussed above

Remediation of PFAS Impacts

Sewer Modifications and Performance Sampling

- Post construction/modification storm sewer inspections were completed at each Plant in May and June 2021 following a period of rainfall - the purpose of these inspections is to evaluate the Plants for ponding and the potential for storm water runoff onto neighboring properties
- Additional modifications were completed in April 2021 at Plants 2 and 6 to move backed up water internal to the Site - consistent with work completed previously at Plant 3
- Results from these events, along with the results from the 2021 First and Second Quarter site wide performance monitoring for storm sewers will be presented in a Plant 2 and 6 Sewer Modification Completion Report to be submitted to EGLE in July 2021. The report will be available on RACER's Webpage for Lansing Plant 2.

Remediation of PFAS Impacts

Plant 2 Storm Sewer Performance Monitoring

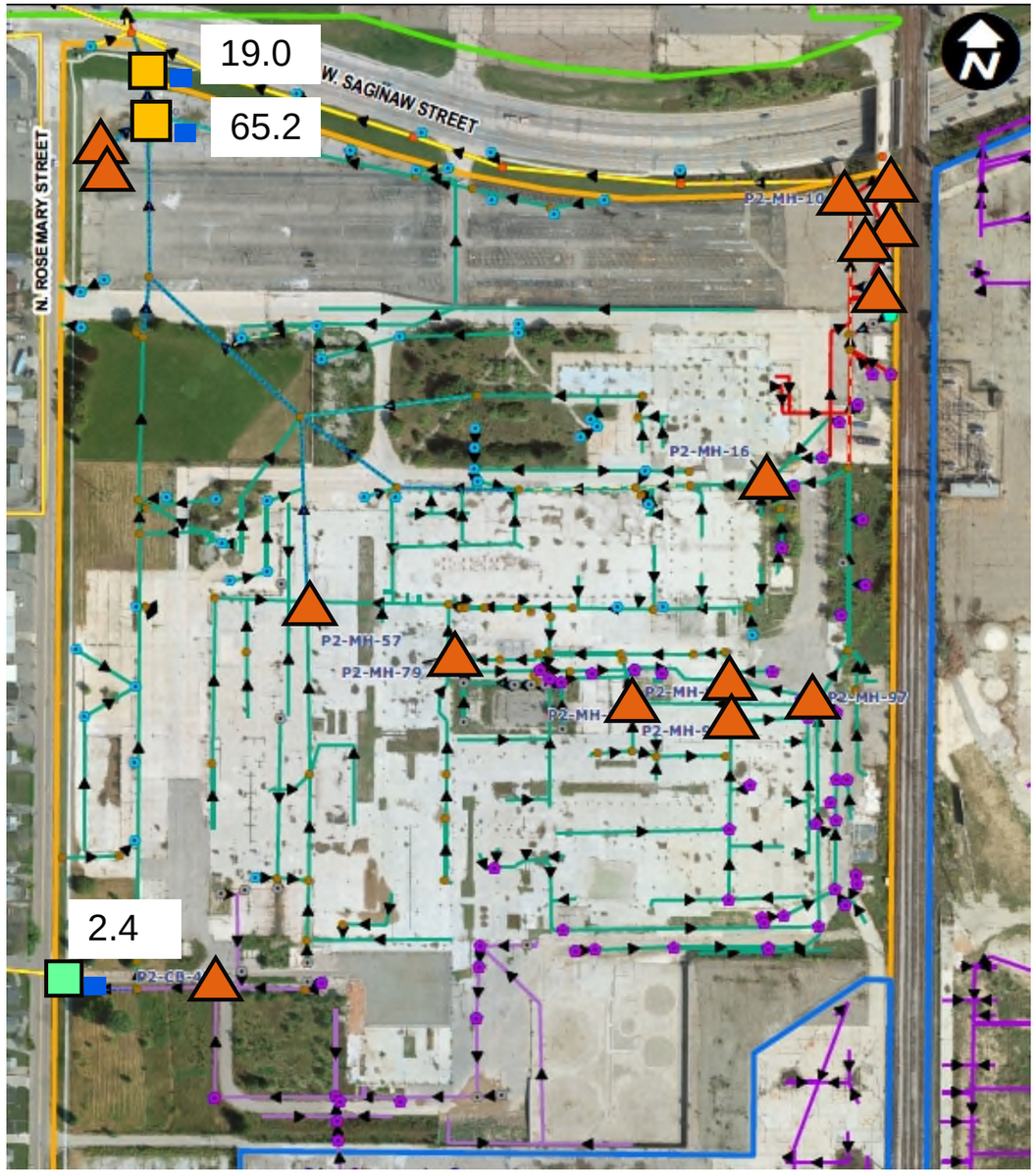
- March 2021 sampling results indicate that out of the 4 storm sewers sampled at Plant 2, 1 contained PFOS above EGLE Surface Water Criteria
- The Plant 2 video inspection conducted in March showed no significant infiltration in the northwest storm line.
- May 2021 sampling results indicate that out of the 3 storm sewers sampled at Plant 2, 2 contained PFOS above EGLE Surface Water Criteria
- See map to right and legend below for visual depiction of results from the May 2021 sampling event

