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SWL&P MGP SITE
Superior, Wisconsin

WDNR/SWL&P Team Meeting
September 22 , 2021

Agenda

Safety Moment	Steve Laszewski
90% Design Documents – Overview and Highlights - RA Design Report - OM&M - FSP - CQAP - AMP - ECSMP - QAPP	Brian Symons
Upland Remediation Schedule	Erin Hughes
RAOs and Case Closure Approach	Erin Hughes
Other MGP Sites with Similar Closure Strategies; Lessons from NR700	Brian Symons
Permitting Timeline	Brian Symons
GLNPO Update	Erin Hughes

90% Remedial Action Design

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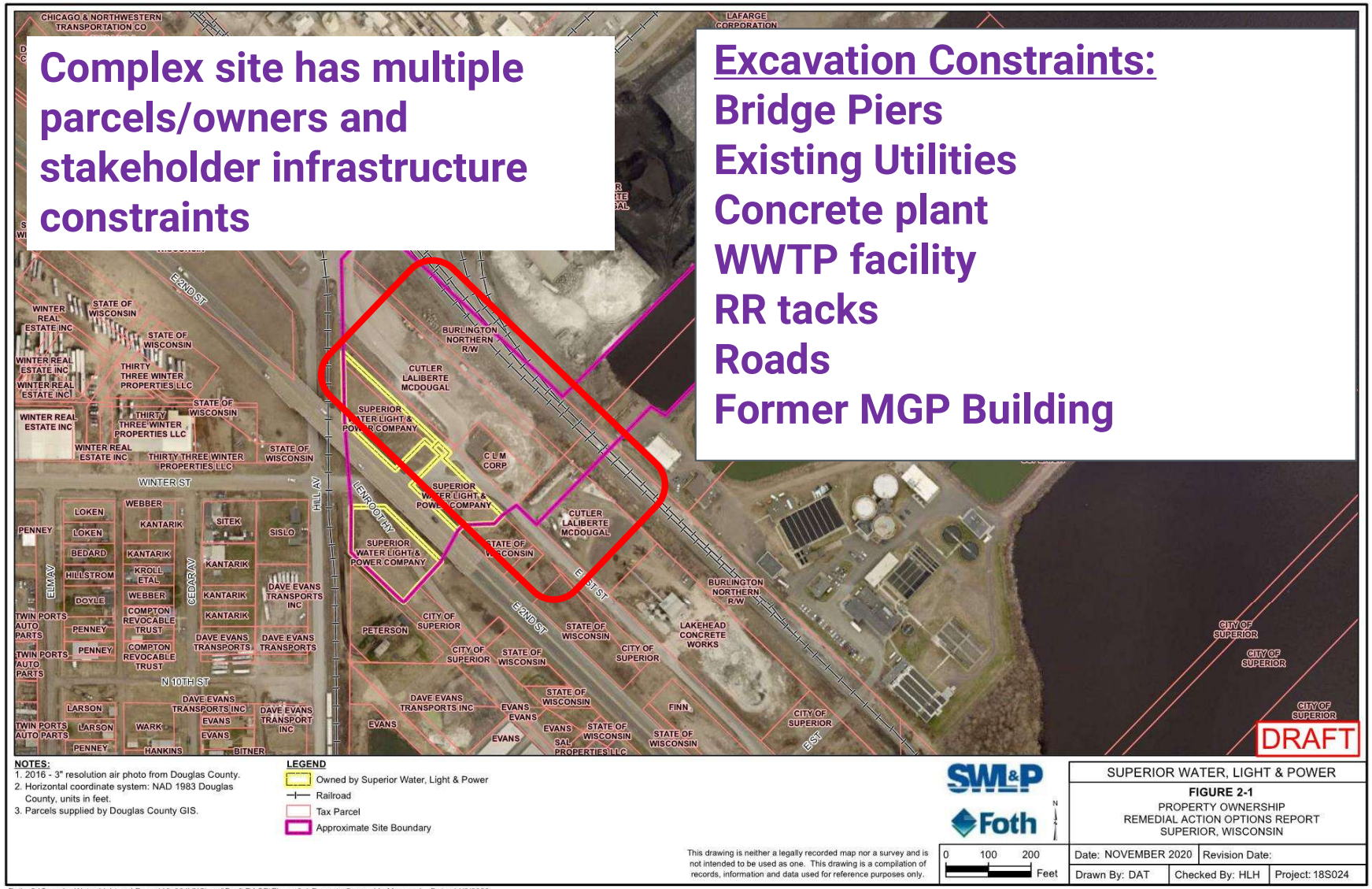
Key Elements of 90% RA Design Report

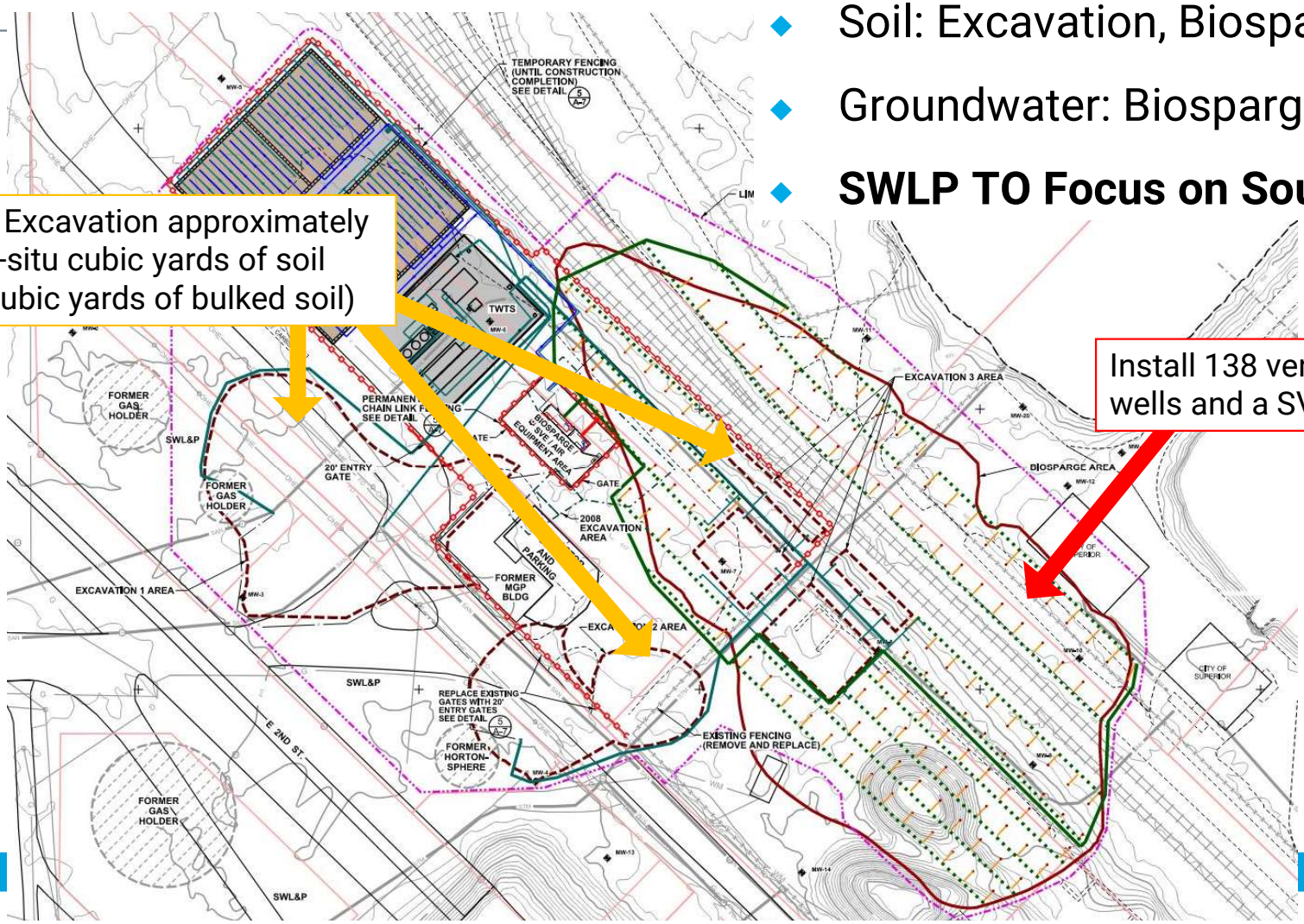
- Comment response matrix table attached to the cover letter.
- Sections 1.5 to 1.7 further describe monitoring to achieve RAOs, Contingency Action Plan, site closure approach, and continuing obligations.
- Performance monitoring approach (Table 1-1) and regulatory cross-reference (Table 1-2) added.
- Appendices revised including estimated residual soil/groundwater levels.
  - Appendix B-1 added to illustrate soil data and present most current groundwater data.
  - Appendix D-1 revised to further illustrate and document biosparge and MNA performance estimates.
- Other sections, tables, and drawings revised to address specific WDNR comments noted in the comment response matrix table.


