

**Case Study: Industrial Site, Connecticut, USA**

<p><b>Site Overview</b></p>	<p>Former aircraft parts manufacturing facility, currently light industrial use. Former heavy industrial use led to chlorinated solvent VOC contamination in groundwater directly beneath the factory building. Replaced legacy groundwater pump-and-treat system with <i>in situ</i> anaerobic bioremediation in 2004.</p>
<p><b>GSR Project Outcome</b></p>	<p>Replacement of groundwater pump-and-treat by <i>in situ</i> anaerobic bioremediation:</p> <ul style="list-style-type: none"> <li>- Negotiated with CTDEEP alternative cleanup goals to end active remediation.</li> <li>- Progressed from contaminant removal to contaminant destruction.</li> <li>- Reduced remediation carbon footprint by 67%.</li> <li>- Greatly decreased energy usage.</li> <li>- Virtually eliminated water consumption.</li> <li>- Achieved much lower VOC concentrations in treated groundwater.</li> <li>- Mitigated vapor intrusion risk inside factory building.</li> </ul>
<p><b>Background &amp; Drivers</b></p>	<p>Groundwater pump-and-treat had become very inefficient for further removal of VOCs. A better solution (<i>in situ</i> bioremediation) was needed to complete groundwater cleanup. Groundwater remediation and control was required by CTDEEP to manage residential vapor intrusion risk at down-gradient off-site properties, and on site beneath the factory building. CTDEEP accepted higher alternative cleanup goals to end active remediation based on vapor intrusion risk management. Long-term monitoring is necessary until drinking water standards are reached.</p>
<p><b>Regulatory Program</b></p>	<p>CTDEEP</p>
<p><b>Site End Use</b></p>	<p>Continued light industry.</p>
<p><b>Contaminants of Concern and Impacted Media</b></p>	<p>PCE, TCE, DCE, &amp; vinyl chloride. Groundwater: impacted zone is shallow sandy aquifer, 10 ft thick, underlain by clay.</p>
<p><b>Key Stakeholders in Project</b></p>	<ul style="list-style-type: none"> <li>- Former property owner, PRP</li> <li>- Current owner, light industry small business</li> <li>- CTDEEP</li> <li>- Nearby homeowners</li> </ul>
<p><b>Cleanup Objectives</b></p>	<p>Groundwater:</p> <ul style="list-style-type: none"> <li>- Residential volatilization criteria off site</li> <li>- Drinking water criteria on site</li> </ul>



<b>Remediation Strategy</b>	<p>Groundwater <i>in situ</i> anaerobic bioremediation through biostimulation. Initial carbon source injections were sodium lactate solution; later injections were emulsified vegetable oil. After alternative cleanup levels are reached, monitored natural attenuation (MNA) until drinking water standards are achieved.</p>
<b>GSR Strategy/Best Management Practices (BMPs)</b>	<ul style="list-style-type: none"> <li>- <i>In situ</i> remediation</li> <li>- Contaminant destruction</li> <li>- Optimization of sub-slab depressurization system</li> <li>- Decreased energy use</li> <li>- Eliminated water use</li> <li>- Minimized impact on business and community</li> </ul>
<b>GSR Metrics and/or Footprinting Tool(s)</b>	<ul style="list-style-type: none"> <li>- Energy usage</li> <li>- CO2-equivalents emissions</li> <li>- Water usage</li> <li>- VOC chlorine number reduction</li> </ul>
<b>Lessons Learned [Optional]</b>	<p>Collaborate with regulatory agency to develop interim alternative cleanup goals that remain protective of human health and the environment, while also maximizing the efficiency of the remediation processes. Final remedial goals were unchanged, but active remediation could end before those goals were achieved, followed by MNA.</p>
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<b>Relevant Links [Optional]</b>	
<b>References [Optional]</b>	