PFOS Results are in ng/L

- Does not exceed criteria
- Exceeds PFOS Surface Water Criteria (12 ng/L)
- Manhole filled

Flow Under Dry Conditions

- Moderate Flow
- Little Flow
- Trickle



Remediation of PFAS Impacts

Plant 3 Storm Sewer Performance Monitoring

- Plant 3 NW Outfall quarterly samples collected in March and May 2021 did not contain PFOS above EGLE Surface Water Criteria

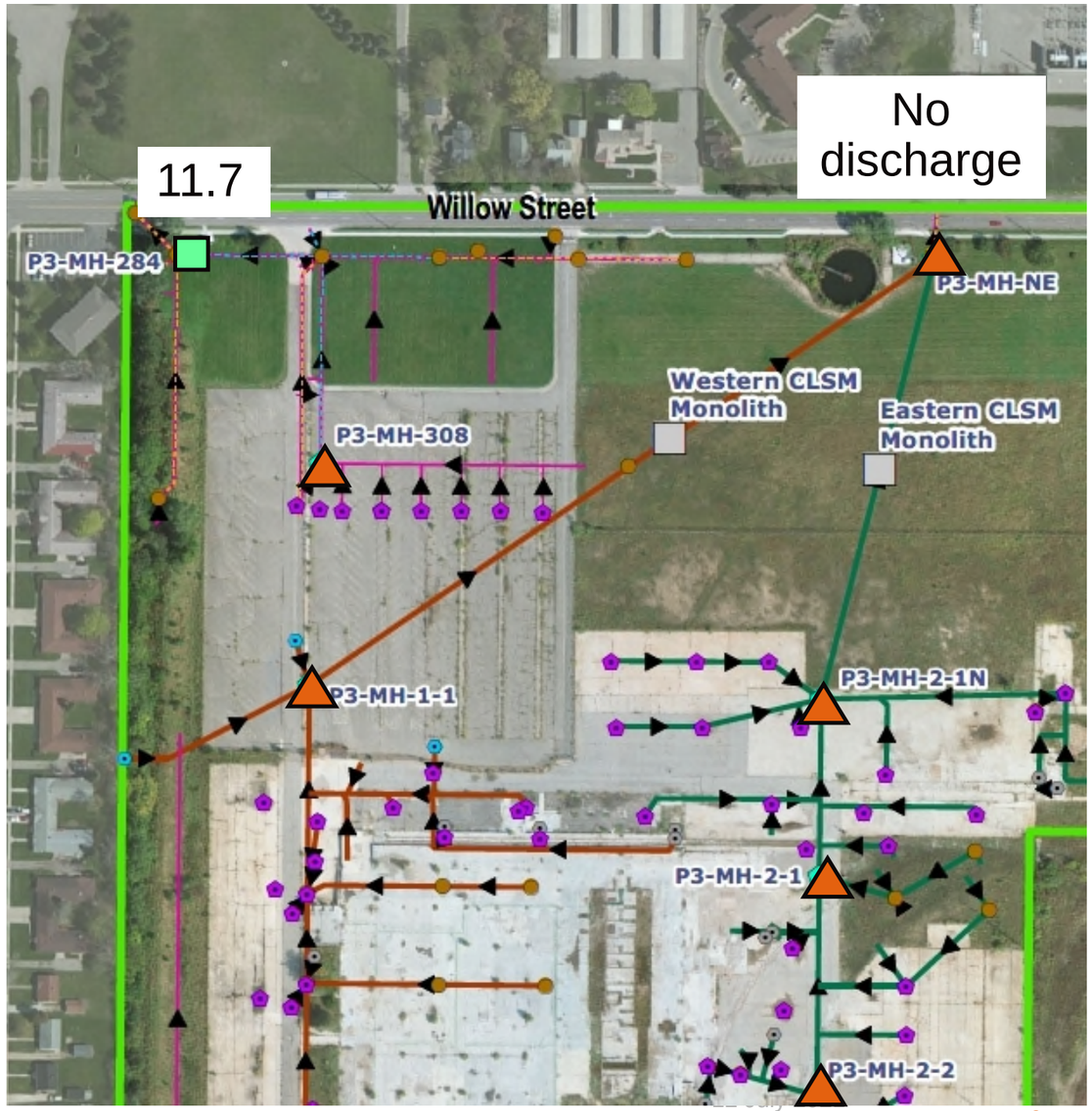
Date	PFOS (ng/L)
March 2021	6.3
May 2021	11.7