Complex site has multiple parcels/owners and stakeholder infrastructure constraints
Excavation Constraints:
Bridge Piers
Existing Utilities
Concrete plant
WWTP facility
RR tacks
Roads
Former MGP Building
CHICAGO & NORTHWESTERN TRANSPORTATION CO
LAFARGE CORPORATION
E 2ND ST
WINTER REAL ESTATE INC
STATE OF WISCONSIN
THIRTY THREE WINTER PROPERTIES LLC
WINTER ST
BURLINGTON NORTHERN R/W
CUTLER LALIBERTE MCDOUGAL
SUPERIOR WATER LIGHT & POWER COMPANY
C L M CORP
HILL AV
LENROOT HY
WEBBER
LOKEN
KANTARIK
SITEK
SISLO
PENNEY
BEDARD
HILLSTROM
KROLL ETAL
DOYLE
ELM AV
CEDAR AV
COMPTON REVOCABLE TRUST
DAVE EVANS TRANSPORTS INC
TWIN PORTS AUTO PARTS
N 10TH ST
LARSON
WARK
EVANS
HANKINS
BITNER
PETERSON
CITY OF SUPERIOR
LAKEHEAD CONCRETE WORKS
FINN
SAL PROPERTIES LLC
E 1ST ST
DRAFT
NOTES:
1. 2016 - 3" resolution air photo from Douglas County.
2. Horizontal coordinate system: NAD 1983 Douglas County, units in feet.
3. Parcels supplied by Douglas County GIS.
LEGEND
Owned by Superior Water, Light & Power
Railroad
Tax Parcel
Approximate Site Boundary
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data used for reference purposes only.
0 100 200 Feet
SUPERIOR WATER, LIGHT & POWER
FIGURE 2-1
PROPERTY OWNERSHIP
REMEDIAL ACTION OPTIONS REPORT
SUPERIOR, WISCONSIN
Date: NOVEMBER 2020
Revision Date:
Drawn By: DAT
Checked By: HLH
Project: 18S024
Path: Q:\Superior Water Light and Power\18s024\GIS\mxd\Draft RAOR\Figure 2-1 Property Ownership Map.mxd Date: 11/2/2020

Upland Remedial Action Layout

- Soil: Excavation, Biosparge and SVE
- Groundwater: Biosparge and SVE
- **SWLP TO Focus on Source Areas**

Targeted Excavation approximately 10,600 in-situ cubic yards of soil (13,000 cubic yards of bulked soil)



Install 138 vertical biosparge wells and a SVE System

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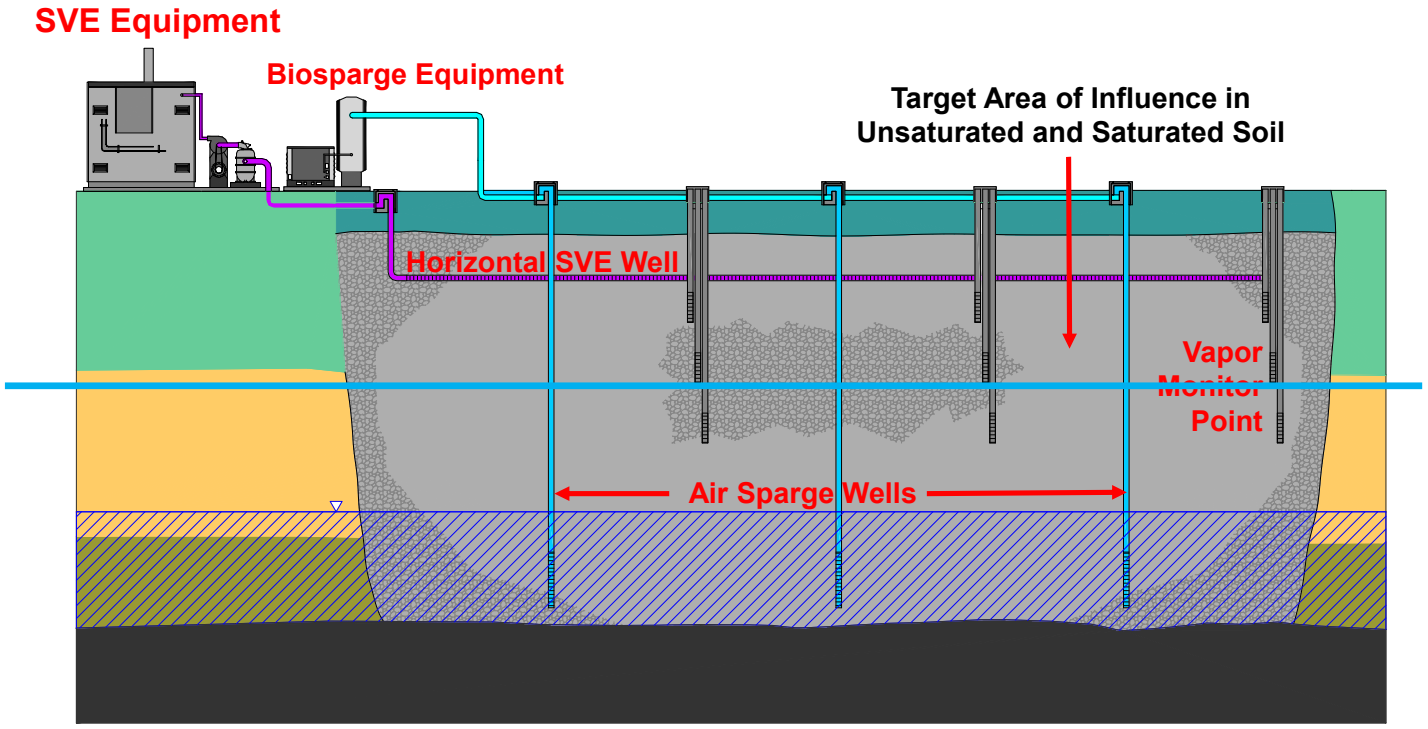
Biosparge/SVE Schematic



