

**Blast Fracturing and *In Situ* Treatment Agents for
Passive Treatment of Chlorinated Solvent Plumes in Bedrock**

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Successful cleanups have been implemented using Permeable Reactive Barriers (PRBs) in unconsolidated aquifers, however little field experience exists for applying PRBs to fractured bedrock aquifers. Example case study sites will be described which are contaminated with chlorinated volatile organic chemical (CVOC) parents and their natural breakdown products. CVOC penetration is along native bedrock fracture networks, where lateral and vertical plume configuration typically falls along orthogonally oriented stress-relief fracture systems, and manmade features (utilities that penetrate bedrock, foundations, etc.). The features complicate plume control and remediation, particularly if remediation through a PRB type system is sought. PRB implementation in bedrock involves design and deployment of a bedrock blast-fractured trench in specifically oriented alignments, and installation of *in situ* treatment at key treatment locations in or along the alignments. Examples will be described where the opportunity exists to combine previously developed, but never combined, remediation methods – bedrock blast fracturing to refractively channel flow of groundwater, reactive iron (abiotic) treatment, and enhanced bioremediation. Example applications of reactive iron and hydrogen release agents -installed separately in blast-fractured alignments to separately evaluate their effects on hydraulics, treatment results, and geochemical characteristics – will be described. Example modeled configurations will also be provided to demonstrate plume flow toward, through, and out of the systems.