- See map to right and legend below for visual depiction of results from the May 2021 sampling event

PFOS Results are in ng/L

Does not exceed criteria

Manhole filled



Remediation of PFAS Impacts

Plant 6 Storm Sewer Performance Monitoring

- March 2021 sampling results indicate that out of the 13 storm sewers sampled at Plant 6, 5 contained PFOS above EGLE Surface Water Criteria
- May 2021 sampling results indicate that out of the 9 storm sewers sampled at Plant 6, 5 contained PFOS above EGLE Surface Water Criteria
- Continue monitoring outfalls (next quarterly monitoring event in August/September 2021)
- See map to right and legend below for visual depiction of results from the May 2021 sampling event

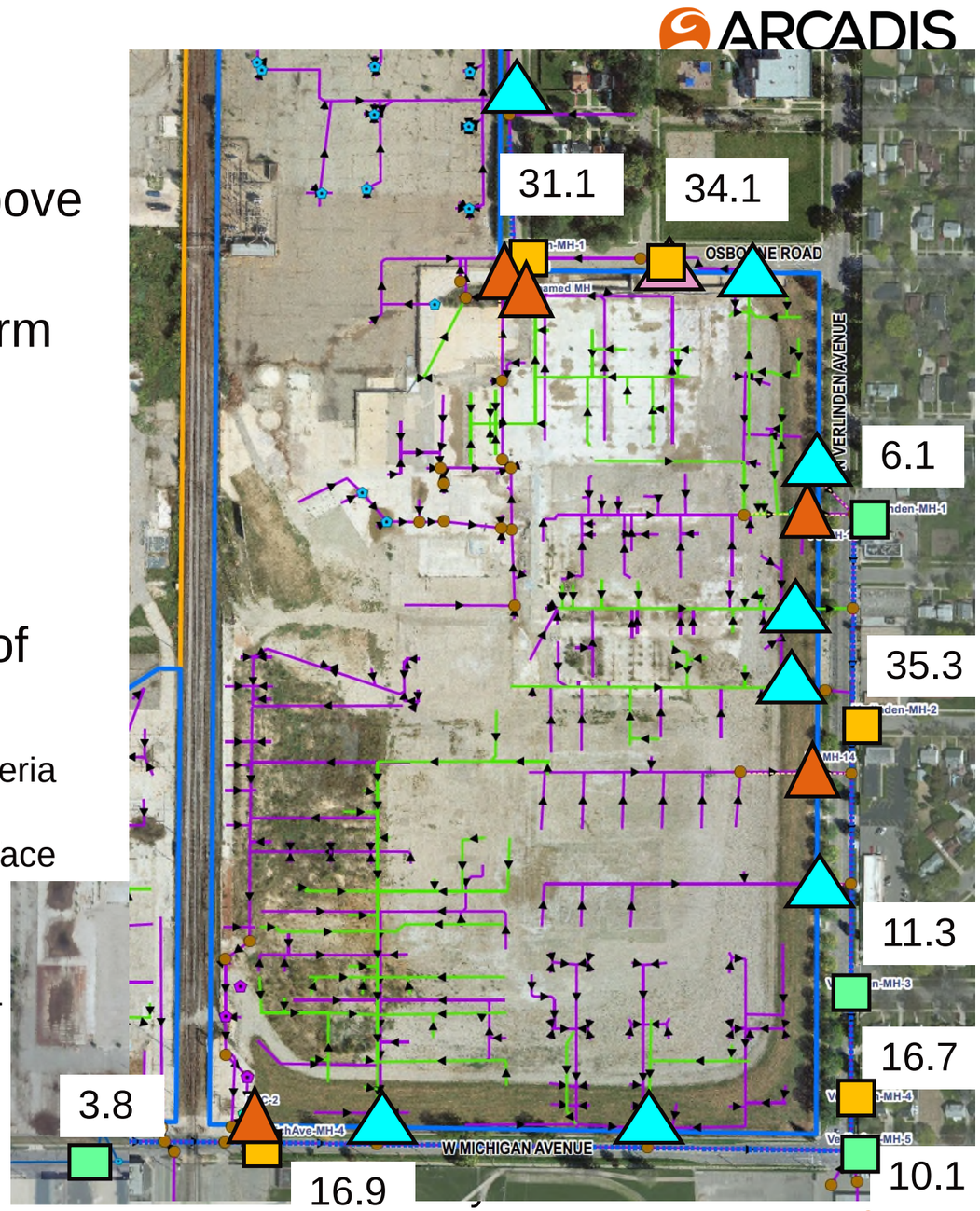
MH does not exceed criteria

MH exceeds PFOS Surface Water criteria (12 ng/L)

Pipes plugged April 2021

Manhole filled

Sewer line cut and capped at curb in 2014



Corrective Measures (CM) for Plant 2 and Plant 3 Soil

September 2020 - Revised CM Workplan per EGLE comments

March 2021 – EGLE approved CM Workplan

April 7-9, 2021- investigation completed

May 20, 2021 – Additional step outs needed in 4 areas

Shallow soils evaluated for EGLE Direct Contact (DC) and Site-Specific Particulate Soil inhalation Criteria (PSIC) to determine appropriate corrective measure:

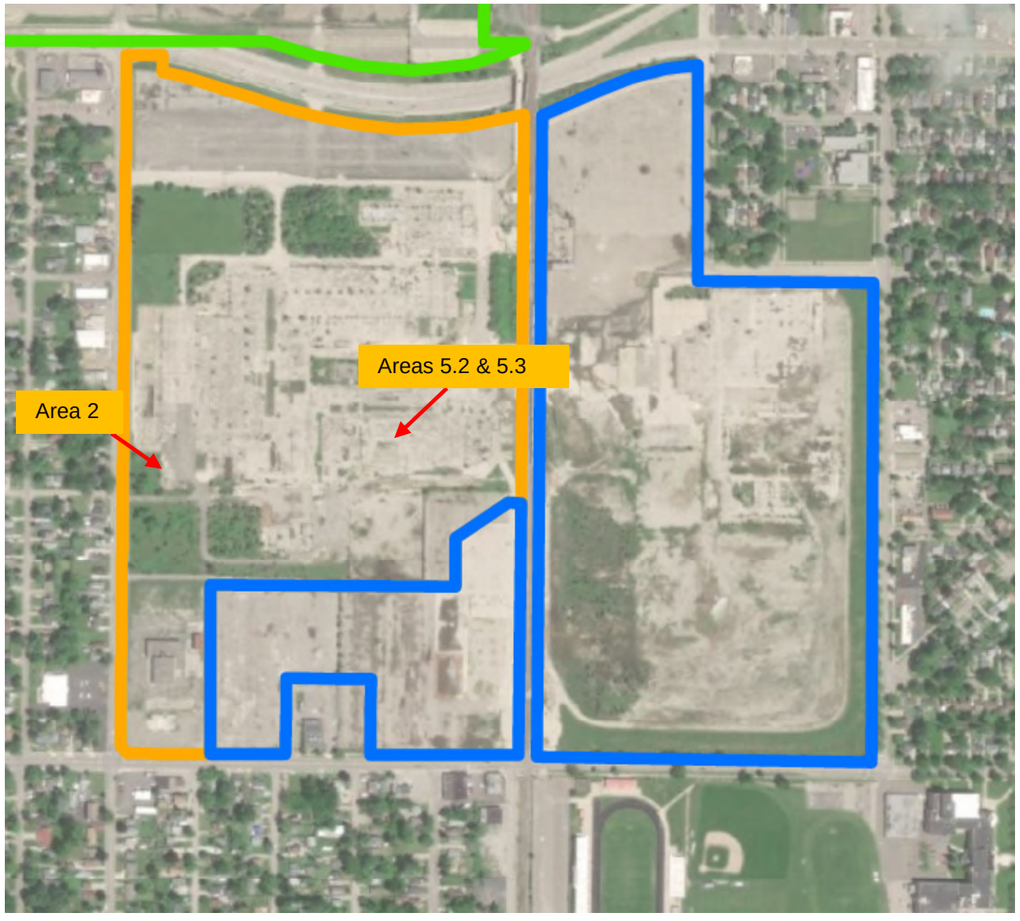
- Some requiring additional investigation to complete delineation