Summary of Selected Remedy and Remedy Performance

- RA Option 3 (excavation, biosparge/SVE, and MNA) was selected as the WDNR-approved preferred remedy in the RAOR
- Source control consists of removal and treatment
- Source control leads to lower residual soil concentrations and greater groundwater plume reductions
- Monitoring to establish that asymptotic SVE and stable groundwater conditions are attained (more detail included in the OM&M Plan)
- NR726 Closure Criteria (more detail included in the OM&M Plan)

OM&M, FSP, CQAP, AMP, ECSMP and QAPP Documents

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Key Elements of Documents

- OM&M Plan
  - The RA OM&M Plan describes operation, maintenance, monitoring for implementing the RA and defines the approach to demonstrate achievement of applicable RAOs.
- CQAP
  - The CQAP outlines the construction inspection and documentation procedures utilized before, during, and after construction activities.
- FSP
  - The FSP describes RA sampling and analytical procedures, QA/QC, and reporting for soil, water, and air including both field screening and off-site laboratory analyses.
- AMP
  - The AMP describes how ambient air quality will be managed during construction.

Key Elements of Documents

- ECSMP
  - The ESCMP describes the site-specific erosion control and stormwater management practices implemented before land disturbance and during construction and describes conditions established during construction to minimize post-construction erosion.
- QAPP
  - The RA QAPP describes the QA/QC methods and standard operating procedures (SOPs)for the collection and analysis of environmental samples (soil, groundwater, air, and soil gas chemistry samples, and in-situ soil data).

Upland Remediation Schedule

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Upland Remediation and Monitoring Schedule

Task		Upland Design and Approval	Contracting	Contractor Prep, Permitting, and Mobilization	Upland Remedial Construction	Construction Completion Report	Biosparge/ SVE Operation	Upland Site Monitoring	Site Closure
2021	Sep								
	Oct								
	Nov								
	Dec								
2022	Jan								
	Feb								
	Mar								
	Apr								
	May								
	Jun								
	Jul								
	Aug								
	Sep								
	Oct								
	Nov								
	Dec								
2023									
2024									
2025									
2026									
2027									
2028									

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RAOs and Closure Approach

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Remedial Action Objectives

- **RAO 1 – Shallow Soils (0 to 4 feet below ground surface [bgs]): Reduce risk to human health receptors from direct contact.** Remove shallow contaminated soils with concentrations that exceed the WDNR Chapter NR 720 Residual Contaminant Levels for Direct Contact (D-C RCL), Industrial exposure, Not-To-Exceed concentrations. These D-C RCL levels are listed in Table 2-1 of the *Field Sampling Plan (FSP)* (Foth, 2021b).

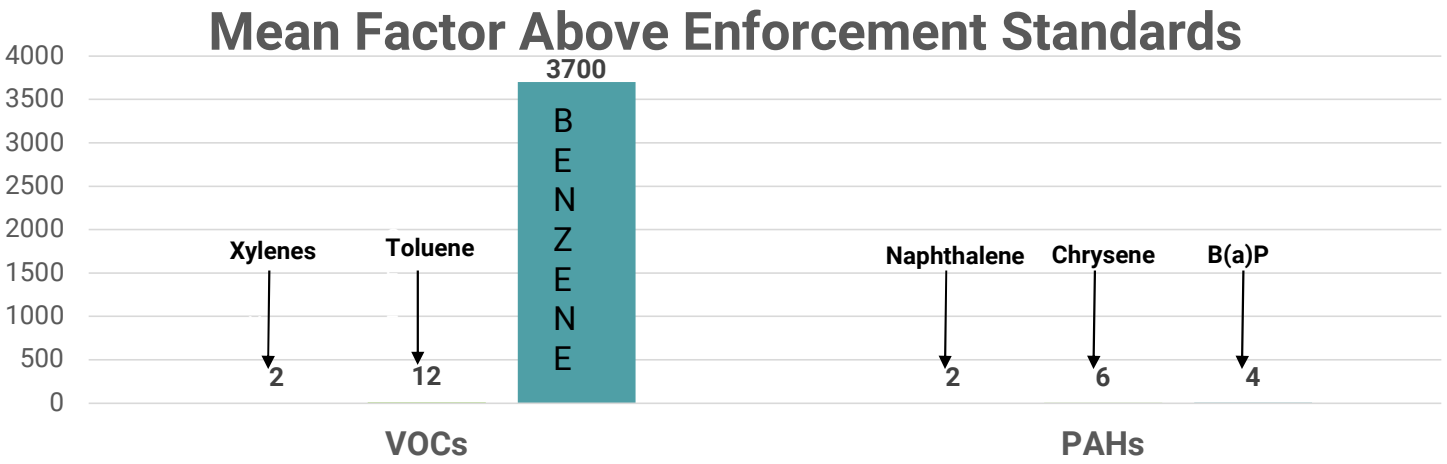
- **RAO 2 – Deeper Soils (>4 feet bgs): Reduce contaminant mass in subsurface soil source materials.** Reduce the contaminant mass in soil and groundwater as measured from pre- and post-RA measurements and approach an asymptotic rate of mass removal for an *in-situ* remedy, demonstrating that active remedy operations can cease.

