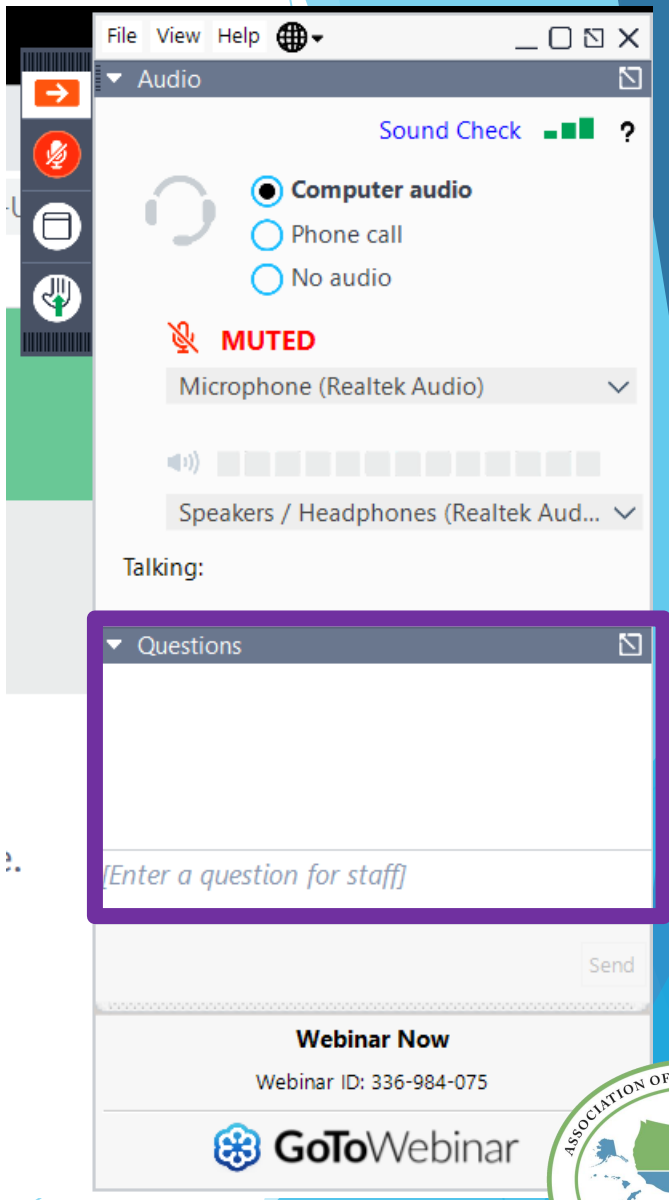
Getting Remedies Back on Track

Fund Lead CERCLA Remedies Transferred to State for O&M

December 17, 2021

Before We Start

- All attendees will be muted throughout the webinar. →
- If you cannot hear us speaking right now or hear an echo, make sure your audio settings are configured correctly →
- **Questions:** Use the **Questions Panel** in the dashboard to send questions to the speakers during the webinar.
- **Note who the question is directed to in your submittal.**
- You can also "Raise Your Hand" so that we can unmute your microphone to ask any questions as well.
- Questions will be answered once presentations have concluded.
- The webinar is being recorded and will be made available on the ASTSWMO website.



Overview of Presentation

Actions to take after transfer of Operational and Maintenance (O&M)

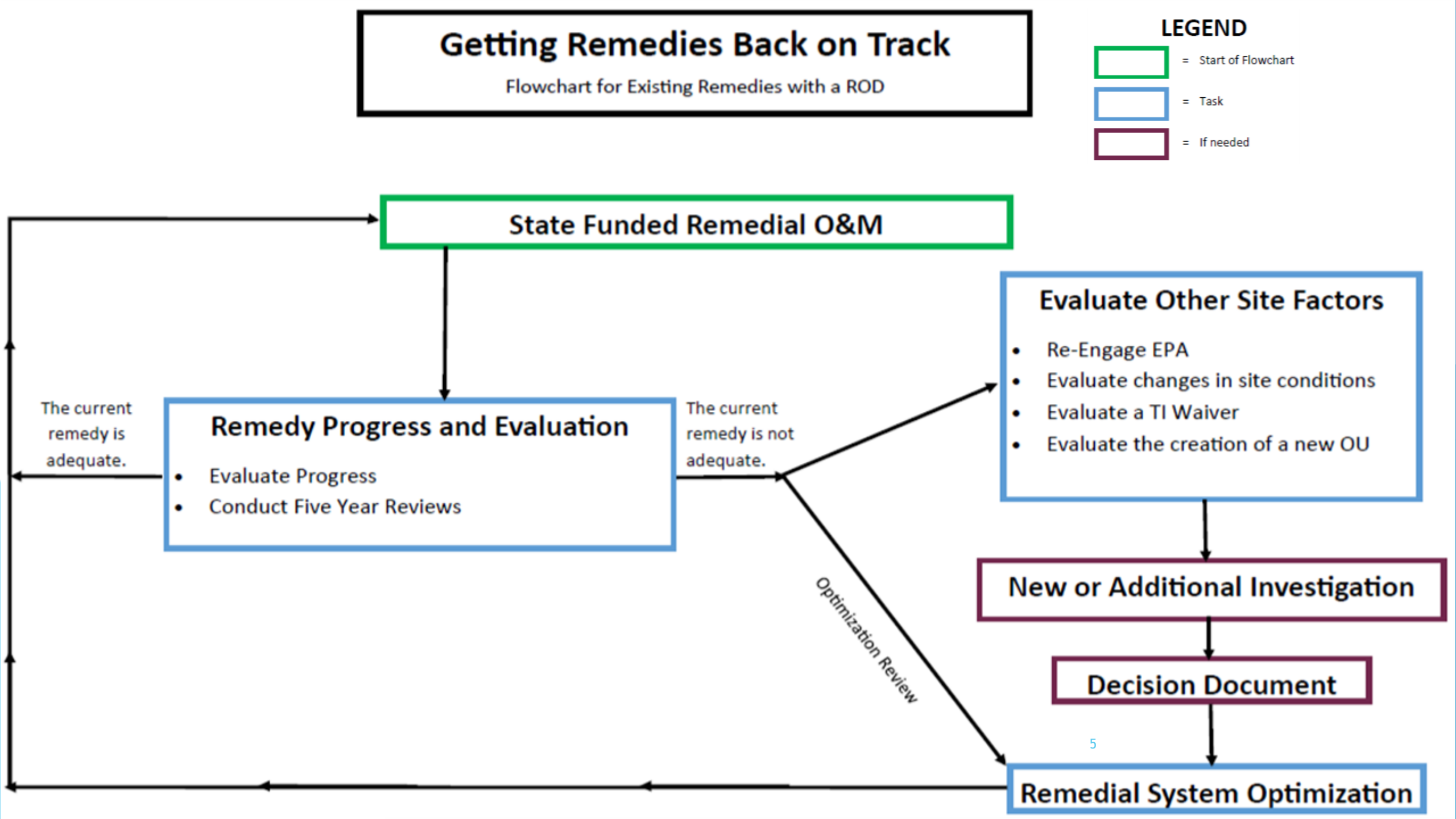
- Completing Remedy Evaluations:
  - Remedy Operation
  - Remedy Progress
  - Other Site Factors
- Case Studies – Sites in Kansas and Wisconsin
- State Optimization and Options
- Proactive Steps
- Other State Options
- Groveland Wells Superfund Site Case Study

Situations Where a State Should Take Action

- Lack of progress meeting Remedial Action Objectives (RAO) for Contaminants of Concern (COC) identified in the Record of Decision (ROD)
- Additional pathways or media identified
- New or emerging COC(s)
- Identification of New Source Areas
- System Maintenance Issues

