

The Bedrock Bioremediation Center



The Bedrock Bioremediation Center (BBC) is situated within the Environmental Research Group (ERG) at the University of New Hampshire. The BBC specializes in multidisciplinary research focused on enhancing microbially-mediated bioremediation of organically-contaminated aquifers. Funding for the development of the BBC is provided by U.S. Environmental Protection Agency (U.S. EPA). The BBC's Research Advisory Board has representatives from the U.S. EPA, the New Hampshire Department of Environmental Services, the U.S. Geological Survey and the U.S. Air Force.

The BBC is uniquely focusing on an innovative field program to conduct its research. This is occurring at the former Pease Air Force Base in Portsmouth, NH through a cooperative agreement with the U.S. Air Force. Research is being conducted at Site 32 located at the Pease International Tradeport. Pease Site 32 contains a contaminant plume of the degreasing agent trichloroethylene (TCE) that has migrated into the bedrock. BBC research activities at Pease have focused largely on methodologies for characterizing bedrock geology and hydrology and monitoring contamination.

Current topics of research being conducted by BBC researchers include: comparison of different groundwater sampling methods for bedrock boreholes; applications of drilling parameter recorders for real-time investigation of bedrock; characterization of fracture surfaces; development of fracture-based microcosms; comparison of hydraulic characterization methods; and characterization of bedrock microbial communities.

Mission and Outreach

The overall mission of the BBC is to (i) examine whether microbial communities in organically-contaminated bedrock aquifers are capable of biodegrading the contaminants, (ii) more efficiently and economically characterize the direction of groundwater flow and fracture patterns (size, direction, secondary mineralization) in contaminated bedrock aquifers, (iii) improve and develop new field technologies to control hydraulic and flow conditions in the contaminant zone, (iv) develop laboratory and field methods to estimate and accelerate in situ rates of bioremediation of organic contaminants in bedrock aquifers, and (v) to develop and apply innovative microbial and molecular biology techniques to enhance in situ bioremediation and assess the efficacy of remediation strategies.

One of the major outreach efforts of the BBC is to transfer information gained during its research to Federal, state and local regulatory agencies and environmental consultants. The BBC conducted several technology transfer workshops for regulators and consultants in 2002 and 2003 on Innovative Approaches for Bedrock Investigation and Remediation. The BBC also offers a 16-hour short course entitled "Bioremediation - An Option Worth Considering" for regulators and consultants (information on the BBC website).

Interdisciplinary Consortium

The BBC consists of a consortium of faculty from ERG and the University's Departments of Civil Engineering, Earth Sciences, and Microbiology. The Center is supporting graduate, undergraduate and postdoctoral research students.

Field Research

The BBC conducts comprehensive drilling, monitoring, and testing programs in their efforts to study and evaluate existing site conditions. The program is also structured to allow interested researchers from other institutions to come to the BBC field sites and conduct evaluations of other innovative bedrock drilling and evaluation technologies.

Technology Evaluation

The BBC creates field test sites consisting of borehole clusters where new technologies can be evaluated *in situ*. Each set of boreholes within a cluster will be connected by at least one common fracture, so that it will be possible to monitor water as it moves through the fracture from upgradient to downgradient boreholes. Such monitoring will help determine the ability of a new technology to reduce contamination.

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