June 2021 - One area for delineation remaining

Complete summary report and identify:

- Areas to be included as notifications in Declaration of Restrictive Covenant
- Areas addressed through risk evaluation
- Areas requiring cover

Corrective Measures (CM) for Plant 2 and Plant 3 Soil



PLANT BOUNDARIES
- PLANT 2
- PLANT 3
- PLANT 6

Plant 2/Area 2 - Arsenic

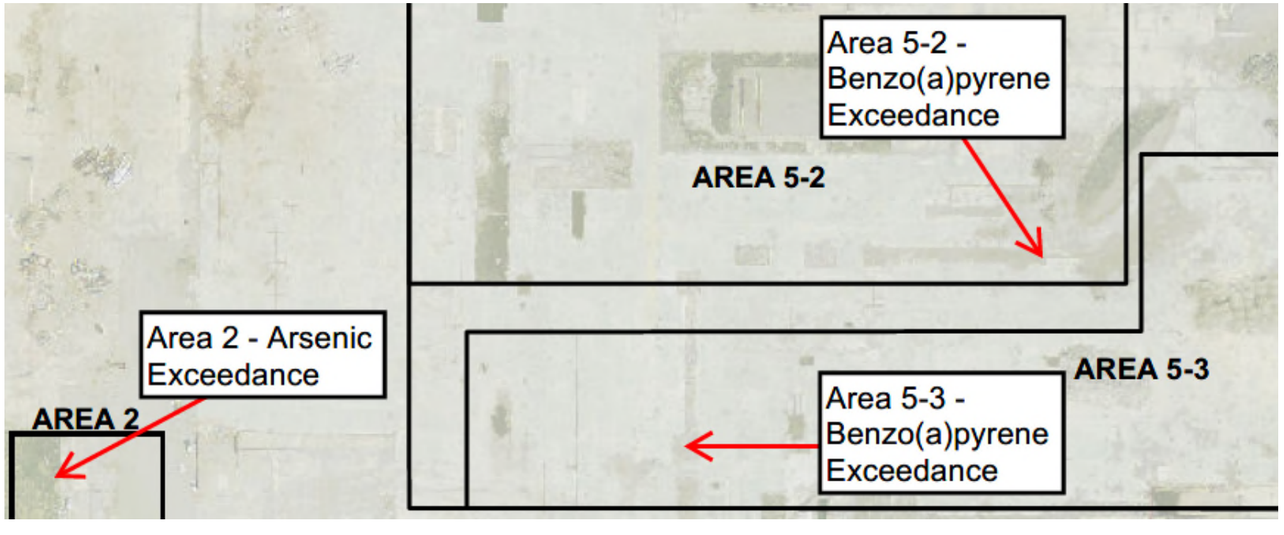
Direct Contact Criteria for Arsenic = 37 milligrams per kilogram (mg/kg)

- Area 5-2 Delineation Complete
- Evaluating corrective measures, due to two locations above Direct Contact Criteria
- Highest exceedance detected is 307 mg/kg