Getting Remedies Back on Track

Flowchart for Existing Remedies with a ROD



Conduct Remedy Evaluations

The remedy evaluation process is outlined in
U.S. EPA's Groundwater Remedy Completion Strategy Guidance, May 2014

https://semspub.epa.gov/work/HQ/100000021.pdf

1. Understand the site conditions
2. Design site-specific remedy evaluations
3. Develop performance metrics
4. Conduct remedy evaluations
5. Make management decisions

Additional information:

https://www.epa.gov/superfund/completing-groundwater-response

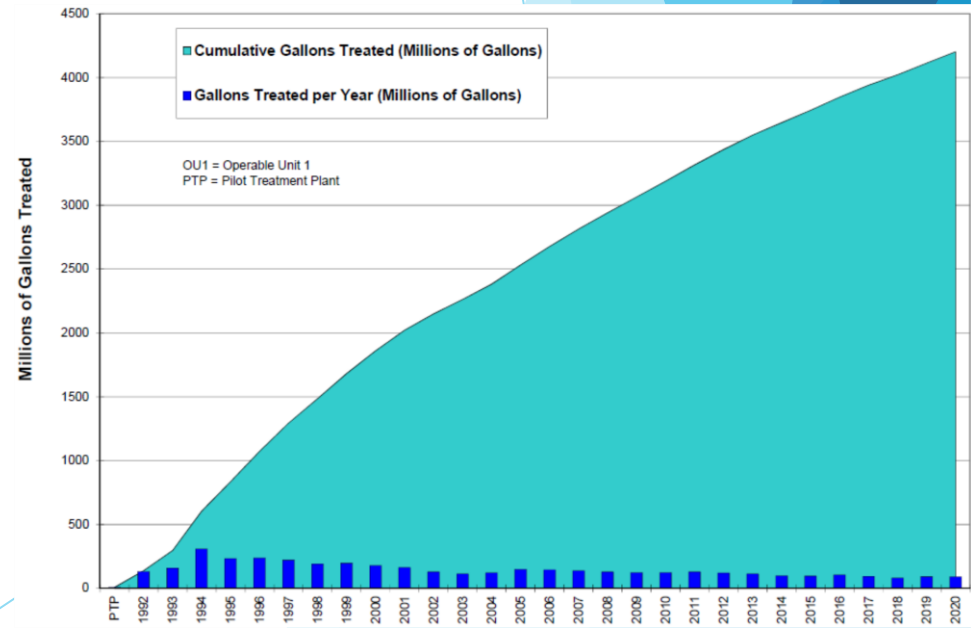
1. Evaluate Remedy Operation

- Is the system functioning adequately and as designed?
  - Review Design, evaluate engineering and O&M Plans
- Situations that may indicate the system is not meeting performance metrics:
  - Operating parameters are outside design range/specifications;
  - Contaminant levels are not decreasing as anticipated;
  - Plumes are expanding/migrating;
  - Extraction/injection rates not met; or
  - Discharge limits exceeded

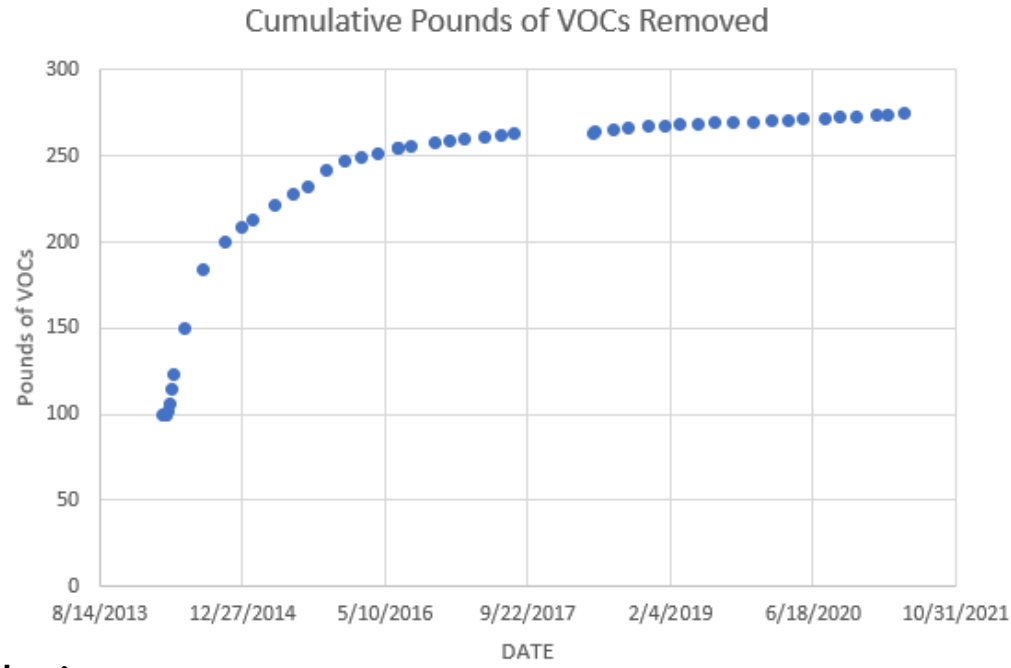
1. Evaluate Remedy Operation

Evaluate changes to improve/optimize remedy performance

- Redevelop or add additional extraction wells
- Add additional injection points or change injection rates
- Different treatment train may be needed for COCs (PFAS)
- Concentrations may be too high for existing treatment technology
- Equipment may be approaching end of useful life
- Adjustments needed to the monitoring effort



2. Evaluate Remedy Progress



Effectiveness Evaluation

- Typically performed annually
- Multiple measures used to determine if remedy meets RAOs
- Five-year review includes complete evaluation and recommendations

Evaluate remedial action (RA) performance metrics and monitoring data

- Performance and Compliance Monitoring – Many methods and data

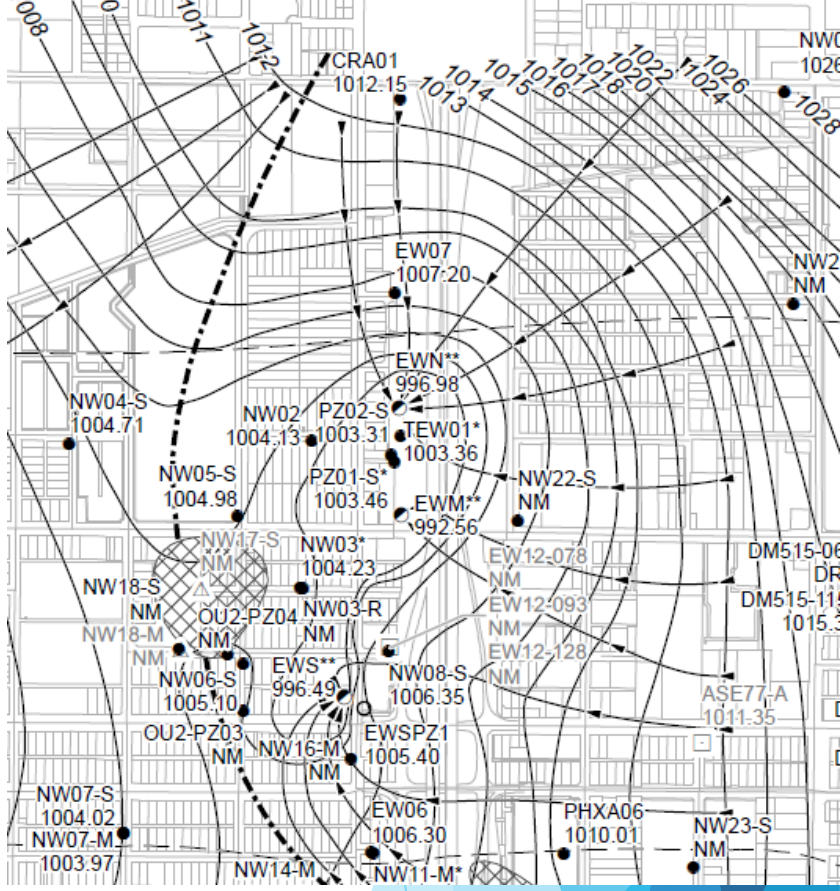
2. Evaluate Remedy Progress

Evaluate whether:

- Current RA able to achieve remedial goals within a ROD timeframe?
- Will remedy optimization/modification reset RA to achieve remedial goals?
- Can an optimized, updated, changed RA meet ROD timeframe or is a new projected timeframe reasonable?