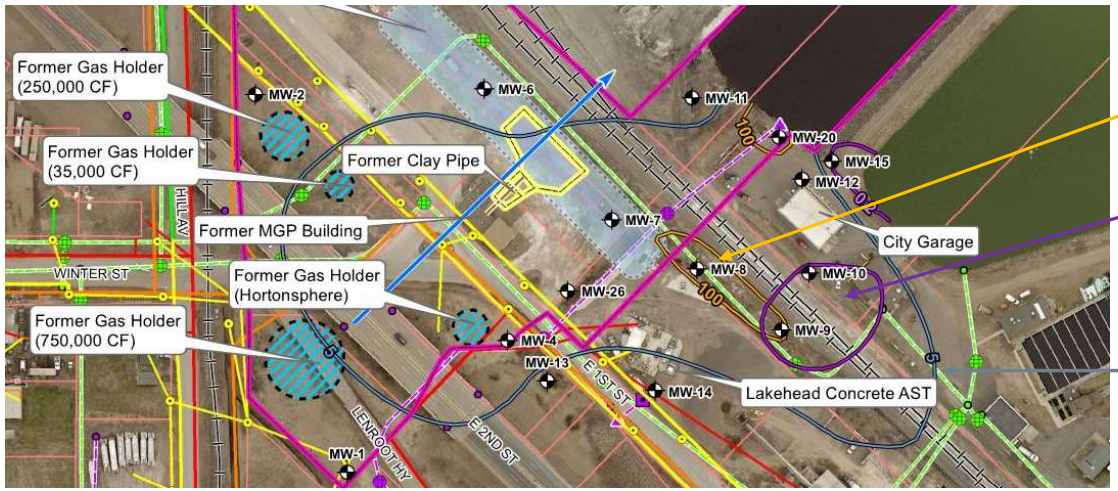
- **RAO 3 – Groundwater: Restore groundwater to the extent practicable.** Attainment of a stable or receding groundwater plume, as demonstrated over a minimum of eight quarterly sampling events, indicating sustained groundwater Natural Attenuation.

Remedial Approach and Closure Strategy

- Active Remedial Measures in 2022:
  - Excavation 10,600 cy soil in-situ
  - ORC in backfill below water table
  - Backfill with low permeability materials
  - Biosparge/SVE construction and approximately 4 years of operation
  - Performance Based Closure per NR700/NR726 Approach
- Source control/removal at approximately 95% contaminant mass, leaving residual contamination

