

Electronics Manufacturing Facility Redevelopment and Reuse

CALIBRE

Our Success Follows Yours

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About CALIBRE

Founded in 1989, CALIBRE Systems Inc. is an employee-owned management consulting and technology services company supporting government and industry. CALIBRE is committed to the success of our clients, and delivers enduring solutions that solve management, technology, and program challenges.

Solutions That Make a Difference

We work in multidisciplinary teams, partnering with you to deliver practical, timely, best value solutions that solve your management, technology, and program challenges and help you achieve your business objectives. This collaborative work style helps produce the results you seek – today and where you want to be tomorrow.

Project Background

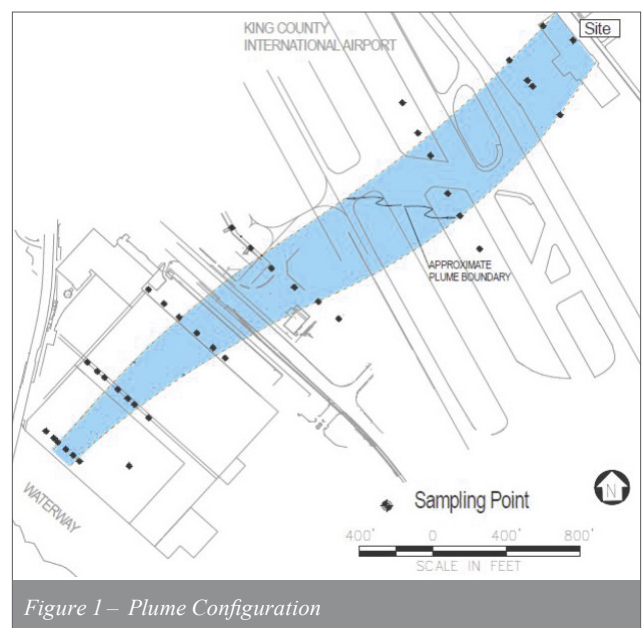
>> The former Electronics Manufacturing Facility (EMF) Site, located at Boeing Field/King County International Airport (KCIA) in Seattle, Washington, is an industrial property where degreasing operations resulted in a release of trichloroethene (TCE) to groundwater beneath the property. The resulting volatile organic compound (VOC) groundwater plume has been transported by groundwater towards the Lower Duwamish Waterway (LDW). CALIBRE was retained to investigate and remediate the groundwater contamination while the site was undergoing redevelopment for reuse as an airport cargo terminal.

Benefits to the Client

>> CALIBRE's groundwater remediation at the Site was undertaken simultaneously with redevelopment of the property for reuse as an airport cargo terminal. Our remediation approach resulted in our client being able to maintain normal operations without redevelopment delays. CALIBRE designed and implemented the remedy for the 50-acre VOC plume at this Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site with DNAPL; the remedial action has successfully reduced VOCs in groundwater to non-detect levels at the point of compliance (from 6,000 ug/L down to < 0.2; a 99.99+% reduction in VOCs). Our in-situ biological treatment has reduced contamination in groundwater to less than 0.1% of the historical baseline levels and removed the VOC plume over an area extending 1,200 feet up gradient from the point of compliance. The remediation has included beneficial reuse of a prior waste material as the biological treatment substrate applied throughout the plume. This beneficial reuse of substrate, a material CALIBRE strategically identified and acquired rather than buying expensive proprietary substrates, has saved our client in excess of \$1M over 6 years.

PROJECT SUMMARY

The former Electronics Manufacturing Facility (EMF) is located at Boeing Field/ King County International Airport (KCIA) in Seattle, Washington (Figure 1). Past industrial activities at the EMF property resulted in a release of trichloroethene (TCE) to groundwater beneath the property and the VOC plume has been transported by groundwater towards the Waterway, the down-gradient boundary of the site and point of compliance. The LDW is located approximately 3,600 feet from the EMF property.