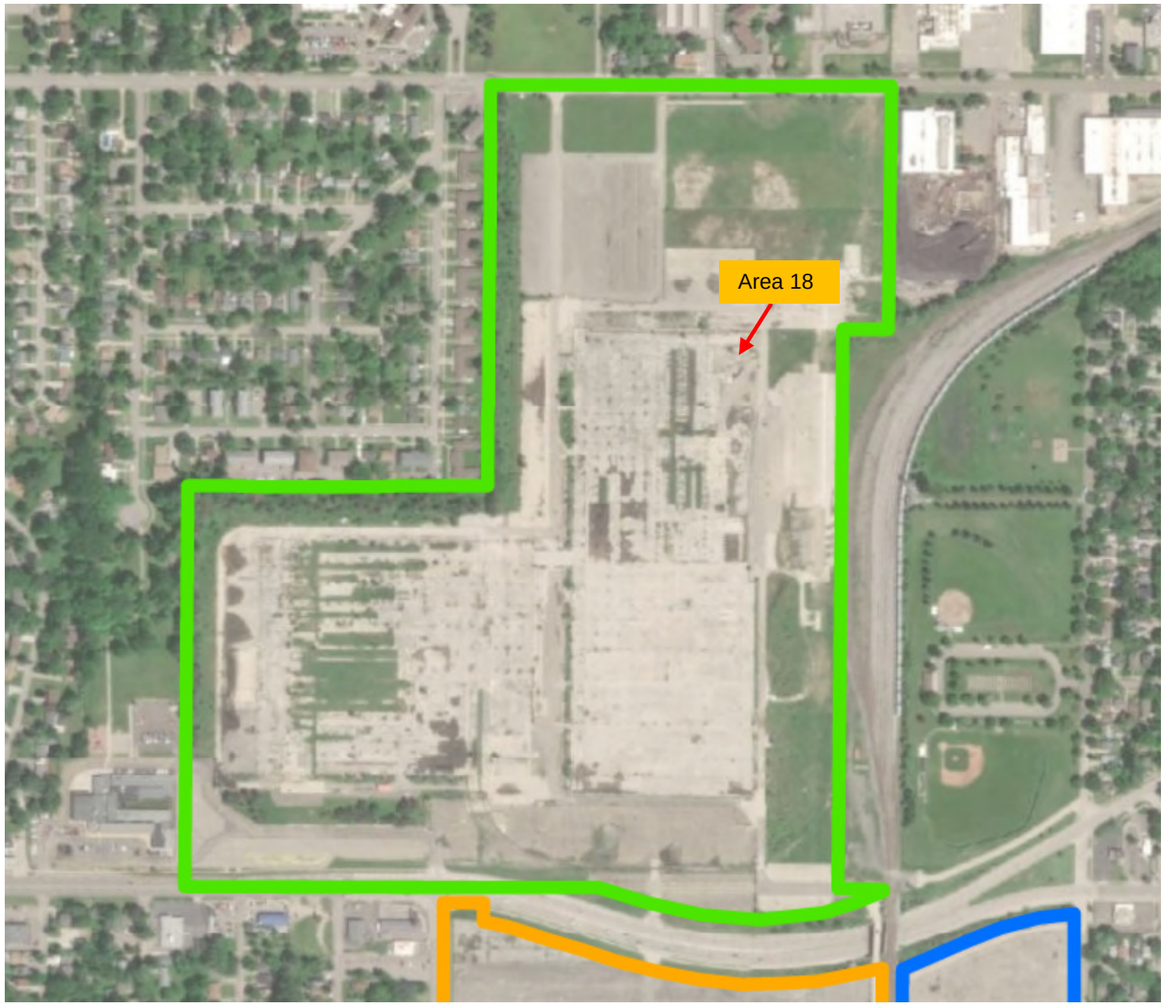
Plant 2/Areas 5-2 & 5-3

Direct Contact Criteria for Benzo(a)pyrene = 8,000 micrograms per kilogram (µg/kg)

- Exceedances limited to the fill area within the slabs
- Residual tarry substance, tar paper, etc. (likely roofing material) observed in fill material. Likely source of benzo(a)pyrene exceedances
- Highest exceedance is 39,000 µg/kg in Area 5-2 and 21,500 µg/kg in Area 5-3
- Evaluating corrective measures alternatives