Driving COCs at the Site



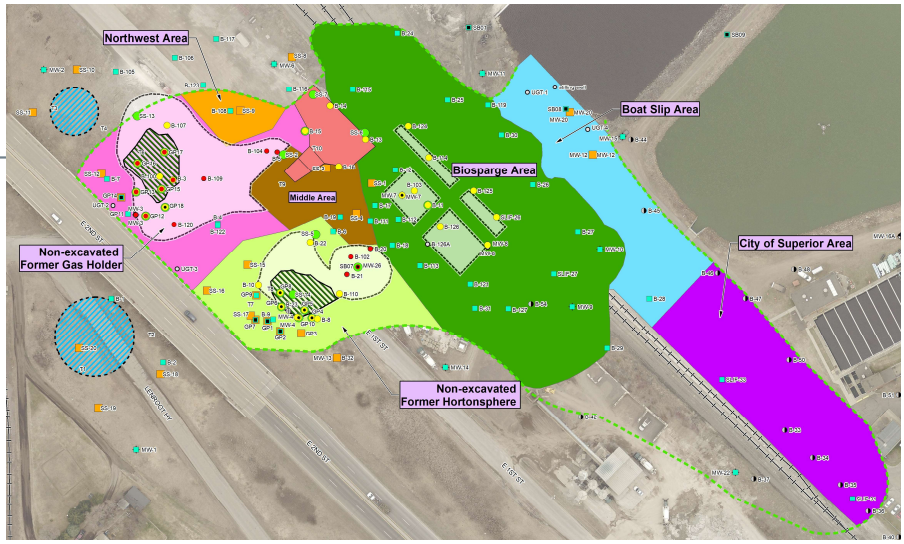


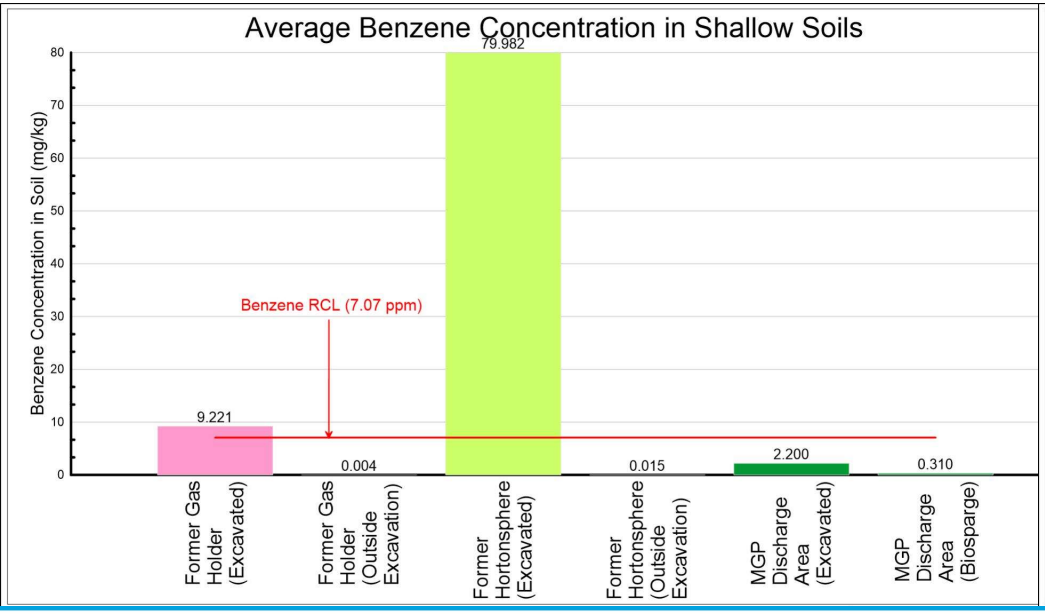
Naphthalene

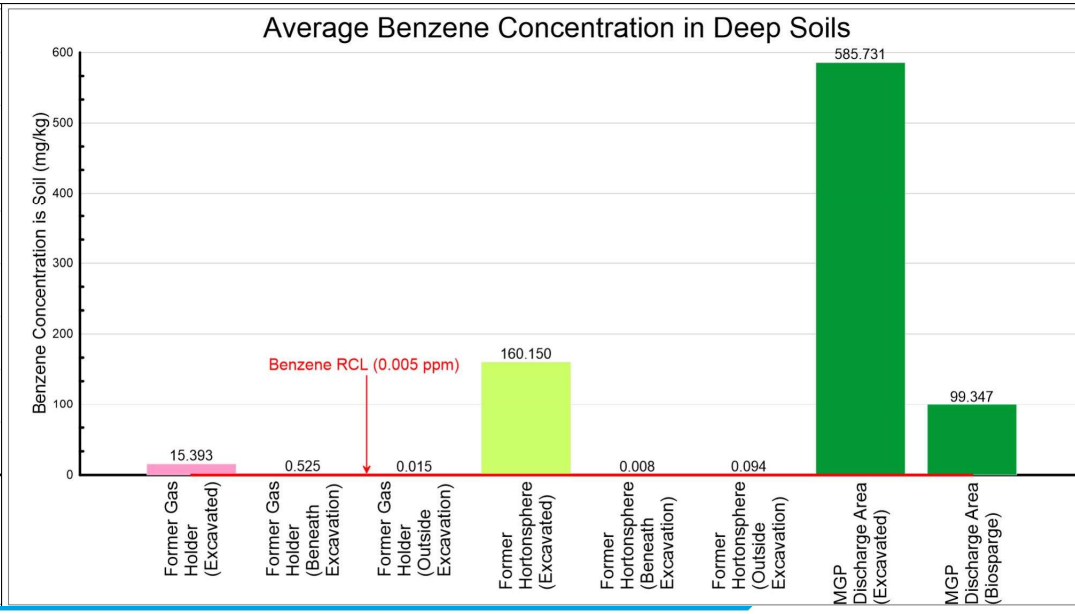
B(a)P

Benzene

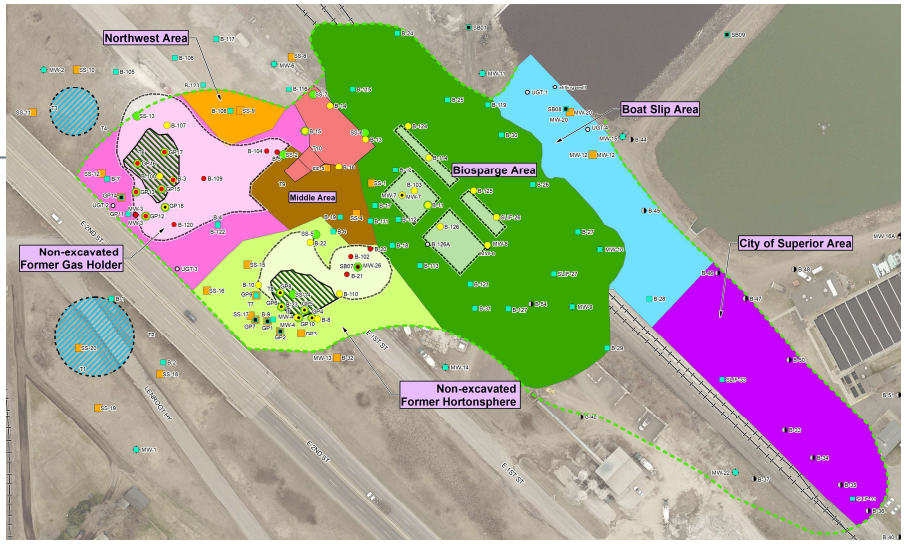
Source Targeted for Removal

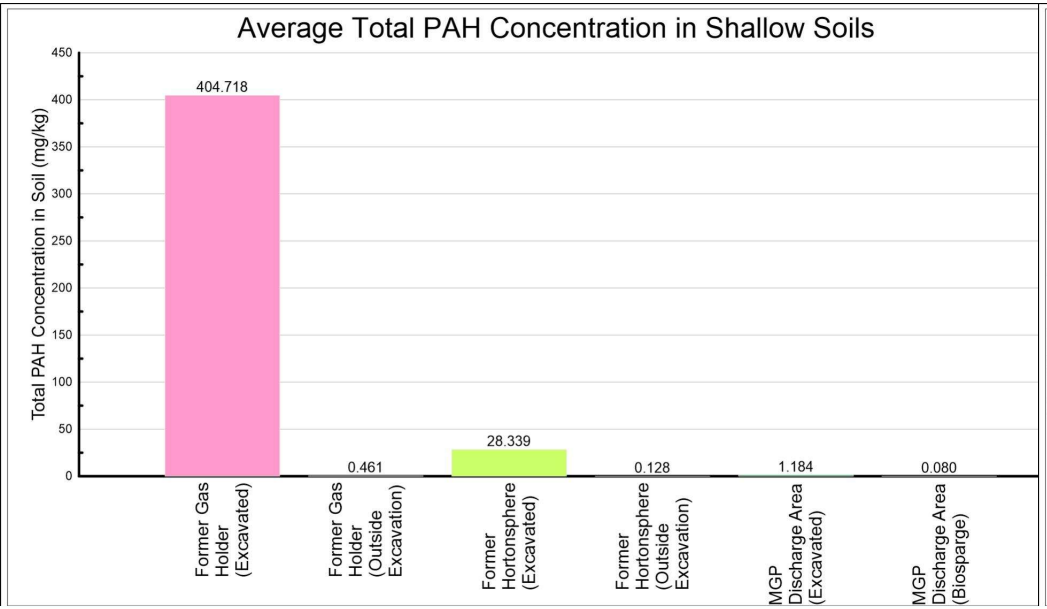


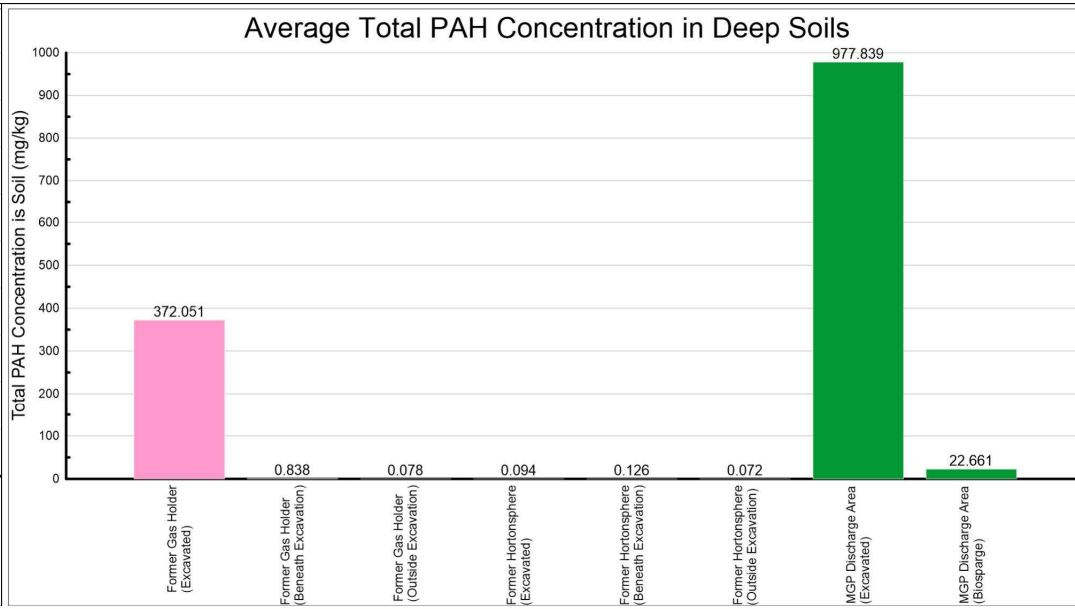




Source Targeted for Removal



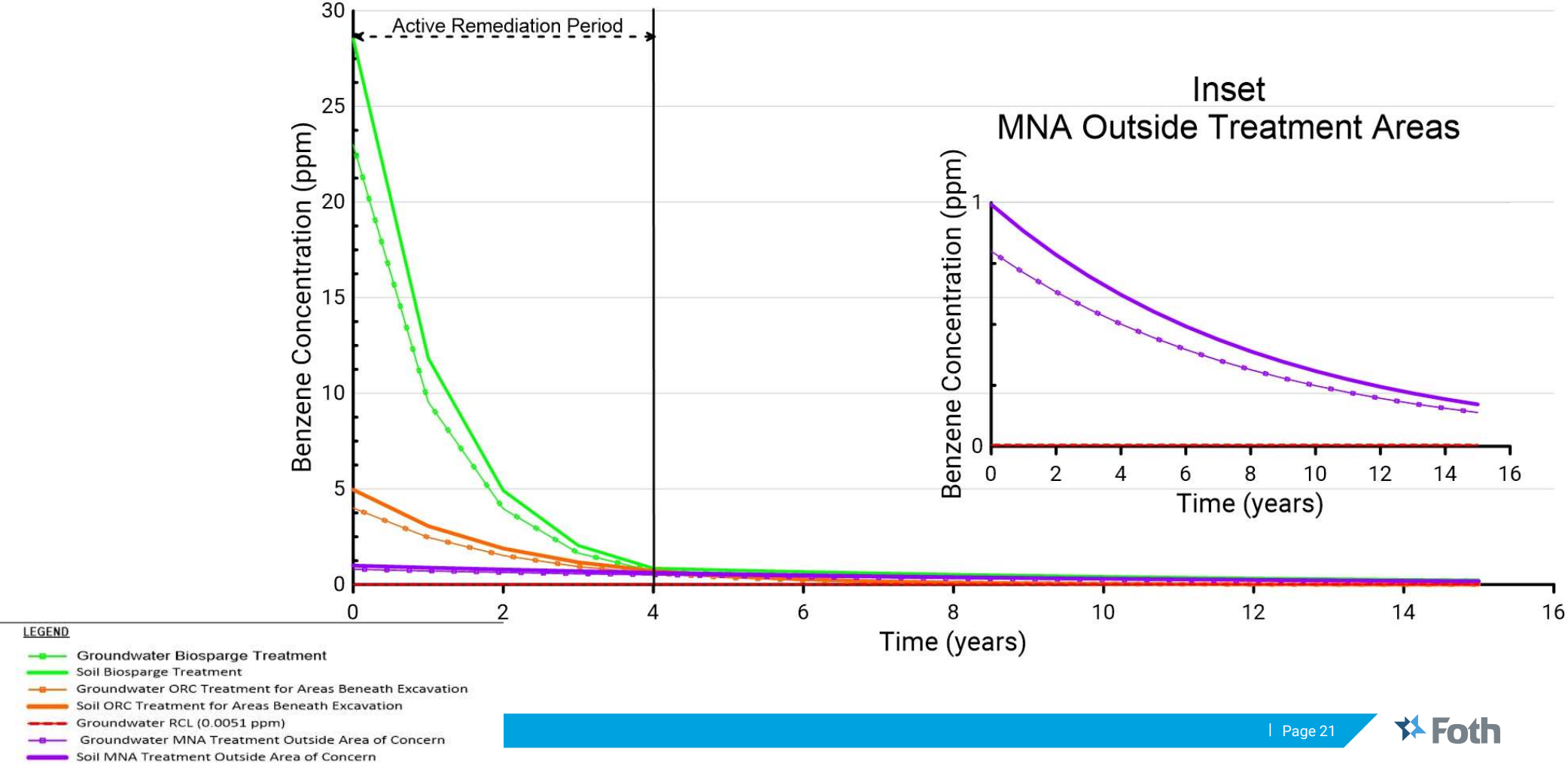




Biosparge and MNA Performance Evaluation

- **Biosparge, Enhanced MNA, and MNA** were evaluated using standard industry approach and equations for removal of chemicals with time.
- Model results are most sensitive to **biodegradation rates**. Aerobic and anaerobic rates based on literature citations and Foth experience.
- Other key parameters established based on **site-specific data**: initial soil/groundwater concentration, soil/water partition coefficients, total organic carbon content and aquifer hydraulic conductivity.
- Site-specific soil/water partition coefficients compare well with **WDNR default data** (from EPA RSL Table).

Predicted Biosparge and MNA Performance



Remedial Approach and Closure Strategy

- Monitoring approach will seek to confirm groundwater contamination plume is shrinking/stable and poses no human health or environmental risk
- Active remediation followed MNA to **Achieve Remedial Active Objectives**
- As provided in NR700 WDNR **Continuing Obligations** will apply to Properties

NR726.05(6) Closure Criteria

- Adequate source control measures have been taken.
- Natural attenuation will bring the groundwater into compliance with NR 140 within a reasonable period of time.
- The groundwater plume margin is stable or receding.
- There is no existing or anticipated threat to public health, safety or welfare or the environment.
- All applicable environmental laws have been complied with.

Remedial Approach and Closure Strategy

- **Contingency Action Plan** (in OM&M Plan)– if RAOs are not met:
  - Adjust treatment system
  - Treat soil or groundwater for a longer time prior than expected
  - Perform targeted active remediation in select areas

Table 1-1
