

Fox Avenue Site

CALIBRE

Our Success Follows Yours

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About CALIBRE

CALIBRE Systems, Inc. is an employee-owned management consulting and information technology solutions company supporting government and industry.

CALIBRE is committed to the success of our customers and delivers enduring solutions that solve management, technology, and program challenges.

Solutions That Make a Difference

We work in multidisciplinary teams, partnering with organizations to support mission-essential needs at every stage of program, product, and business lifecycles, and help achieve business objectives. This collaborative work style helps produce the results you seek – today and where you want to be tomorrow.

Project Scope

>> *The work completed on the project has included: 1) project scoping/planning based on data quality objectives (DQOs) to identify data gaps and develop project work plans and quality assurance plans; 2) remedial investigation and feasibility study (RI/FS); 3) implementation of interim actions that were later expanded to plume-wide treatment; and 4) site-wide monitoring and reporting.*

Benefits to the Customer

>> *Since joining this project, CALIBRE Systems, Inc. (CALIBRE) has successfully established a biological treatment zone that has reduced contamination in groundwater by 99.98% from the historical baseline levels. This bio-treatment zone, implemented before the start of source-area treatment/removal, has met the required cleanup levels at the point of compliance several years ahead of the schedule required in the cleanup action plan.*

PROJECT SUMMARY

The Fox Avenue project is located at a chemical distribution facility in Seattle, Washington approximately 600 feet from the Lower Duwamish Waterway (LDW) Superfund site (Figure 1). A prior property owner used the facility for distribution of tetrachloroethene (PCE) including the re-packaging of PCE from railcars into drums and delivery to dry cleaners. On-site spills resulted in the release of PCE to groundwater as a dense non-aqueous phase liquid (DNAPL). Elevated levels of chlorinated volatile organic compounds (CVOCs), with concentrations in groundwater exceeding 50,000 ug/L were first identified in soil and groundwater at the site in the early 1990s. The contaminants identified in the VOC plume were tetrachloroethene (PCE) and degradation daughter products [trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC)].

Since the initial discovery of a release, investigations and various remedial actions commenced in the early 1990s and continued through 2008. The previous remediation approaches led to some CVOC mass removal but made no real progress in reaching the required cleanup standards.

CALIBRE was hired in 2009 to demonstrate biological treatment within the plume, work with the Washington State Department of Ecology for approval of a RI/FS and a Cleanup Action Plan, and implement full-scale remedial actions throughout the plume. The biological treatment approach was initiated as part of Interim Actions (IA) to mitigate the risk presented by VOCs in the site groundwater down-gradient of the main source area. The IA objective was to create

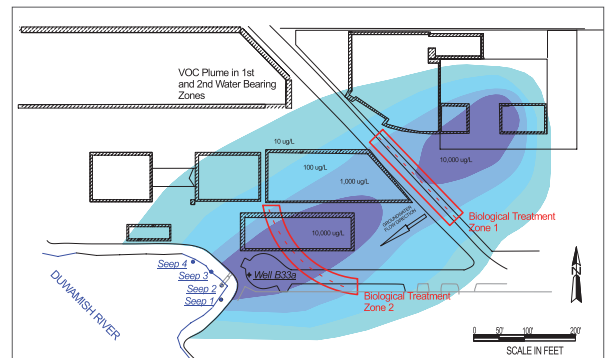


Figure 1 – Site map showing initial phase Enhanced Reductive Dechlorination (ERD) treatment areas and four seeps at the point of compliance.

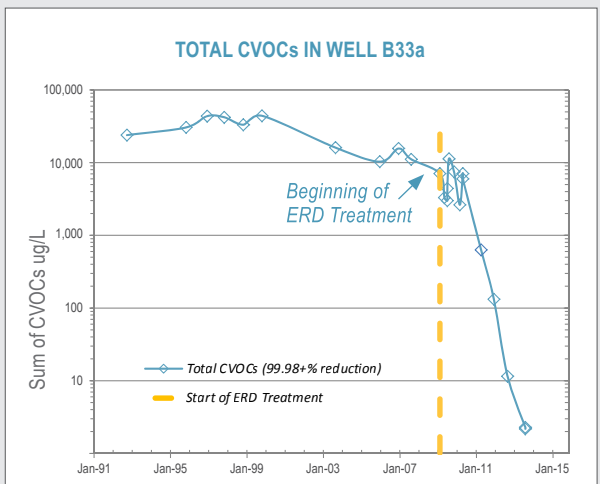


Figure 2 – Concentration trends at a monitoring well at the point of discharge to the Lower Duwamish Waterway.

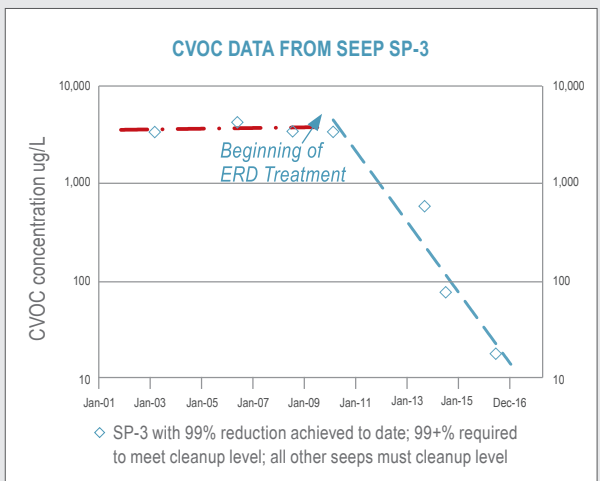


Figure 3 – CVOC Concentration in Seep SP-3

a groundwater treatment zone that would fully degrade VOCs before discharging to the waterway. CALIBRE chose to meet this objective by treating the targeted plume areas using Enhanced Reductive Dechlorination (ERD), an in-situ treatment technology that promotes accelerated degradation of CVOCs by stimulating biological populations. CALIBRE installed groundwater injection wells within the central portions of the plume where concentrations exceeded

10,000 ug/L (Figure 1). At these treatment areas CALIBRE optimized geochemical conditions by injecting food grade solutions (a substrate for the bacteria) in order to promote accelerated reductive dechlorination. The bacteria are naturally occurring in groundwater and CALIBRE’s ERD approach significantly increased the CVOC biodegradation rate meeting the required cleanup levels at the Waterway. Based on the success of the initial phase of ERD treatment, CALIBRE expanded the treatment zones to implement plume-wide remediation in the down-gradient areas. Since the expansion of the treatment areas, performance monitoring data show many areas with over 99% reductions in total CVOCs (Figure 2).

These areas include four visible groundwater seeps located in the Waterway where the CVOC plume discharges to the LDW. This area is the point of compliance and has been sampled over the course of the project during low tides. For the four groundwater seeps, three have met the cleanup criteria established in the cleanup action plan. The final location above standards has demonstrated a 99% reduction to date and concentrations have shown continued decline towards the cleanup goals (Figure 3).

The levels of CVOCs measured at many wells are below remediation levels and are approaching project cleanup standards which will meet the cleanup action plan requirements several years ahead of schedule.

CALIBRE’s role in the project started as an Interim Action (IA) in a Feasibility Study (FS). Based on the initial performance data, biological treatment was expanded to plume-wide remediation in all down-gradient areas and has achieved 99+% reductions in CVOCs in many areas including the point of compliance.