

Technical Assistance from USGS in the Characterization and Remediation of Contaminated Fractured Rock Sites

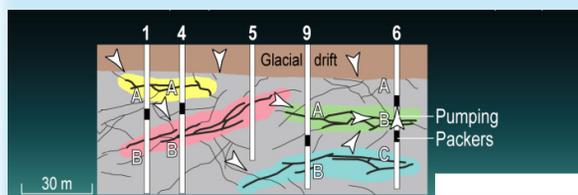
Through an interagency agreement with EPA, the U.S. Geological Survey (USGS) is offering technical assistance to regional EPA staff for the characterization and remediation of fractured rock sites contaminated with chlorinated solvents. The technical assistance includes reviewing project planning documents and investigation reports, as well as collecting and interpreting data from fractured-rock sites. This brochure describes the expertise available to EPA and how to obtain it.

BACKGROUND

USGS has been researching groundwater flow and contaminant transport in fractured rock aquifers for over 20 years. Investigative and remedial efforts in such aquifers are challenging due to complex connectivity of fractures coupled with the extreme variability in their hydraulic and transport properties. These conditions can lead to large differences in contaminant concentrations, water chemistry, and groundwater flow rates over short distances. In addition, contaminants can diffuse from fractures into the primary porosity of the rock, and slowly diffuse back out, acting as a long-term secondary source of contamination. Thus, contaminant fate and transport become more complex in fractured rock, and remedial efforts are more difficult.

For more information visit

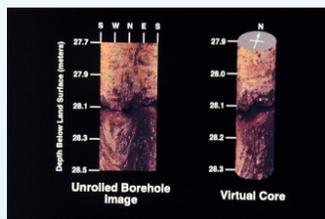
http://toxics.usgs.gov/investigations/fracrock_aquifers.html



ONGOING RESEARCH

Mirror Lake, NH

USGS has developed methods for characterizing subsurface fracture networks and the properties affecting flow and contaminant transport. These include hydraulic and tracer testing, noninvasive geophysical techniques, and borehole methods for conducting hydraulic tests and collecting water samples. The investigations were initiated in fractured rocks underlying Mirror Lake and have been tested at many other sites across the U.S. that are underlain by igneous, metamorphic, sedimentary, and carbonate rocks.



Former Naval Air Warfare Center (NAWC), West Trenton, NJ

Since 2001, USGS has conducted multidisciplinary investigations of the distribution, transport, and biodegradation of TCE, DCE, and vinyl chloride in fractured mudstones underlying the former NAWC. Ongoing research includes developing innovative methods for geologic framework development; monitoring contaminants, geochemistry, and microbiology; and estimating hydraulic and transport properties. Results are being used to compare the performance and efficacy of different strategies for remediating TCE and its degradation products, including natural and enhanced bioremediation and contaminant removal by pump and treat.



AVAILABLE EXPERTISE

USGS can help develop three-dimensional subsurface conceptual models and evaluate remedy effectiveness in fractured-rock aquifers through:

- Geologic framework development
- Surface geophysics to delineate geologic heterogeneity
- Borehole geophysics to identify permeable fractures
- Straddle packer deployment for hydraulic testing and geochemical sampling
- Aquifer testing to identify site-scale hydraulic properties and connections
- Groundwater flow modeling to estimate flow directions and rates
- Tracer testing to identify transport properties and processes
- Measurement of contaminants in the rock matrix
- Monitoring to assess biodegradation and long-term water quality
- Empirical calculations and reactive transport modeling to understand processes controlling remediation and to estimate contaminant mass removal
- Regional training or workshops on characterization and remediation of contaminated fractured rock sites.



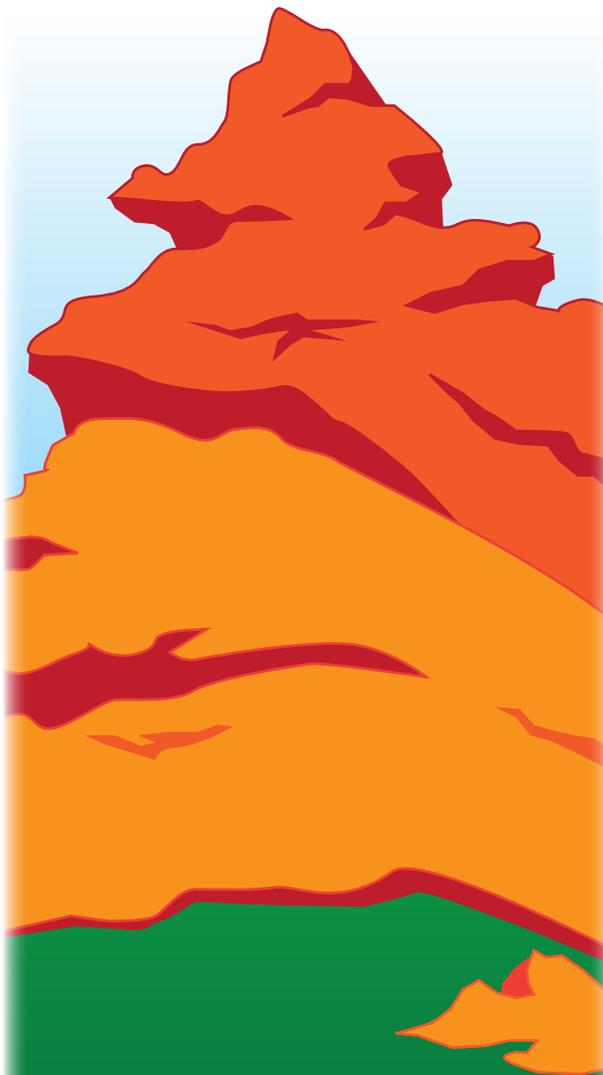
HOW TO REQUEST TECHNICAL SUPPORT

To request support for your site, please send an e-mail describing the support to:

Linda Fiedler of EPA's
Office of Superfund Remediation and
Technology Innovation at
fiedler.linda@epa.gov

The request should include a brief scope of work, including the problem statement, the type of work requested from USGS, the deliverable, and the timeframe of the work.

Limited funding is available in the interagency agreement to EPA regional offices for document review, data analysis, and modeling. Site-specific support and regional workshops would typically be funded by the client Region, and funds must be available at the time of the request. Interested states should contact a regional contact to request assistance, as all requests must come from regional staff.



United States
Environmental
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Office of
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Emergency Response

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