3. Evaluate Other Site Factors

- New Source Identified
- New COC or emerging contaminant
- Change in risk based on site use
- Change in risk based on new pathway



These evaluations may be conducted in parallel or separately from the remedy operation, progress and attainment evaluations.

Examples through Case Studies

Completing Remedy Evaluations:

- 1. Remedy Operation
  - Ace Services - Kansas Chrome Plater: Joe Dom
  - Penta Wood - Wisconsin Wood Treater: Judy Fassbender
- 2. Remedy Progress
  - Moss American - Wisconsin Wood Treater: Judy Fassbender
- 3. Evaluate Other Site Factors
  - Oconomowoc Electroplating – Wisconsin Electroplater: Judy Fassbender

Kansas Case Study

1. *Remedy Operation Evaluation* Triggers State Action/EPA Reengagement

Example 1

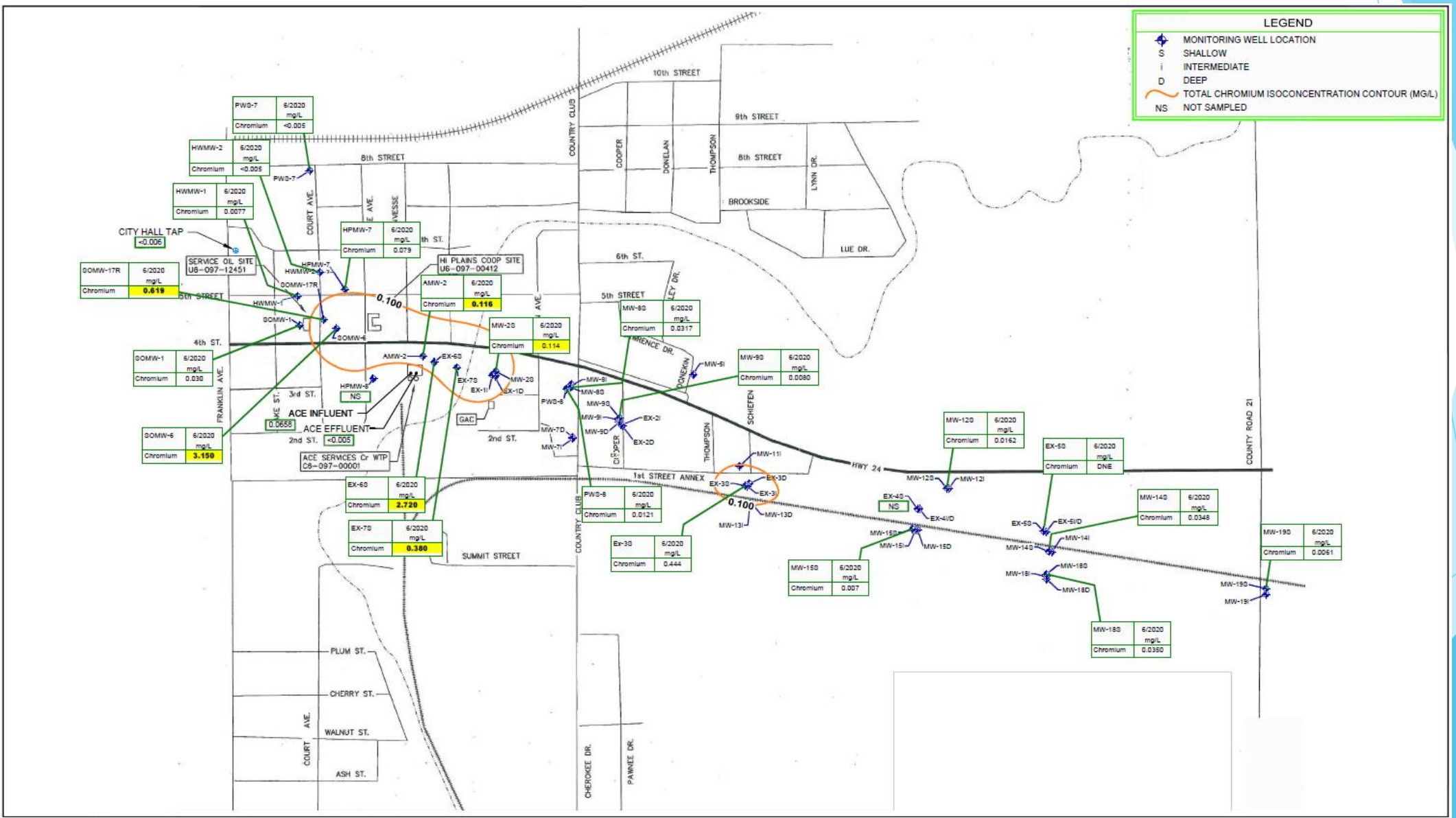
- Optimization of GETS from 24/7 operation to batch treatment of contaminated groundwater
- No administrative document change required – O&M change

Ace Services – Colby, KS
Site Background

- The site was utilized for chromium plating facility from 1954 to 1989
- Granular activated carbon units pre-treat the water for volatile organic contaminants (VOCs) prior to ion exchange treatment.
- Strong base anion resin to remove the hexavalent chromium in chromate form from the groundwater
- Beneficial re-use for the City of Colby. (Drinking water)

Ace Services Site: Pre-treatment and post-treatment tanks each hold 250,000 gallons. Building houses equipment for non-regenerable ion-exchange system. Photo by KDHE

Shallow Zone Extraction Wells Selected Based Chromium Concentrations.



Source: MILCO Environmental Services, Inc. "Total Chromium Concentration Map - Figure 1"

Intermediate Zone and Deep Zone Chromium Concentrations are below MCL.

Ace Services: Batch Mode Cost Savings

- What are the primary costs for Ace Services?
  - Ion Exchange Resin
    - Resin cost ~$248,800 under current contract.
  - City Utilities to operate the plant.
  - Analytical Testing
- How can efficiency be improved?
  - Extend lifespan of resin
  - Reduce volume of treated water.
  - Target extraction wells.
  - Batch mode operation.

Microsoft Power BI Cost Data Comparison, KDHE

Ace Services: Batch Mode Cost Savings

Batch Mode Operation

1. A targeted number of extraction wells based on chromium concentration pump groundwater into the 250,000-gallon influent water storage tank.

2. Transfer pumps transport chromium contaminated groundwater through ion exchange treatment system once influent tank is filled to high-high level.

3. Groundwater is tested daily and may be transferred to City of Colby public water supply for **beneficial reuse.**

The groundwater treatment plant was originally designed to treat up to 1000 GPM with continuous operation. *(Black & Veatch, June 2013, Groundwater Treatment Plant O&M - Volume I)*

Batch mode was initially proposed on November 25, 2014. Plant modifications were made to account for the batch mode and operation in batch mode commenced on November 13, 2015.