Performance Monitoring to Achieve Remedial Action Objectives

RAO 1 – Shallow Soils (0 to 4 feet bgs): Reduce risk to human health receptors from direct contact.
SHALLOW SOIL EXCAVATION

Construct Facilities and Excavate Soil According to Design
- Site Preparation: Design, A-series drawings
- Excavation Limits: Design, B- and C-series drawings
- Temporary Water Treatment System: Design, D-series drawings
- Biosparge/SVE/Air Treatment: Design, E- and F-series drawings

Monitor Soil Quality (per Field Sampling Plan)
1) Excavate soil to excavation limits and segregate as follows:
   - Soil <Industrial Shallow Soil D-C RBC
   - Impacted Soil (>Industrial Shallow Soil D-C RBC and <10 mg/kg benzene)
   - Impacted Soil (> 10 mg/kg benzene)
2) Excavation limits (bottom/sides of excavation)
   - 1 sample / 625 ft2 (25 ft x 25 ft grid) to document residual soil quality only

Evaluate Soil Data
1) Determine final disposal requirements
   - Soil <Industrial Shallow Soil D-C RBC may be used as shallow excavation fill
   - Soil meeting landfill criteria may be loaded and transported to landfill
   - Soil requiring pre-treatment; treated in vented pile before off-site disposal
2) Update mass-removed and residual soil quality (bottom/sides of excavation)
   - See RAOR, App. A-1 and Design, App. B-1)

EXCAVATION COMPLETE
RAO 1 ACHIEVED

RAO 2 – Deeper Soils (>4 feet bgs): Reduce contaminant mass in subsurface soil source materials.
DEEP SOIL EXCAVATION

Construct Facilities and Excavate Soil According to Design
- Site Preparation: Design, A-series drawings
- Excavation Limits: Design, B- and C-series drawings
- Temporary Water Treatment System: Design, D-series drawings
- Biosparge/SVE/Air Treatment: Design, E- and F-series drawings

Monitor Soil Quality (per Field Sampling Plan)
1) Excavate soil to excavation limits and segregate as follows:
   - Soil <Industrial Shallow Soil D-C RBC)
   - Impacted Soil (>Industrial Shallow Soil D-C RBC and <10 mg/kg benzene)
   - Impacted Soil (> 10 mg/kg benzene)
2) Excavation limits (bottom of excavation)
   - 1 sample / 625 ft2 (25 ft x 25 ft grid) to document residual soil quality only

