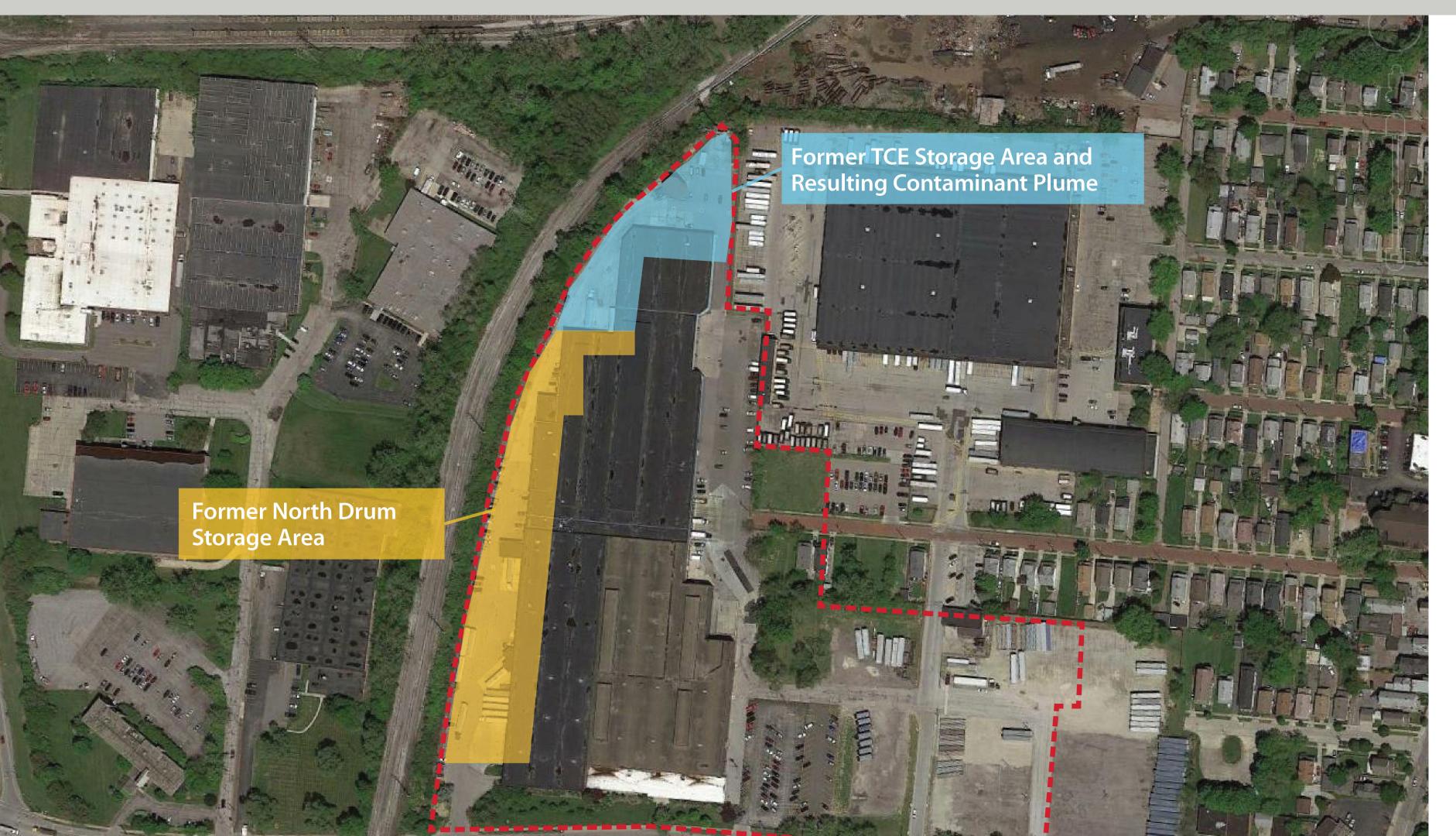
## Performance-Based Remediation

# Cost-to-Objective Achieved Utilizing In-Situ Reductive Remediation of Chlorinated Solvents

Stephen Betts

Groundwater & Environmental Services, Inc.