Ace Services: Batch Mode Cost Savings

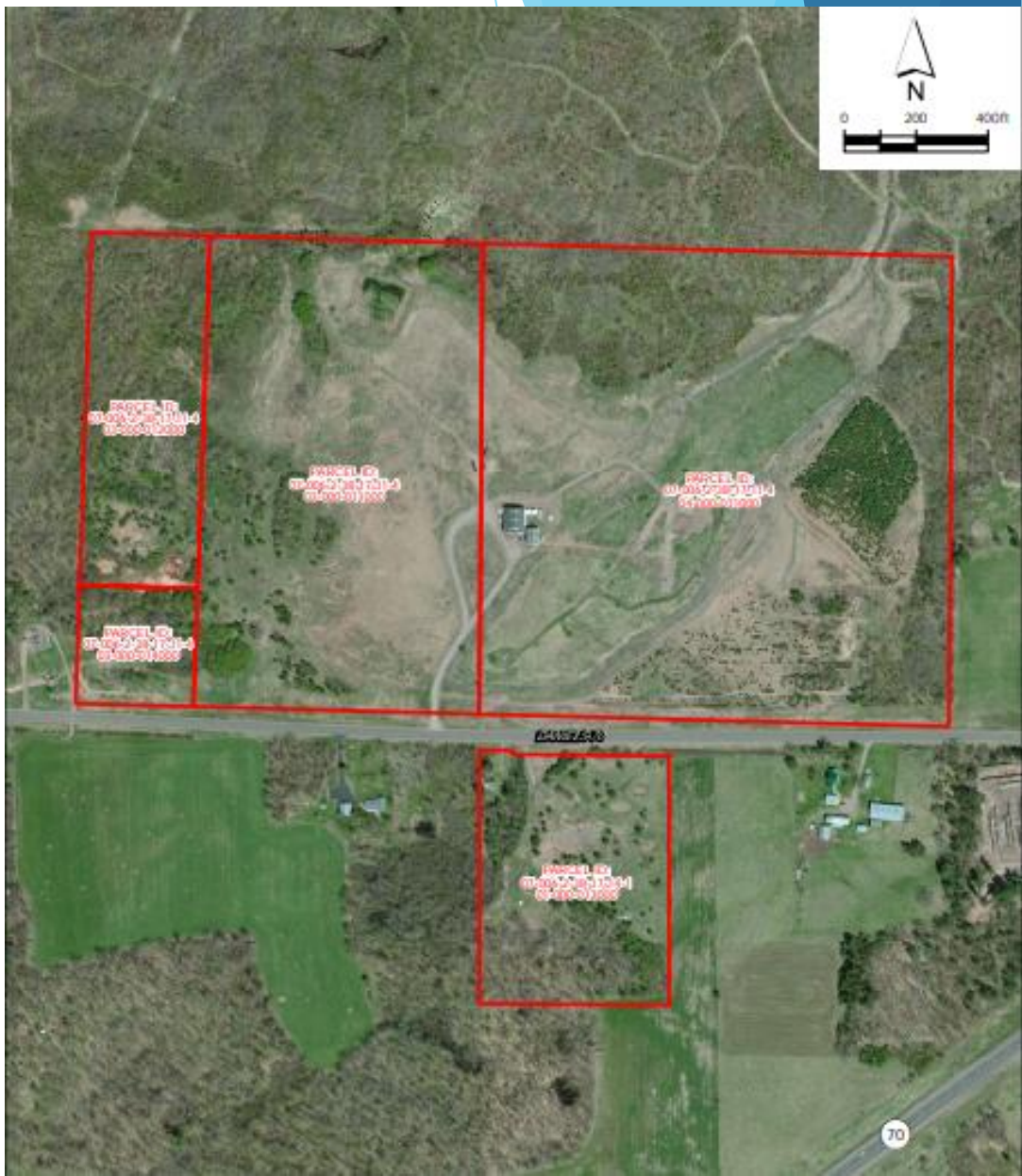
Operation Mode	Changeout	Between Changeouts	Months between changeouts	Pumping Rate (GPM)
Contiuous Mode	September 1, 2012	191	6.37	405
Contiuous Mode	January 1, 2013	188	6.27	391
Contiuous Mode	May 1, 2013	149	4.97	435
Contiuous Mode	September 1, 2013	117	3.85	435
Contiuous Mode	February 1, 2014	148	4.87	432
Contiuous Mode	July 1, 2014	182	5.99	432
Contiuous Mode	April 1, 2015	268	8.82	252
Batch Mode	**December 1, 2015**	**227**	**7.47**	**150**
Batch Mode	**December 1, 2016**	**372**	**12.24**	**150**
Batch Mode	**February 1, 2018**	**426**	**14.01**	**161**
Batch Mode	**February 1, 2019**	**307**	**10.10**	**162**
Batch Mode	**March 23, 2020**	**409**	**13.45**	**162**

- Extraction wells pumping rate was reduced from ~425 GPM to ~160 GPM resulting in approximately **$21,000** saved in electrical costs.
- Increased time between resin change out.
- ~ **$100,000** annual savings for resin costs.

1. *Remedy Operation Evaluation* Triggers State Action/EPA Reengagement

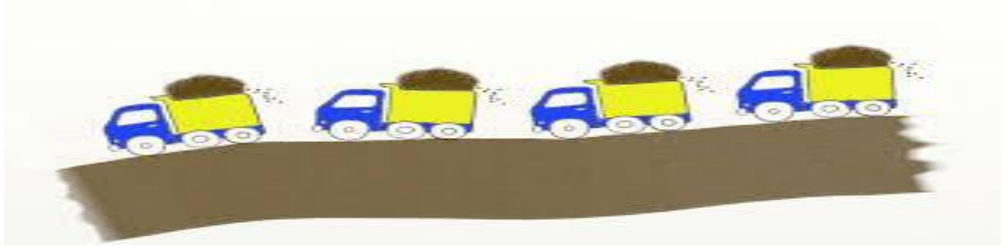
   Example 2

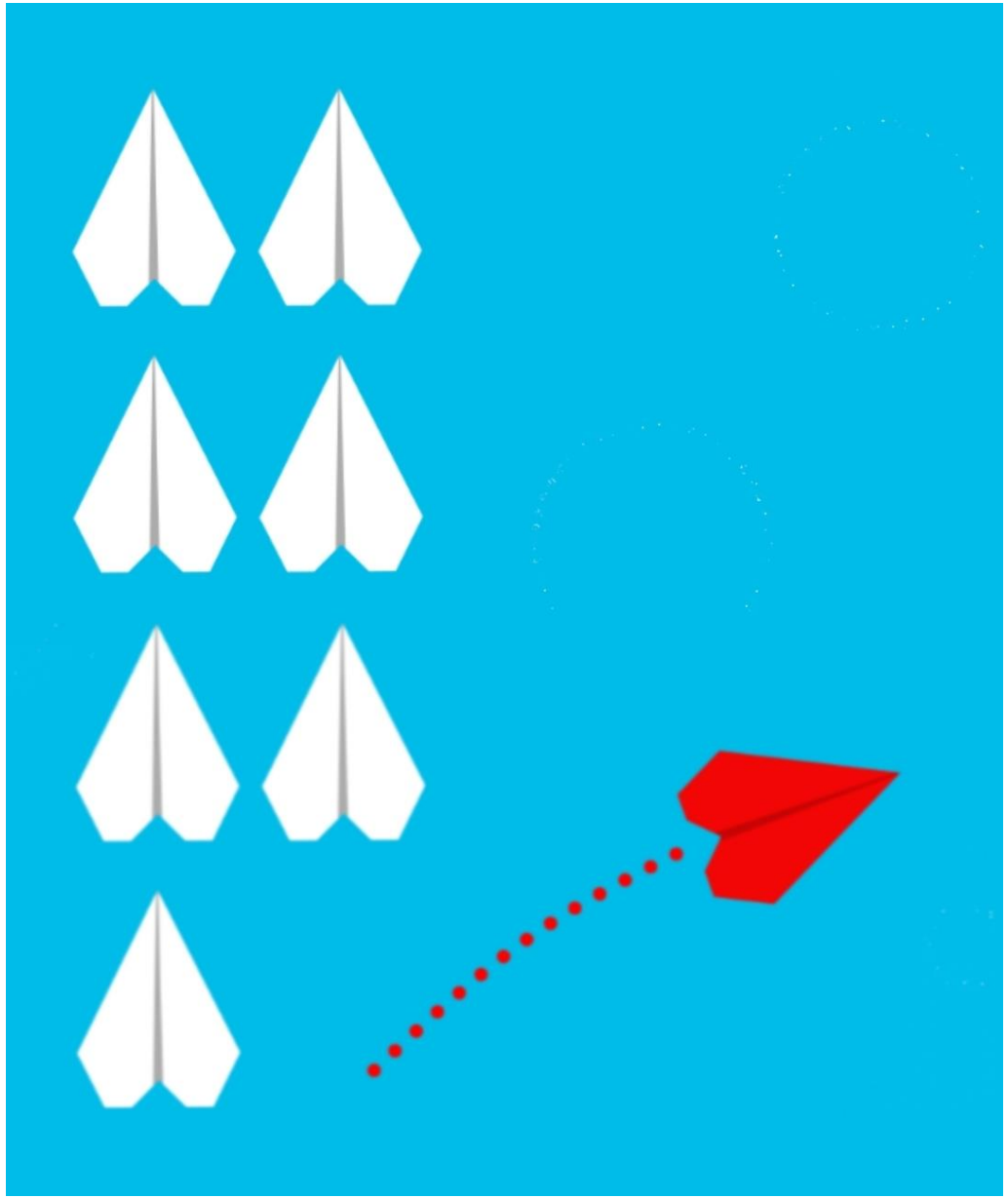
- Penta Wood Products, Siren, WI
  - Former wood treating facility operated on 120-acre parcel from 1953-1992.
  - Main contaminants are pentachlorophenol (PCP) and arsenic.