Corrective Measures (CM) for Plant 2 and Plant 3 Soil

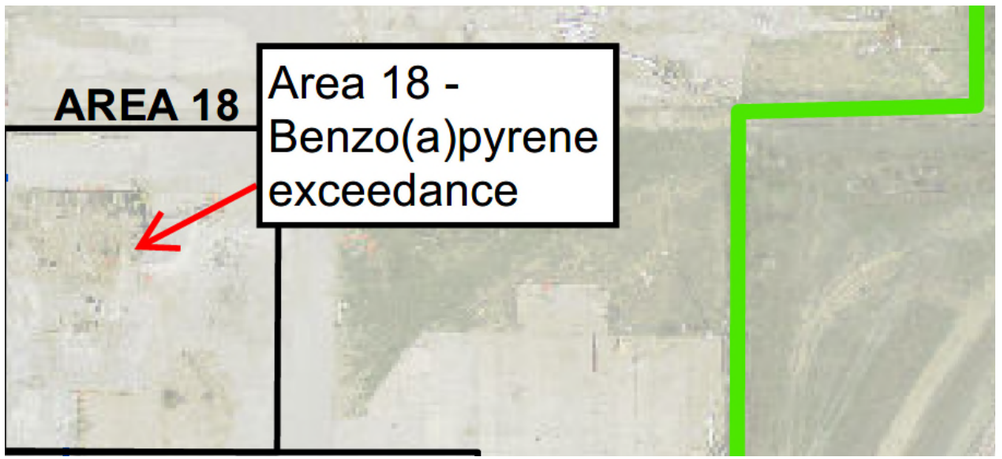


PLANT BOUNDARIES
- PLANT 2
- PLANT 3
- PLANT 6

Plant 3/Area 18

Direct Contact Criteria for Benzo(a)pyrene = 8,000 micrograms per kilogram (µg/kg)

- Delineation boring above criteria, which contained a detection of 14,500 µg/kg
- Additional step out sample location required for Area 18 to complete delineation
- Will evaluate this area for residual roofing material and corrective measures
- Highest exceedance detected is 42,237 µg/kg



Closure of Plant 2 Vault

- A vault containing contaminated water is present at Plant 2 (pink box area in figure)
- A scope of work to properly clean and close the vault was submitted to EGLE on April 13, 2021 for approval
- Once approval is provided by EGLE, RACER will schedule closure activities for the vault

Work in Progress and Near-Term Milestones Anticipated During the Third Quarter of 2021

Activity	Schedule
Remediation of 1,4-Dioxane in the Weathered Bedrock	
Plants 2 and 3 Biosparge System Operation	Ongoing
Plant 2 and 3 1,4-Dioxane Well installation and Abandonment Work Plan Submittal	July 2021
Remediation and Investigation of PFAS	
Plant 6 Off-site Groundwater investigation Scope of Work implementation (dependent upon EGLE approval)	August 2021
Plants 2 and 6 Storm Sewer Modification Update Report	July/August 2021
Quarterly Storm Sewer Sampling	August/September 2021
Other investigations and Sampling	
Perched Well Abandonment Work Plan Submittal	July 2021
Plant 2 TSCA (PCB) Soils IM Work Plan Submittal	August 2021
Plant 2 PCB Vault Closure Scope of Work Implementation	Upon EGLE Approval
Plant 2 and 3 Soils Corrective Measure Additional Delineation	July 2021
2021 Semi-Annual Groundwater Monitoring Report Submittal	August/September 2021
Third Quarter 2021 Groundwater Monitoring	September 2021

ARCADIS Design & Consultancy for natural and built assets

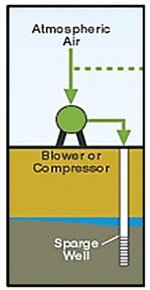
Appendix

BIOSPARGING TREATMENT OF 1,4-DIOXANE

Lansing Industrial Land, Lansing and Lansing Township, Michigan

WHAT IS BIOSPARGING?