Evaluate Soil Data
1) Determine final disposal requirements
   - Soil <Industrial Shallow Soil D-C RBC may be used as shallow excavation fill
   - Soil meeting landfill criteria may be loaded and transported to landfill
   - Soil requiring pre-treatment; treated in vented pile before off-site disposal
2) Update mass-removed and residual soil quality (bottom of excavation)
   - See RAOR, App. A-1 and Design, App. B-1)

EXCAVATION COMPLETE
RAO 2 FOR EXCAVATION ACHIEVED

CONSTRUCTION COMPLETION

RAO 2 – Deeper Soils (>4 feet bgs): Reduce contaminant mass in subsurface soil source materials.
BIOSPARGE/SVE

Treat Air Before Discharge in Air Treatment System
- Air from Vented Piles
- Air from SVE System effluent

Monitor Soil, Groundwater, and Air Quality (per Field Sampling Plan)
1) Air - Measure monthly at SVE Blower Influent
2) Groundwater - Measure quarterly at wells in Area A, B, C, and D
3a) Initial Soil - Measure at each biosparge well location during construction
3b) Final soil - Measure at 50 locations throughout Area A, B, C, and D

Evaluate SVE Recovered Air Data
1) Graph COCs in air vs time using SVE system influent air data
   Total BTEX, mostly benzene, Measured vs. Predicted
   Total PAH, mostly naphthalenes, Measured vs. Predicted
2) Identify Asymptotic Decline in Total BTEX & Total PAH Mass Removal after 6 months
3) Statistically Evaluate Significance of Asymptotic Trend
   Decreasing --> Decreasing >5% of initial rate --> Continue Treatment
   Increasing --> Continue Treatment, but optimize operations
   Stable (Asymptotic) --> Decreasing <5% of initial rate
      a) Shut down system for 1 week
      b) Restart system and monitor for rebound (COCs >10% above pre-shut down)
      c) Identify if hot spots exist based on soil vapor probe data
         1) Hot Spots Exist - Restart System for focused treatment
         2) No Hot Spots Exist - EVALUATE GROUNDWATER DATA

Evaluate Groundwater Data
1) Graph COCs from quarterly groundwater data vs time
   Total BTEX, mostly benzene, Measured vs. Predicted
   Total PAH, mostly naphthalenes, Measured vs. Predicted
2) Identify Asymptotic Decline in Groundwater Concentrations after 1 year
   Decreasing --> Decreasing >5% of initial rate --> Continue Treatment
   Increasing --> Continue Treatment, but optimize operations
   Stable (Asymptotic) --> Decreasing <5% of initial rate
      a) Shut down system for 3 months
      b) Monitor GW at next quarterly event for rebound (COCs >10% above pre-shut down)
      c) Identify if hot spots exist based on individual well data
         1) Hot Spots Exist - Restart System for focused treatment
         2) No Hot Spots Exist - EVALUATE SOIL DATA

Evaluate Soil Data
1) Tabulate initial and final soil data including average soil concentrations
   Total BTEX, mostly benzene, Initial vs. Final
   Total PAH, mostly naphthalenes, Initial vs Final
2) Compare percent removal to predicted performance (Design, App. D-1)
   Treatment < Predicted Performance --> Consider GW Concentrations
      a) If COCs in groundwater < or = predicted --> BIOSPARGE COMPETE
      b) If COCs in groundwater > predicted --> Evaluate hot spots
         1) Hot spots do not exist --> BIOSPARGE COMPLETE
         2) Hot spots exist --> Implement Contingency Actions
            Hot spot addressed --> BOSPARGE COMPLETE
            Additional biosporge performed --> BIOSPARGE COMPLETE
   Treatment > or = Predicted Performance --> BIOSPARGE COMPLETE
      Predicted = prediction after 4 year's treatment time (Design, App. D-1)
      Actual = calculated from measured initial and final data

BIOSPARGE COMPLETE
RAO 2 FOR BIOSPARGE ACHIEVED

RAO 3 – Groundwater: Restore groundwater to the extent practicable.
MONITORED NATURAL ATTENUATION

Monitor Long-Term Groundwater Network (per Field Sampling Plan)
- Long-Term monitoring begins once construction is complete
- Monitor all groundwater monitoring wells in network, quarterly for 8 quarters

Evaluate Groundwater Data
1) Perform Groundwater Statistical Analysis
   - Trend Analysis by well vs. time (Total BTEX and Total PAH)
   - Trend analysis by plume area vs. time (Total BTEX and Total PAH)
   - Trend analysis by plume mass vs. time (Total BTEX and PAH)
2) Evaluate Data Results
   Stable (Asymptotic) for all trends --> RAO 3 IS ACHIEVED
   Increasing by well, but stable or decreasing plume mass and area
   --> RAO3 IS ACHIEVED
   Increasing by well, and increasing plume area and mass
   --> Monitor groundwater one more year/Repeat
   Perform well network analysis (after 8 quarters) to evaluate:
      1) Wells that may be deleted from network
      2) Wells to be added to network
      3) Change in monitoring frequency (semi-annual)

MONITORED NATURAL ATTENUATION COMPLETE
RAO 3 ACHIEVED

REMEDIAL ACTION COMPLETION

LEGEND

- Remedial Action Objective
- Design Requirement
- Monitoring Activity
- Data Evaluation Steps / Data Evaluation Outcome / *Data Evaluation Qualifier*
- RAO Completion Outcome
- Remedial Action Completion

Prepared by:	BDS1	Date:	4/12/2021
Reviewed by:	RMK	Date:	

Table 1-1 Monitoring to Achieve Remedial Action Objectives

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Other MGP Sites with Similar Closure Strategies; Lessons Learned

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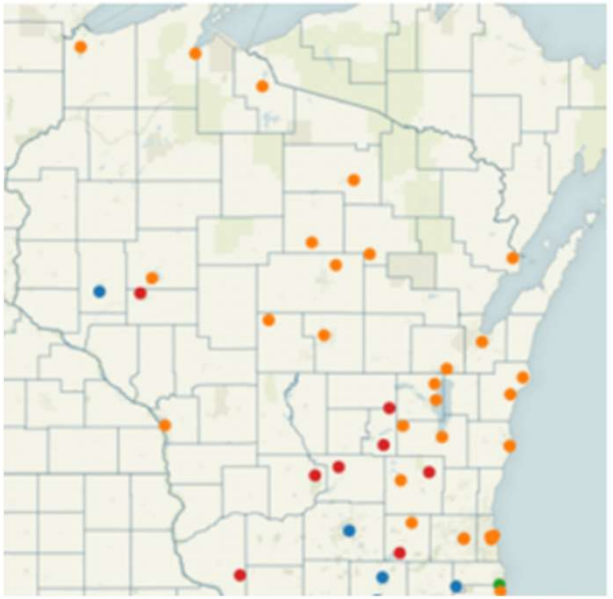
Lessons Learned with NR 700



- MGP Sites In Wisconsin
  - Reviewed closure summaries for the 29 closed MGP sites throughout Wisconsin.
  - Current and future land use was generally **industrial**.
  - The most common remedy for removing source area soil **excavation**.
  - Other remedies were evaluated and/or utilized at these sites including biosparging/SVE, in-situ soil stabilization (ISS), and chemical injection (ISCO or for enhanced MNA).
  - A combination of soil cover, gravel cover, asphalt pavement, and/or building foundation met the **"Cover or Barrier"** performance standard, consistent with clay fill in the former MGP gas holder and former Hortonsphere excavations.