Case Study–Penta Wood Products, Siren, WI

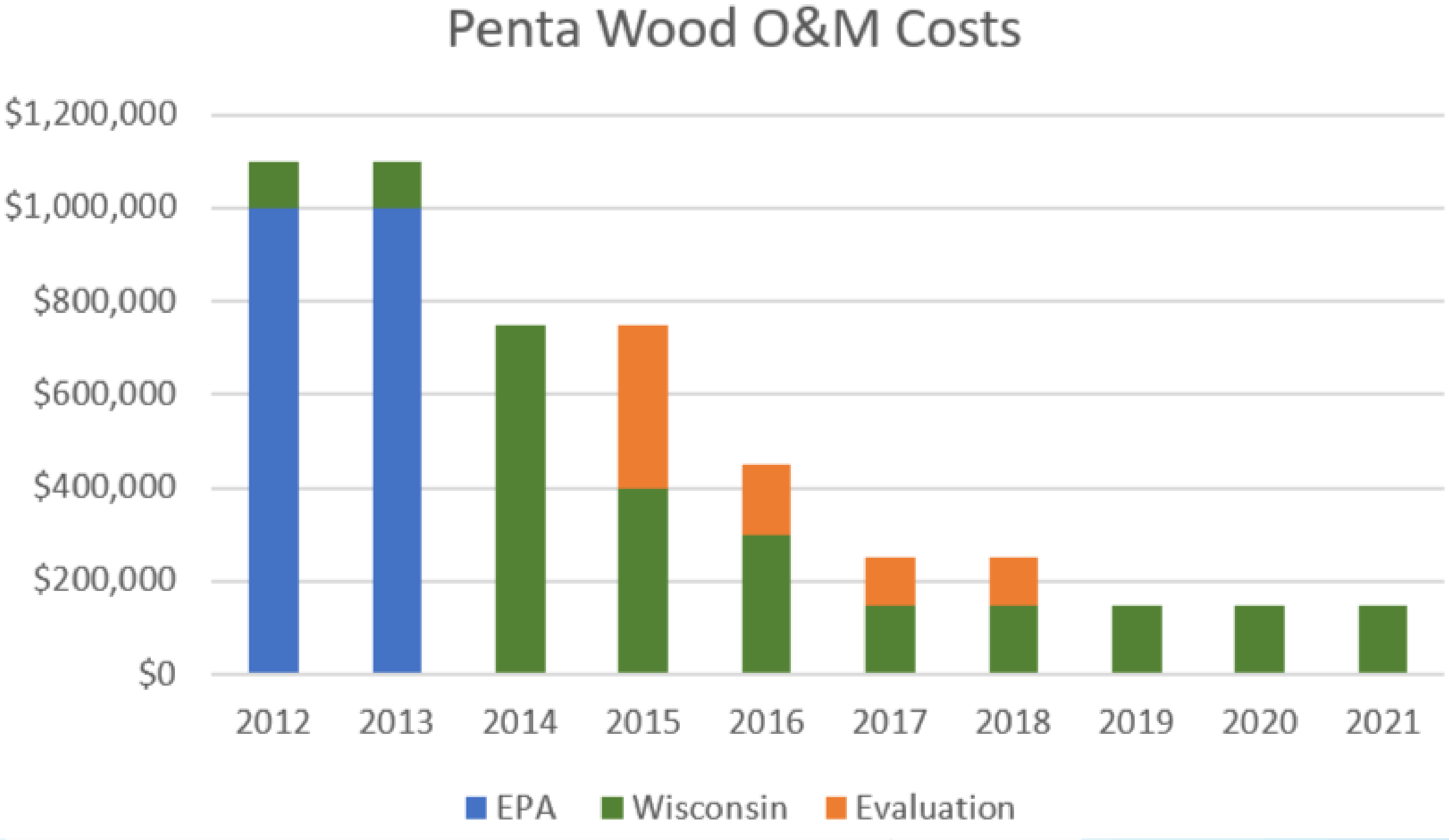
- Remedial Action included
  - Building demolition
  - Consolidation of PCP and arsenic contaminated soils into CAMU
  - Groundwater pump and treat (with upgrades in 2004)
  - LNAPL removal
  - Bioventing
- Transferred to State in 2014
  - Annual operation $1.1M





Catalyst for Action

- Transfer to State – Change in funding
- State funding challenge for $1.1M annual operating costs
- Need alternative less costly solution – still protective


Penta Wood O&M Costs
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
$0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
EPA
Wisconsin
Evaluation