### Site Information

- 20.8-acre former manufacturing facility
- Historic releases of TCE and PCE occurred from a drum storage pad and aboveground storage tanks
- Ampacted area of soil and groundwater is approximately 1,200 feet by 200 feet
- AS/SVE system operated at the site for several years, which accomplished temporary remediation of the constituents of concern

Work Plan & Contract

Site/Project Management Responsibility

Milestone Invoice and

Completion Report

Fixed Fee Grant Payment upon Milestone Completion (\$)

Cost-to-Objective Contract Model

Site Owner

Milestone

Completion

**Validation** 

State Cleanup Grant

## Project Background

- Historical remediation of chlorinated solvents on-site
- Concentrations of chemicals in the groundwater rebounded, requiring additional remediation
- Owner is seeking permanent elimination of concentrations to facilitate no further action status and site closure with a fixed, not to exceed budget
- Cost-to-objective contract was developed with set milestones for remediation and payment
- GES designed a remedial action plan to clean up and maintain concentrations below the risk-based action levels
- The project was evaluated by the Ohio EPA and is receiving additional financial backing from the Clean Ohio Revitalization Fund

(Consultant)

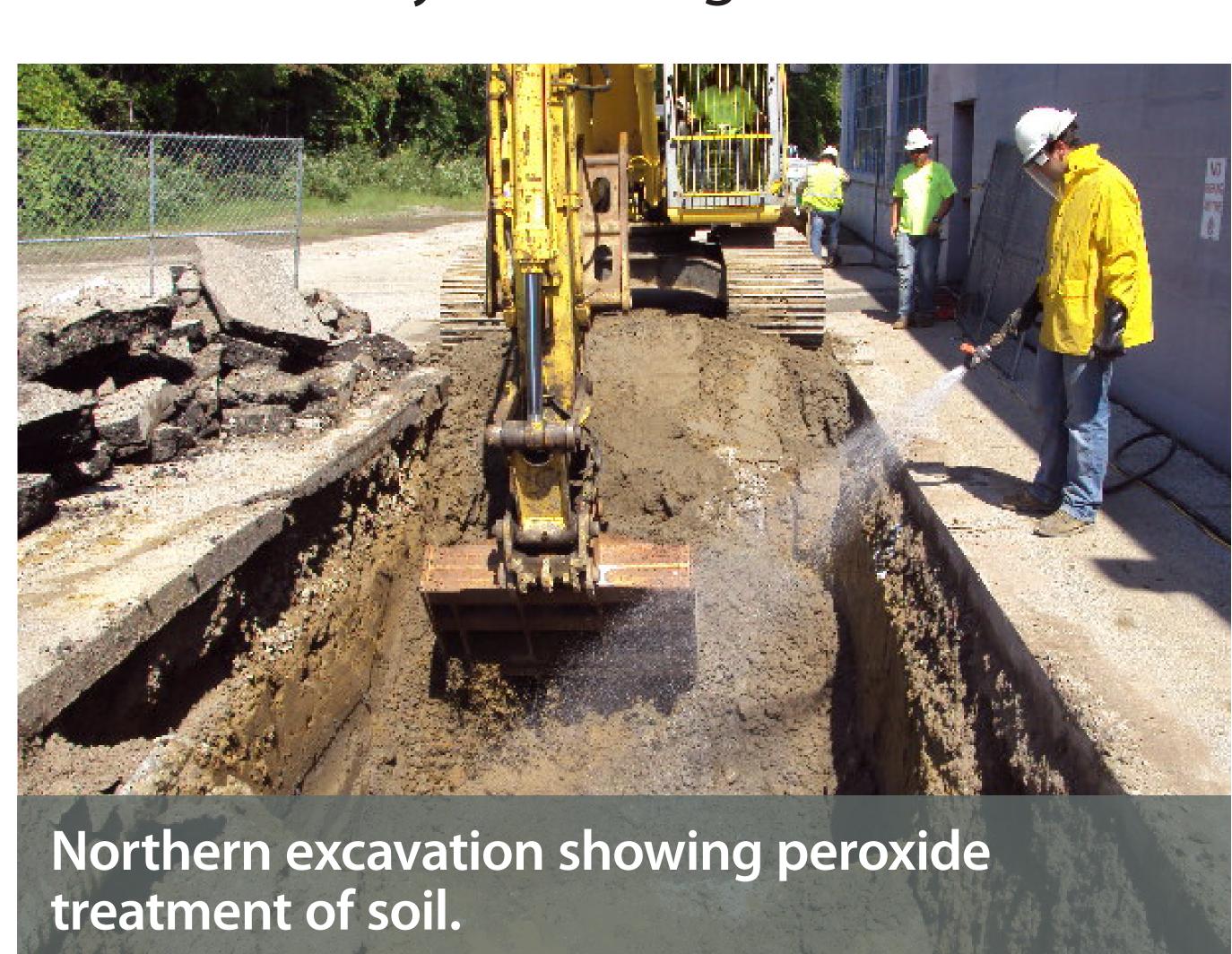
Milestone #1

Milestone #2

Milestone #3

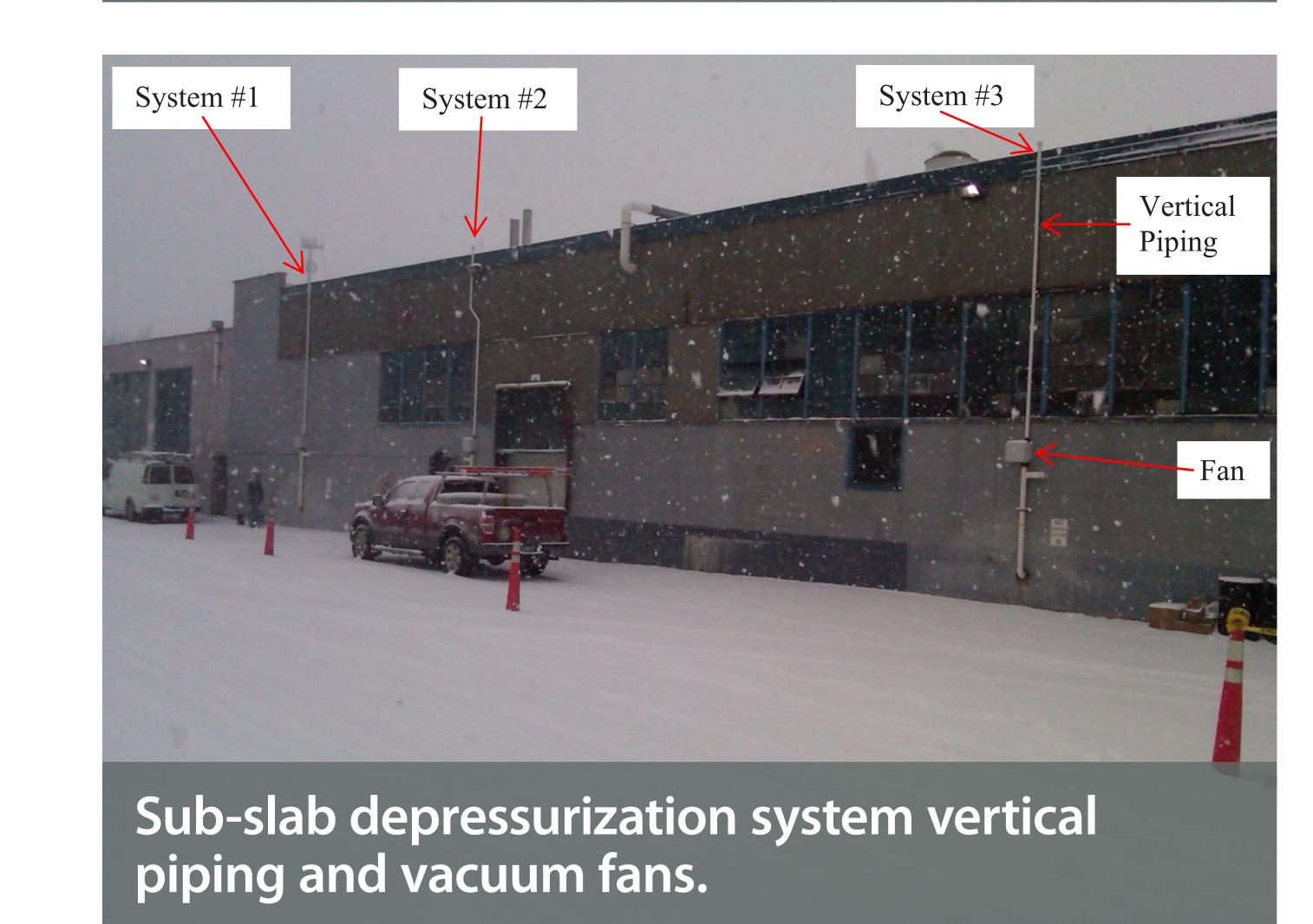
## Technical Approach

GES developed a plan to conduct a limited excavation and the injection of chemicals (emulsified vegetable oil and zero valent iron) to create a reductive state in the subsurface and allow the naturally-occurring microbes to break down the chemicals of concern.