Lessons Learned with NR 700

- MGP Sites In Wisconsin
  - **Nearly every closed MGP site had residual groundwater above the enforcement standard of 5 ug/L for benzene and/or residual benzene or PAHs above groundwater protection RCLs.**
  - Residual groundwater concentrations of benzene were as high as 4,900 ug/L.
  - Residual soil concentrations:
    - **Benzene** as high as 56,000 ug/kg in deep soil, compared to a site-specific target excavation concentration of 5,000 ug/kg and site-specific biosparge target concentration of 1,000 ug/kg.
    - **Naphthalene** as high as 500,000 ug/kg in deep soil.
    - **Benzo(a)pyrene** as high as 15,700 ug/kg in deep soil.

Permitting Timeline

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Permitting

- Permits to complete
  - BNSF: Environmental Access, Shoring, Underground Boring, Track Monitoring Plan
  - City of Superior: ROW/Traffic Control, Treated Wastewater Discharge, Stormwater
  - WDNR: Construction Stormwater, Air Discharge Notice of Intent, Underground Injection
- Schedule
  - Outstanding issues – BNSF permitting is longest/most difficult (6 weeks minimum)
  - Alignment with 2022 construction
  - Submittal dates in revised schedule

GLNPO Update

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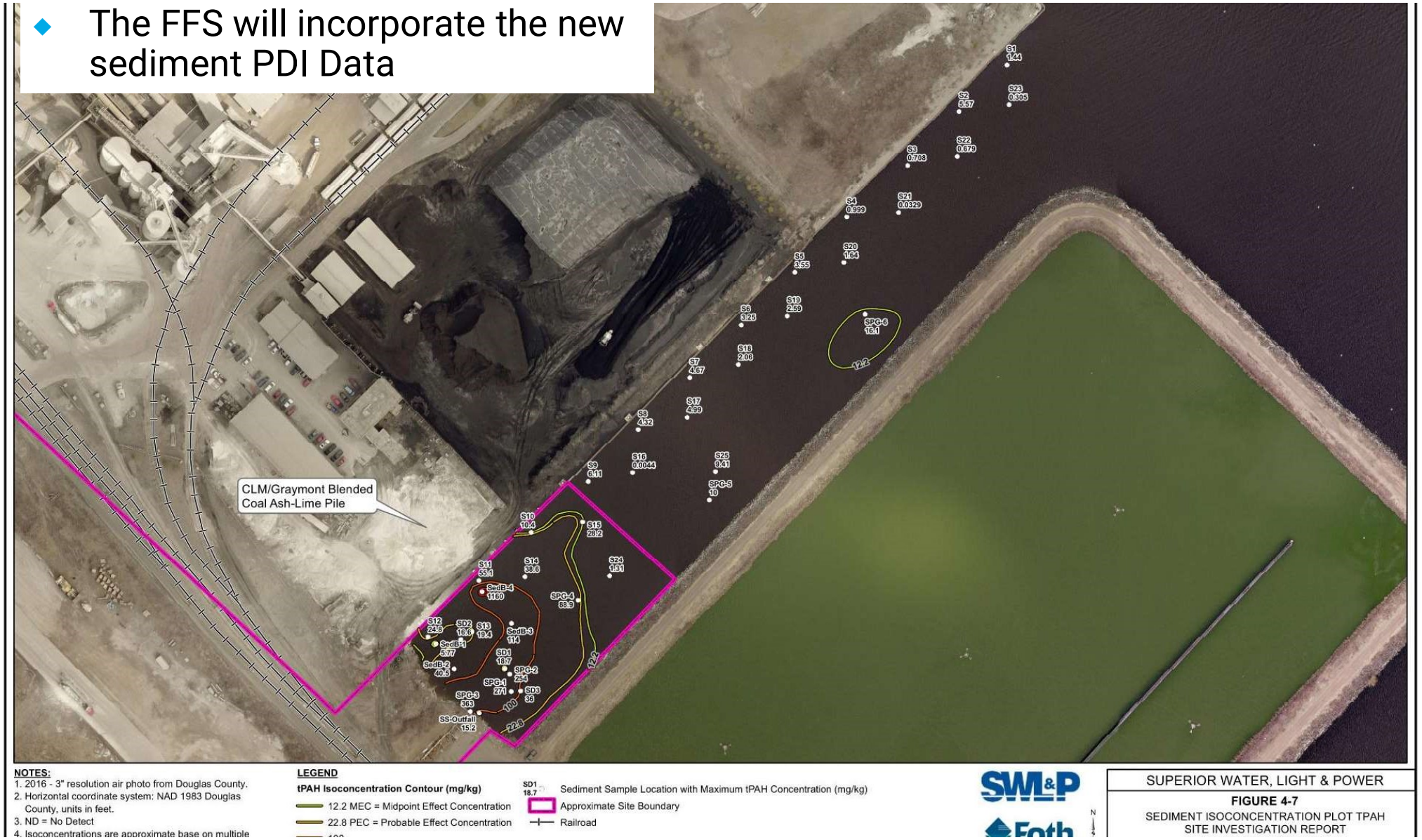
- The FFS will incorporate the new sediment PDI Data



NOTES:
1. 2016 - 3" resolution air photo from Douglas County.
2. Horizontal coordinate system: NAD 1983 Douglas County, units in feet.
3. ND = No Detect
4. Isoconcentrations are approximate base on multiple

LEGEND

tPAH Isoconcentration Contour (mg/kg)
- 12.2 MEC = Midpoint Effect Concentration
- 22.8 PEC = Probable Effect Concentration

SD1 18.7 Sediment Sample Location with Maximum tPAH Concentration (mg/kg)
Approximate Site Boundary
Railroad

SUPERIOR WATER, LIGHT & POWER

FIGURE 4-7

SEDIMENT ISOCONCENTRATION PLOT TPAH
SITE INVESTIGATION REPORT

In-Water Remediation and Monitoring Schedule

Task		Prepare FFS	FFS Approval	In-Water Design and Approval	Contractor Prep, Permitting, and Mobilization	In-Water Remedial Construction	Project Close Out with GLNPO
2021	Oct						
	Nov						
	Dec						
2022	Jan						
	Feb						
	Mar			30% RD Check-In			
	Apr						
	May			60% RD Submittal			
	Jun						
	Jul			90% RD Submittal			
	Aug						
	Sep			Finalize RD			
	Oct						
	Nov						
	Dec						
2023	Jan						
	Feb						
	Mar						
	Apr						
	May						
	Jun						
	Jul						
	Aug						
	Sep						
	Oct						
	Nov						
	Dec						

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Adjourn