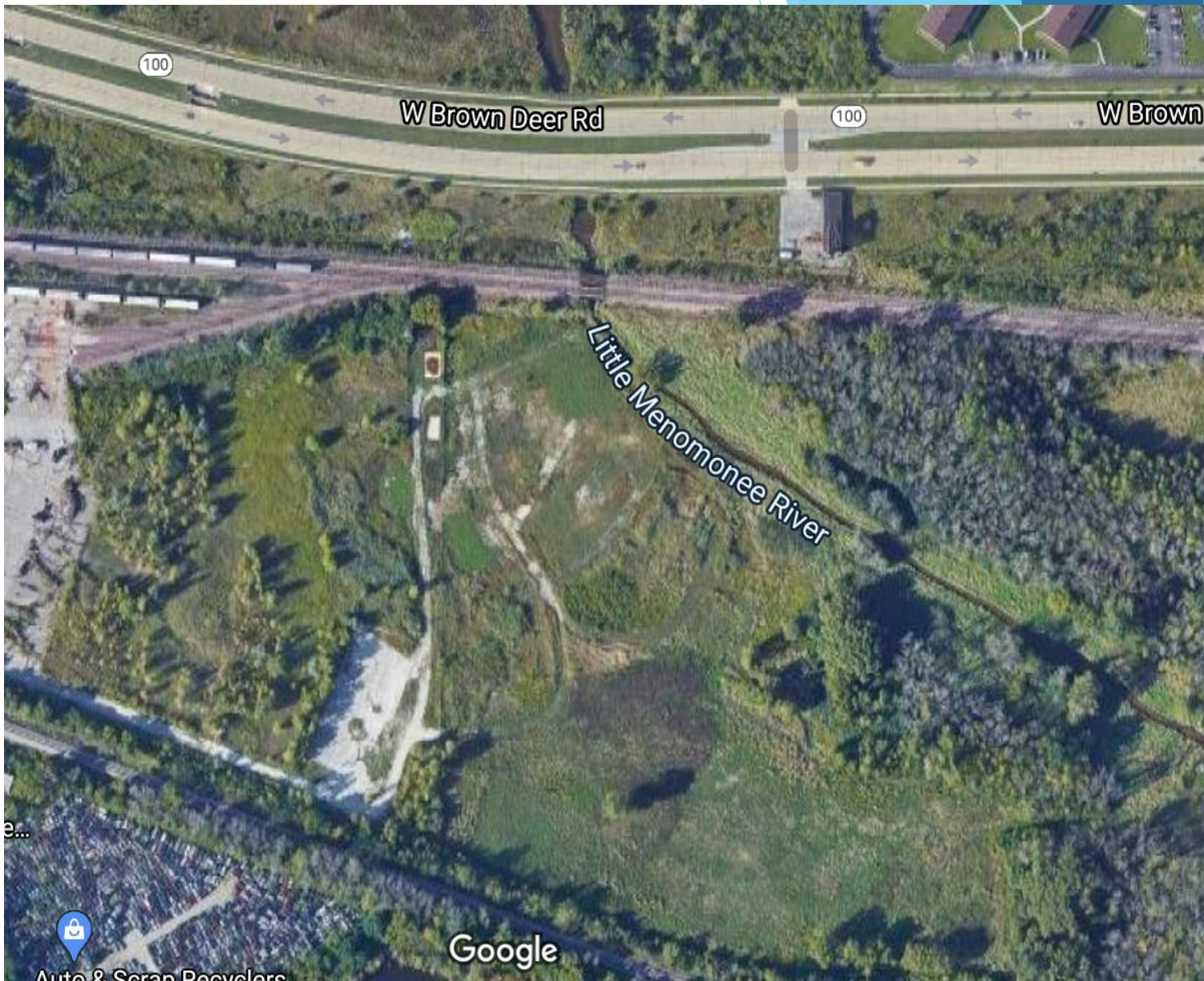
Pilot Study to Reduce Long-Term Funding Requirements

- Eliminate
  - active groundwater remediation
  - bioventing
  - NAPL removal
- Evaluate alternate technology
  - Natural Source Zone Depletion
- Optimize monitoring

- Goal: ESD with change in remedy requirements

2. *Remedy Progress Evaluation* Triggers State Action/EPA Reengagement

- Case Study– Moss American Former Wood Treating Site, WI with impacts to
  - Surface Water/ Sediment
  - Soil
  - Groundwater



Remedy Progress

Past Actions

- Free product extraction
- River rerouting to address contaminated sediment
- GW pump and treat with Funnel and Gate System

Groundwater/Soil Remedy would not meet objectives

- In-situ treatment implemented

Proposed future actions

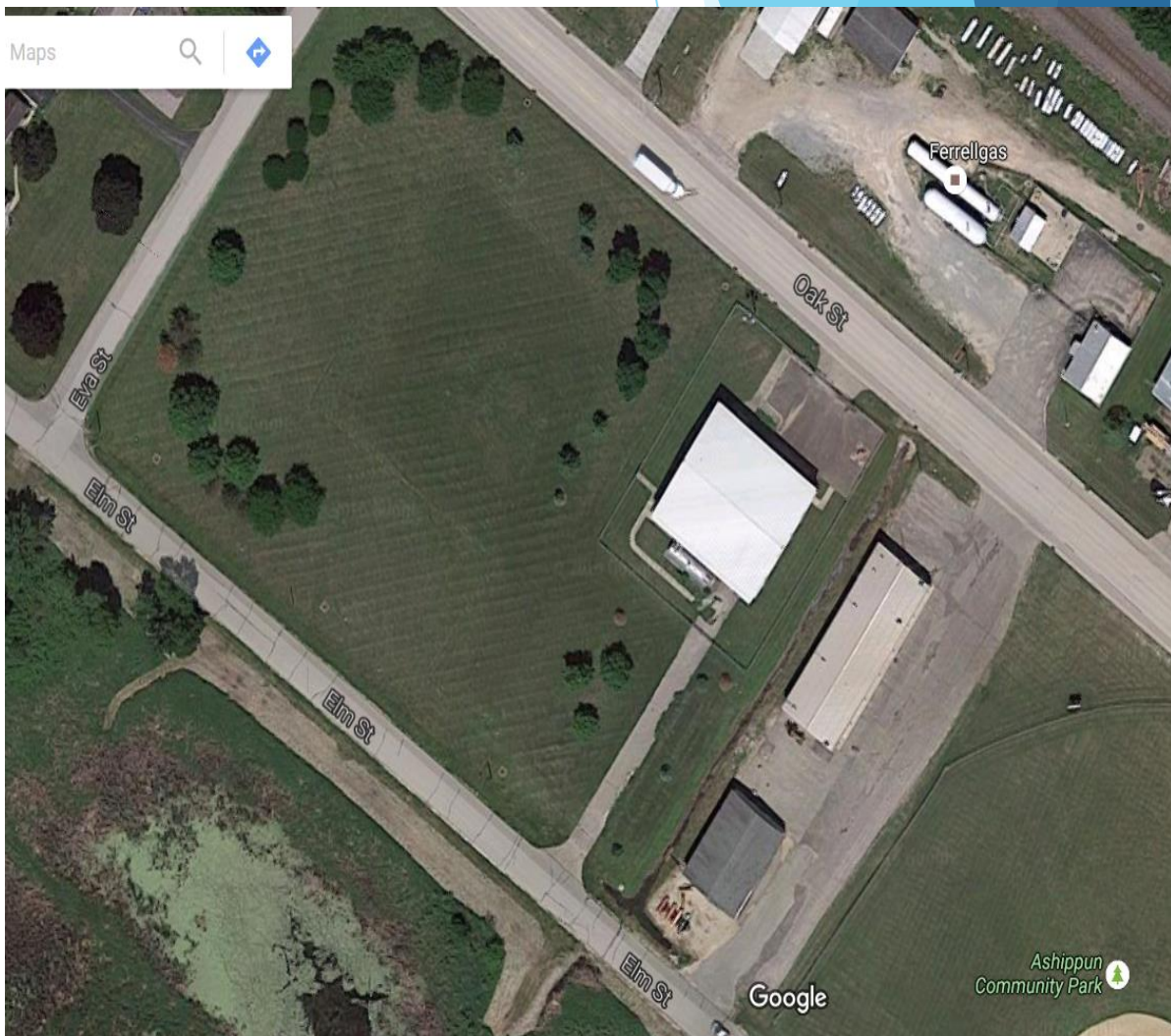
- Natural attenuation

3. Evaluate *Other Site Factors :*
Triggers State Action/EPA Reengagement

Case Study–Oconomowoc Electroplating, Inc. WI

Metals and Chlorinated Solvents

- Soil
- Groundwater
- Sediment



3. Other Site Factors

Past Actions

- Sediment removal
- Groundwater pump & treat for metals/CVOCs with 24/7 operation
- Groundwater pump and treat for metals/CVOCs with batch treatment
- Groundwater pump & treat for CVOCs only

Building Demolition identified *additional source material under* former building footprint

- In-situ soil treatment implemented

Proposed future actions

- Natural attenuation

Next Steps

- Update the Conceptual Site Model (CSM)
- Optimize the remedy
- Optimize the activities associated with long-term monitoring
- Implement the ROD contingency remedy
- Evaluate other cleanup technologies including innovative technologies and approaches
- Revise the remedy decision if necessary

Revise Remedy

- Additional investigation/evaluations may lead to a focused feasibility study (FFS) and a potential modification of the existing remedy.
- The current remedy may need to be replaced with something else
- A revised remedy decision document (ESD or ROD Amendment) may be necessary.