By the Numbers...

off-site for proper disposal

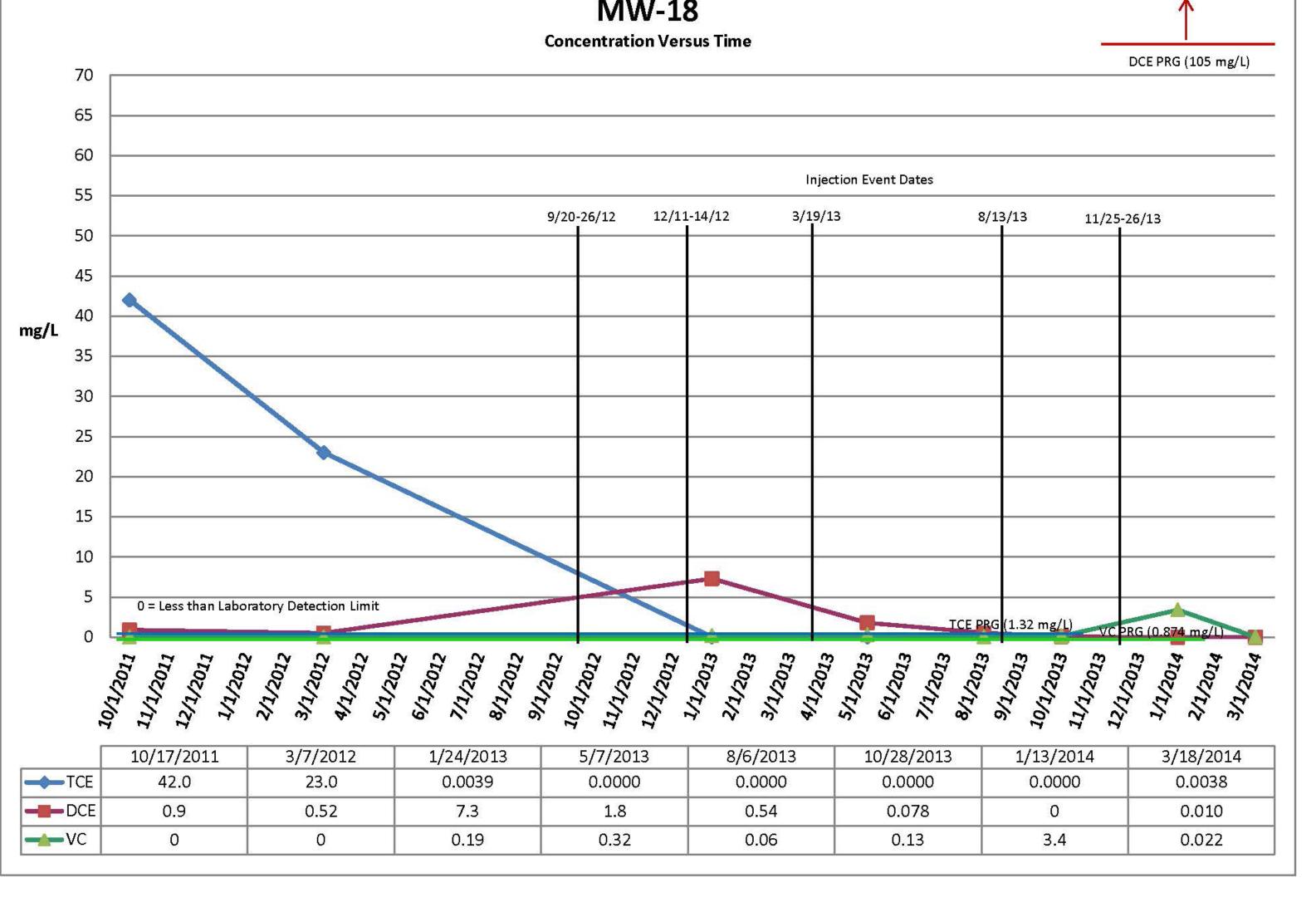
510 Gold Excavated and hauled

14 EEEE
Permanent Injection

Wells Installed

7,280 gallons

ZVI
936 gallons



#### Project Results

- Removal of source soils and degradation of chemicals of concern (COCs) in groundwater to below the risk based levels
- In less than two years, concentrations of COCs were reduced below site action levels using reductive dechlorination
- All work was completed within the milestone cost-to-objective agreement
- The Ohio EPA granted closure for the site
- All monitoring and injection wells were properly abandoned following closure; the property owner has "no further action" documentation

#### **Additional Information**

- As part of the reductive process of remediating Trichloroethylene there was an increase in other chemicals of concern
- This was a known effect and was conveyed to the client prior to the start of the process to ensure an understanding of the process and attempt to eliminate reactions based on increases to other COCs

Contact:
Stephen Betts
Senior Project Manager

Work Plan

**Approval**