- Air and small amounts of propane are injected into the ground through wells
- Promotes biodegradation of chemicals in groundwater, much faster than it would occur naturally
- 1,4-dioxane is treated in the ground, so minimal waste is generated
- Nearby wells are sampled to make sure treatment is occurring

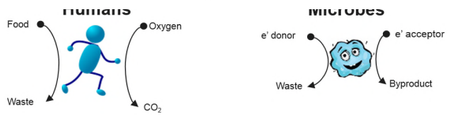


TREATMENT OBJECTIVES

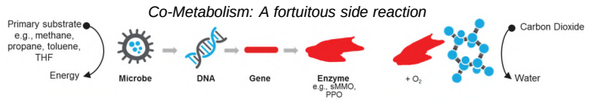
- Reduce onsite concentrations of 1,4-dioxane in the top/weathered zone of the bedrock aquifer
- Prevent off-site migration of 1,4-dioxane

CO-METABOLIC BIODEGRADATION OF 1,4-DIOXANE:

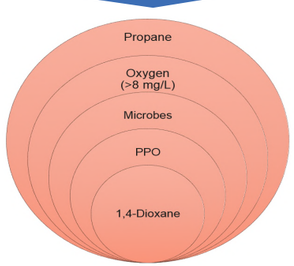
Metabolism: the goal is to produce energy



Co-Metabolism: A fortuitous side reaction

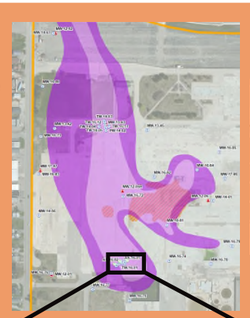


Propane + Oxygen + Microbes = 1,4-Dioxane Treatment



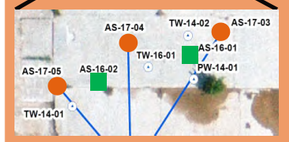
SYSTEM SETUP

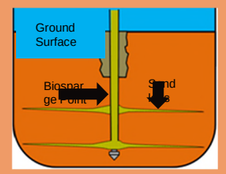
Propane



Compressor

Biosparge Points





Sand Enhancements

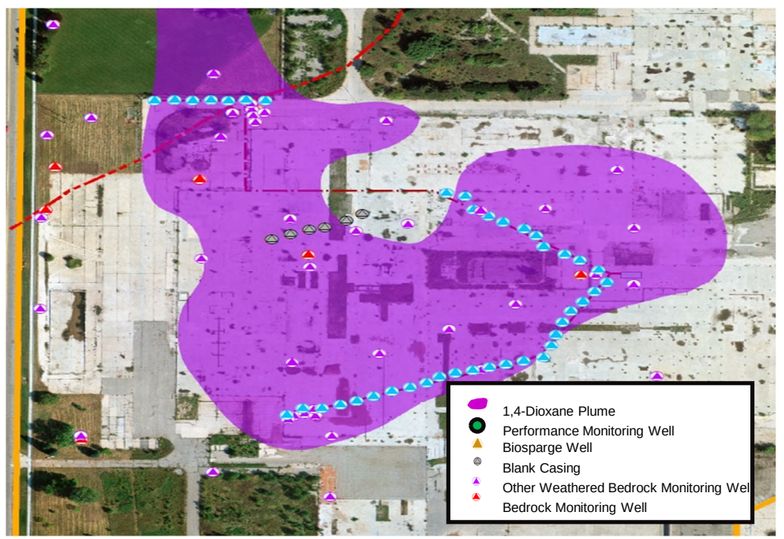
Biosparge Transect With Hoses in Gravel Cover

2016 Pilot Test Biosparge Points

2018 Pre-Design Study Biosparge Points With Sand Enhancements

Weathered Bedrock Monitoring Well

Plant 2 Biosparge Transect Layout



CONCLUSIONS

- Biosparging is a low cost, effective, safe and sustainable method for treating 1,4-dioxane
- Installation of sand enhancements improves treatment
- Continual monitoring of the treatment system improves results
- Technology can be scaled up to treat the rest of the site

FULL-SCALE DESIGN

- 5 transects with 48 air sparge wells across Plants 2 and 4
- Nearly 5 miles of air hose and an air/propane injection network
- Groundwater flows from northwest to southeast and is cleaned by each transect
- Tubing installed above grade to save on costs and to accommodate future development
- Network of monitoring wells to track treatment progress

Plant 2 Biosparge Unit and Nutrient Injection Tanks