State Optimization and Options

- Fund-Financed Remedy Repairs or Modifications
- Work with EPA HQ through a request of Regional EPA staff
- Re-engage EPA, Responsible Parties or Interested Parties

Steps to Re-Engage EPA

- At what point should a State reach out to EPA for assistance?
  - New source
  - New receptor
  - New COC
  - New risks numbers requiring lowering of a cleanup number
  - Remedy not achieving RAOs in a Reasonable Timeframe
  - Site redevelopment

Steps to Re-Engage EPA

State may collect supporting data to demonstrate that a change to remedy and/or treatment system is required.

- Supporting data may facilitate:
  - Remedy Optimization/Modification
  - ROD Amendment or ESD
  - Technical Impracticability (TI) Waiver
  - New Operational Unit creation
  - Treatment system repairs

Fund-Financed Repairs or Modifications

EPA may pay for repairs or modifications of operating remedies even though they have already been transferred to a State.

Conditions may include:

- A latent defect in a remedy that affects protectiveness discovered after construction complete and O&M has begun;
- A new, previously not identified COC is discovered, which necessitates a change to the remedy and/or treatment system; or
- An ARAR change necessitates a more stringent cleanup level than the one established in the ROD and a fundamental change to the remedy selected in the ROD

EPA Guidance for Management of Superfund Remedies in Post Construction, February 2017
https://semspub.epa.gov/work/HQ/196829.pdf

Fund-Financed Repairs or Modifications

EPA would not provide funding if repairs are due to:

- inadequate performance of O&M by State,
- equipment life expectancy has been exceeded,
- some form of natural disaster damages the remedy.

Path Forward

- Region consults with OSRTI at EPA HQ
- Following consultation, a formal request for EPA funding is submitted in a memorandum to OSRTI
- If approved, EPA pays for remedy repairs

Proactive Steps

1. Integration with Five Year Review (FYR) process

   5-year review indicates remedy is no longer protective (for example: new COC(s), new receptors, lower risk numbers)

   - Develop interim and long-term objectives
   - Conduct pilot test(s)
   - Collect additional data

2. Update the Conceptual Site Model (CSM)

   - Take additional source identification and source control measures
   - Confirm that the remedy is effective given updated site condition information

3. Request an Optimization review of the remedy

Proactive Steps

- Annual regional/State coordination meetings (40 CFR 300.505 (d)(1))

  "EPA and the state shall consult annually to determine priorities and make lead and support agency designations for removal, pre-remedial, remedial, and enforcement response to be conducted during the next fiscal year and to discuss future priorities and long-term requirements for response. These consultations shall include the exchange of information on both Fund- and non-Fund-financed response activities."

Other State Options

- Re-engage Responsible Party
  - Legal process (reopeners)
- Engage interested parties in site redevelopment and O&M performance
  - 3rd Party – municipalities and others - zoning, Institutional Controls (IC) and other measures to help improve protectiveness
  - 3rd Party (redeveloper) cleanup support

Learn from other States

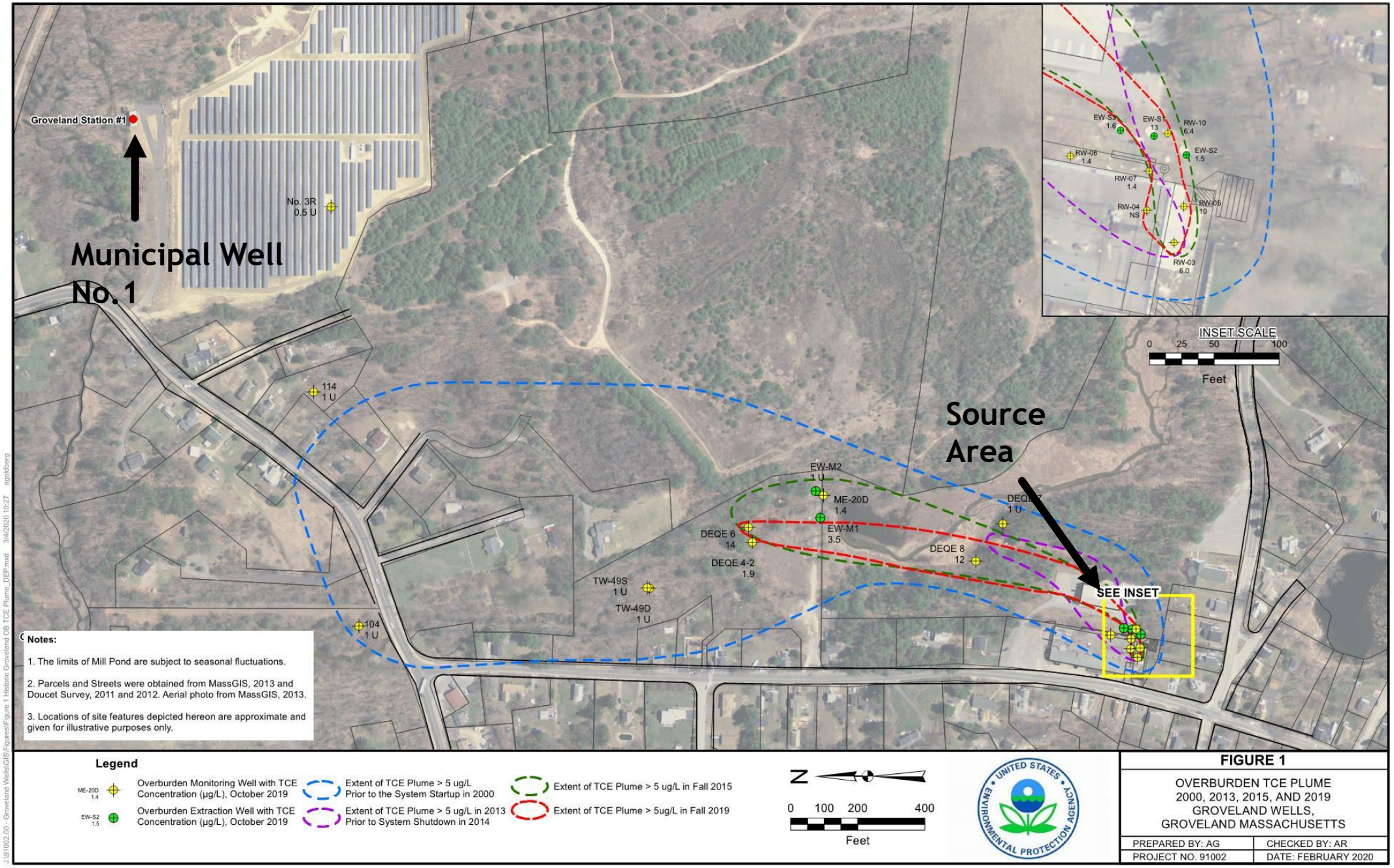
- Reach out to States that have experience with remedies that did not meet long term objectives
  - How to connect with other State representatives?
  - Where did this happen?
  - Media and type of remedy?
  - Define concern?
  - Timeline for progress after concern was identified?
    - Select alternate remedy
    - Procure funding
    - Implement remedy

GROVELAND WELLS SUPERFUND SITE
Case Study

- EPA re-involvement in site activities leads to completion of active P&T
- State's request for "Optimization Review" ultimately leads to shut down of treatment plant – saving approximately $250,000 per year
- Site remedy transitions to MNA only

GROVELAND WELLS SUPERFUND SITE

- Site located in Groveland, Massachusetts (Region 1)
- 1979 Town identified TCE contamination in 2 municipal wells
  - Wells shut down
- 1983 Site added to the NPL


