

## NABIR Field Research Center, Oak Ridge, Tennessee

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**NABIR research objectives and results.** To encourage hypothesis-based field research and process-level understanding, the NABIR program has established a Field Research Center (FRC) for NABIR investigators. The FRC provides a site for investigators to conduct field-scale research and to obtain DOE-relevant subsurface samples for laboratory-based studies of bioremediation. Currently, the NABIR program has a single Field Research Center (FRC) located on the U.S. Department of Energy's Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Staff from Oak Ridge National Laboratory's Environmental Sciences Division has operated the FRC since April 2000. Both contaminated and background (uncontaminated control) areas are located on the ORR's Y-12 National Security Complex in Bear Creek Valley. The initial focus of research at the FRC has been on in situ biostimulation experiments to promote the immobilization of uranium and technetium.

The FRC is used by NABIR investigators for various purposes, including:

- A source of subsurface samples
  - Over 500 groundwater and sediment samples (cores and composites) have been collected and shipped from the background and contaminated sites for use by 8 national laboratories and 15 universities
  - Characterization and source of humic material
- Evaluation of new characterization and monitoring methods
  - Deployment of coupons (or bug traps) for rapid assessment of in situ microbial activity (University of Tennessee, ORNL, INEEL, and others)
  - Microcosm studies, microbial enrichments, and analyses of DNA, RNA, and PLFAs
  - Development of microarray technology for assessment of community dynamics
  - Improvement of mathematical models for prediction of community structure and dynamics
  - Field-portable immunoassay instruments and reagents to measure chelators and mobile forms of uranium (Tulane University)
  - Characterization of the subsurface with surface and crosswell geophysics (ORNL and LBNL)
  - In situ uranium assay with downhole NaI detector (ORNL)
- Multidisciplinary in situ accelerated bioremediation research projects
  - In situ uranium reduction experiments using push-pull techniques (Oregon State University and Oklahoma University located in Areas 1 and 2)
  - Field-scale bioreduction of uranium (Stanford and ORNL located in Area 3)
  - In situ immobilization of uranium in structured porous media via biomineralization at the fracture/matrix interface (PNNL, ORNL, and University of Alabama located in Area 2)

Additional information and data can be obtained at the FRC website:

(<http://www.esd.ornl.gov/nabirfrc/>).