

BOS 200+® TECHNOLOGY APPLICATION AT ACTIVE BULK STORAGE FACILITY: A FIVE YEAR REVIEW

ABSTRACT

The subject facility is an active pipeline and petroleum storage site in the Gulf Coast Region where a leaking aboveground storage tank (AST) created a large dissolved and LNAPL plume. BOS 200+®, a modified version of BOS 200®, was applied over a large area during a 6-month period in 2017. Results to date indicate that LNAPL levels have been eliminated or significantly reduced. In addition, benzene and TPH levels have decreased an average of 96.3% and 97%, respectively. A No Further Action determination has been requested and is pending.

PROJECT SNAPSHOT

KEY DATES

- February 2017 - Remedial Design Characterization (RDC)
- Summer/Fall 2017 - Injection of BOS 200+®
- No Further Action (NFA) Determination: Pending

Treatment Area = 93,000 ft²

Lithology = Varied across the large area but consisted mainly of silty clay to clay over weathered shale with some sand and gravel.

Depth to Water = 5 to 25 ft bgs (variable)

Contaminants = LNAPL and TPH

Implementation Method = Direct push and Pre-Drill injection

APPROACH

- 1,110 soil samples were collected as part of a large RDC in early 2017. The sample results were used to create an optimized and surgical BOS 200+® design. All samples were analyzed at the RPI Project Support Laboratory at no cost.
- Injection specifications:
 - 93,000 ft² Treatment Area
 - >1,000 Injection Locations
 - 361,000 lbs BOS 200+®
- The majority of the injection locations were completed using direct push injection techniques. In one area, shallow refusal was encountered (weathered shale), so the Pre-Drill technique was used to reach the target treatment depth.

CHALLENGE AND OBJECTIVES

- Principal Objective: Elimination of measurable LNAPL.
- The challenges for this project included the following: active petroleum storage, pipelines and sub-surface electrical, shallow groundwater table (western treatment area), and shallow DPT refusal in one area, which required a Pre-Drill injection technique.

RESULTS (5 YEARS POST APPLICATION)

- LNAPL
 - The total number of wells with measurable LNAPL prior to remediation: 15
 - Post-remediation LNAPL statistics
 - No measurable LNAPL: 12
 - Sheen: 2
 - Measurable LNAPL: 1 (current max LNAPL thickness = 0.02 ft)
- Dissolved Total Volatile Petroleum Hydrocarbons
 - The average dissolved TPH concentration in the monitoring wells prior to remediation: 20.9 mg/L
 - Post-remediation average concentration: 0.38 mg/L (97% reduction)
 - Post treatment analytical support provided by the RPI Project Support Laboratory at no cost.

Figure 1. Example of Post Injection Recovery Well Groundwater Data