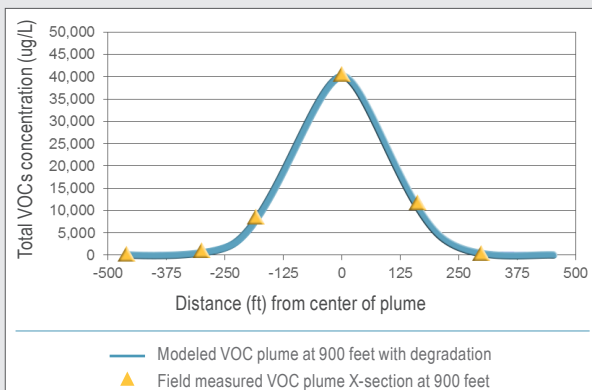


Figure 2 – Typical Plume Cross-Section

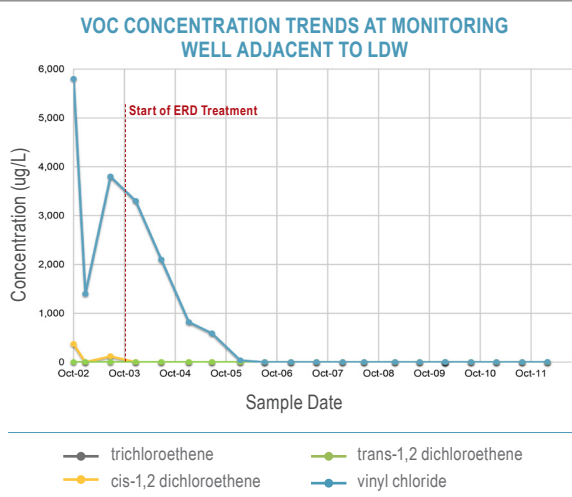


Figure 3 – Final monitoring well at LDW; 99.96% reduction in total CVOCs from pre-remedial action levels

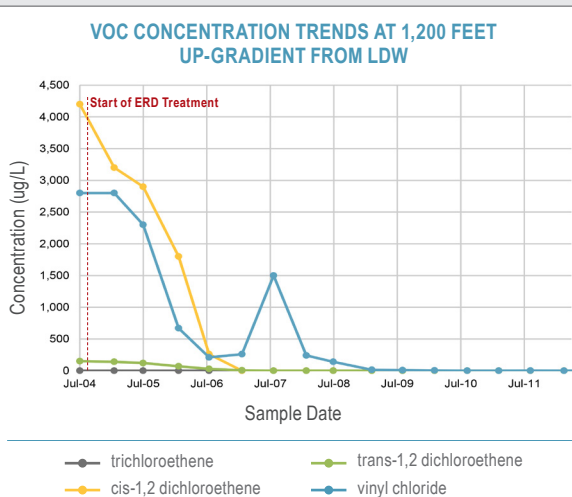


Figure 4 – Performance Data Pre/Post ERD Treatment at 1,200 feet up-gradient from waterway

The release of TCE at the EMF property was identified and reported in the 1980s with initial chlorinated VOC (CVOC) concentrations in excess of 400,000 ug/L (CVOCs as sum of TCE and its degradation daughter products). TCE was found at the site as a separate phase dense non-aqueous phase liquid (DNAPL). The TCE DNAPL served as a source of dissolved phase contamination, creating a stratified VOC plume that migrated southwest towards the LDW. The contaminants of concern (COCs) at the EMF site are (cis-1,2-DCE), trans-1,2- dichloroethene (trans-1,2-DCE), and vinyl chloride.

CALIBRE implemented full scale in-situ chemical oxidation (ISCO) as source-area treatment (using permanganate and persulfate) in 2000. Subsequent groundwater monitoring demonstrated a 95% reduction in total VOCs (primarily DCE and vinyl chloride) from a well located immediately down gradient of the ISCO treatment area. A VOC plume larger than the EMF property was identified during site characterization work completed in 1999; total CVOC concentrations of 44,000 ug/L and 6,200 ug/L were identified at distances of approximately 1,000 feet (Figure 2) and 3,600 feet down gradient from the source area.

CALIBRE initiated a plume-wide remedial action using enhanced reductive dechlorination (ERD). This in-situ treatment used a number of injection well transects (bio-barriers) installed perpendicular to the VOC plume flow path. With this treatment process, CALIBRE has significantly increased the biodegradation rate (the VOC half-life [$T_{1/2}$] at ~ 21 days) resulting in rapid degradation of all VOCs present. The last well at the waterway has shown a 99.96% reduction in total CVOCs from baseline levels (prior to start of remedial actions); the performance monitoring data from this point-of-compliance well are shown in Figure 3. The leading edge of the VOC plume has pulled back more than 1,200 feet from the waterway (see Figure 4). The performance monitoring data collected during the remedial action has demonstrated significant progress in mitigating site risks and meeting the remedial action goals.

Work completed by CALIBRE on this CERCLA project has included: 1) Scoping/planning project based on data quality objectives (DQOs) to identify data gaps; 2) Preparing project work plans and quality assurance plans for site investigations; 3) Conducting Remedial Investigation and Feasibility Study (RI/FS); 4) Implementing pilot tests that were later expanded to plume-wide treatment; 5) Completing an Engineering Evaluation/Cost Analysis (EE/CA); and 6) Performing site wide monitoring and reporting.

CALIBRE's remedial actions have significantly increased the biodegradation rate resulting in rapid degradation of the VOCs present in contaminated groundwater at the Site. Site restoration (throughout the plume) has allowed redevelopment of multiple industrial properties.