Groveland Station #1
Municipal Well No. 1
No. 3R
0.5 U
114
1 U
104
1 U
TW-49S
1 U
TW-49D
1 U
DEQE 4-2
1.9
DEQE 6
14
EW-M2
1 U
ME-20D
1.4
EW-M1
3.5
DEQE 7
1 U
DEQE 8
12
Source Area
SEE INSET
EW-S3
1.6
EW-S1
13
RW-10
6.4
EW-S2
1.5
RW-06
1.4
RW-07
1.4
RW-04
NS
RW-05
10
RW-03
6.0
INSET SCALE
0 25 50 100
Feet
Notes:
1. The limits of Mill Pond are subject to seasonal fluctuations.
2. Parcels and Streets were obtained from MassGIS, 2013 and Doucet Survey, 2011 and 2012. Aerial photo from MassGIS, 2013.
3. Locations of site features depicted hereon are approximate and given for illustrative purposes only.
Legend
ME-20D 1.4
Overburden Monitoring Well with TCE Concentration (µg/L), October 2019
EW-S2 1.5
Overburden Extraction Well with TCE Concentration (µg/L), October 2019
Extent of TCE Plume > 5 ug/L Prior to the System Startup in 2000
Extent of TCE Plume > 5 ug/L in 2013 Prior to System Shutdown in 2014
Extent of TCE Plume > 5 ug/L in Fall 2015
Extent of TCE Plume > 5ug/L in Fall 2019
N
0 100 200 400
Feet
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FIGURE 1
OVERBURDEN TCE PLUME
2000, 2013, 2015, AND 2019
GROVELAND WELLS,
GROVELAND MASSACHUSETTS
PREPARED BY: AG
CHECKED BY: AR
PROJECT NO. 91002
DATE: FEBRUARY 2020
J:\91002.00 - Groveland Wells\GIS\Figures\Figure 1 Historic Groveland OB TCE Plume_DEP.mxd 3/4/2020 10:27 apoldberg

GROVELAND WELLS SUPERFUND SITE

- OU1 – Groundwater Management of Migration (MOM)
  - 2000 – EPA begins LTRA for GWTF
  - 2011 – O&M of P&T remedy transferred to State
  - Site cleanup goals - MCLs
- OU2 - Soil Vapor Extraction (SVE)
  - 1992 – 2002 PRP source area SVE - unsuccessful
  - 2004 – 2006 EPA additional source area investigation
  - Remaining soil contamination feeds groundwater contamination

GROVELAND WELLS SUPERFUND SITE

- EPA conducts Pilot Tests for soil
  - Chemical oxidation is unsuccessful
- EPA conducts enhanced soil vapor extraction by heating (ERH) – required an ESD
  - 1,338 pounds of VOCs removed
  - TCE in soil reduced 72%
  - However, site cleanup goals still not met

GROVELAND WELLS SUPERFUND SITE
State Financed O&M

- May 2011 – State assumes O&M for P&T remedy
- October 2011 – State requests Optimization Review by EPA to "assist with evaluating the P&T remedy post-ERH."
  - Can P&T be optimized to reduce costs?
  - How effective was ERH at reducing downgradient plume?

GROVELAND WELLS SUPERFUND SITE
Optimization Review

Optimization Review Provided:

- A comprehensive review of conceptual site model
- An evaluation of existing remedy & potential remedial options
- Measures of remedial progress

GROVELAND WELLS SUPERFUND SITE
Optimization Review

3 Important Findings

1. ERH significantly reduced source area contamination for both soil and groundwater
2. TCE concentrations at 3 downgradient extraction wells are sufficiently low that pumping is providing no meaningful mass removal or plume control
3. Recognition of the high cost and resource use of continued extraction and the limited benefit of extracting low level concentrations

GROVELAND WELLS SUPERFUND SITE
Optimization Review

Recommendations

1. Establish criteria for discontinuing operation of individual extraction wells that are no longer providing a meaningful benefit for plume control or aquifer restoration
2. Monitor monthly to evaluate decline in contaminant levels and possible shut down of the GWTF based on criteria.

GROVELAND WELLS SUPERFUND SITE

- June 2013 EPA & DEP discuss potential shut down criteria as part of the Exit Strategy for the Site
  - Shutdown/startup criteria for source area (100 ug/l)
  - Shutdown/startup criteria for downgradient areas (40 ug/l)
- Conduct monthly monitoring for 1 year to ensure no rebound post-ERH
  - Compare results to criteria

GROVELAND WELLS SUPERFUND SITE
State Financed O&M

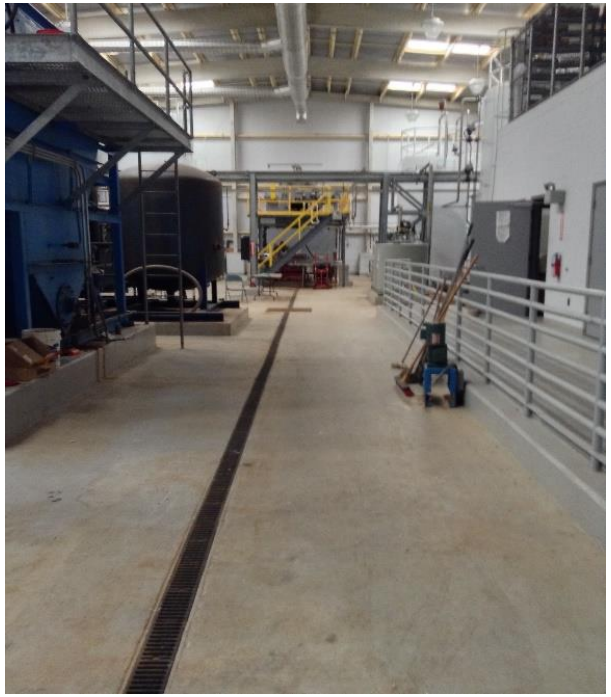
- May 2013 – April 2014 groundwater sampled monthly
  - Concentrations continued to meet the shutdown criteria
- May 2014, MassDEP, with approval from EPA, stops active groundwater treatment and switches to MNA
  - Quarterly groundwater monitoring for 3 years
  - Treatment equipment remains on-site if P&T needs to resume (that is, criteria are exceeded)

GROVELAND WELLS SUPERFUND SITE
State Financed O&M

- 2017 - switch to
  - annual monitoring of plume
  - quarterly monitoring 2 sentinel wells
- 2018 - EPA agrees plant can be decommissioned
  - 2019 – 2020 DEP auctions off equipment
  - 2020-2021 DEP working to decommission EWs, excess MWs, and clean out rest of building
  - EPA working on transfer of building to property owner

GROVELAND WELLS SUPERFUND SITE
Decommissioning

Before



After

GROVELAND WELLS SUPERFUND SITE

- State's request for "Optimization Review" ultimately leads to shut down of treatment plant – saving approximately $250,000 per year

Questions?

Contact Information

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List of Acronyms

- ARAR: Applicable or Relevant and Appropriate Requirements
- CAMU: Corrective Action Management Unit
- COC: Contaminants of Concern
- CSM: Conceptual Site Model
- CVOC: Chlorinated Volatile Organic Compounds
- ERH – Electrical Resistive Heating
- ESD: Explanation of Significant Differences
- EW – Extraction Well
- FYR: Five Year Review
- FFS: Focused Feasibility Study
- GPM: Gallons per minute
- GWTF – Groundwater Treatment Facility
- IC: Institutional Controls
- LNAPL: Light Nonaqueous Phase Liquid
- MNA: Monitored Natural Attenuation
- MOM: Management of Migration

List of Acronyms cont.

- MW – Monitoring Well
- NAPL: Nonaqueous Phase Liquid
- NPL: National Priorities List
- O&M: Operational and Maintenance
- OLEM – Office of Land and Emergency Management
- OSRTI – Office of Superfund Remediation and Technology Innovation
- P&T – Pump & Treat
- PCP: Pentachlorophenol
- RAO: Remedial Action Objectives
- ROD: Record of Decision
- RODA: Record of Decision Amendment
- SVE – Soil Vapor Extraction
- TCE – Trichloroethylene
- TI: Technical Impracticability
- VOCs: Volatile Organic Chemicals