



Department of Energy  
Office of Science  
Washington, DC 20585  
July 23, 2003

Office of the Director

Dr. Keith O. Hodgson  
Director, Stanford Synchrotron Radiation Laboratory  
Department of Chemistry  
Stanford University  
Stanford, CA 94305

  
Dear Dr. Hodgson:

Over the past two decades, the Office of Biological and Environmental Research (BER) has had an increasing commitment to understanding processes controlling the fate and transport of contaminants in the environment, particularly those contaminants released as a result of the DOE's (and its predecessor Agencies') nuclear weapons production and testing activities. Beginning with the Subsurface Science Program in the 1980's, and continuing today with the Natural and Accelerated Bioremediation (NABIR) Program, BER has sponsored interdisciplinary research aimed at understanding the processes that affect how contaminants are transported in the subsurface. This year, BER's activities in this area were further expanded by the transfer of the Environmental Management Science Program and the Savannah River Ecology Laboratory from DOE's Office of Environmental Management to BER.

These programs have resulted in scientific advances that have already had significant practical applications, including the development of *in situ* redox manipulation techniques to immobilize or destroy selected contaminants in groundwater, methods for stimulating the activity of bacteria already present in the subsurface such that they more effectively degrade organic contaminants, and providing a scientific basis for assessing the mobility of radioactive cesium and uranium beneath leaking waste storage tanks at the Hanford Site. More recently, NABIR researchers have shown that microbes capable of transforming metals such as U, Tc, and Cr to insoluble, chemically reduced form are common in subsurface environments, and research continues on the role of microbes in the transport of redox-sensitive elements.

Given the large number of factors that affect the fate and transport of contaminants in the environment, both model predictions and laboratory-scale experimental results require confirmation under the actual conditions present in nature. To facilitate this, the NABIR Program has operated a Field Research Center at the DOE's Oak Ridge Reservation since 2000. The soil and water at that site is contaminated by multiple substances, including radionuclides, metals, and organic compounds, and the site has been an excellent resource for investigators in the NABIR Program to conduct research and obtain samples



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related to *in situ* bioremediation. Based on this experience, and from input received from knowledgeable environmental researchers, we believe that there is a need for a suite of additional field research sites that encompass the range of environmental conditions and problems relevant to DOE. These sites would permit researchers to conduct long-term experiments and observations, test new subsurface characterization and measurement methods, and test model predictions.

To assist our planning, I am asking the Biological and Environmental Research Advisory Committee (BERAC) to evaluate the need for additional field research sites, and if such sites are found necessary, provide guidance on how BER might best set priorities for establishing them. More specifically, the Committee should:

- Assess the need for additional field research sites for the BER programs involved with the science of environmental remediation of subsurface and surficial contamination

Provide recommendations on the desirable features of such sites

Provide advice on prioritizing the selection of sites

- Provide advice on how to design field experiments to optimize data sets for model development and validation.

Comment on the relative desirability of a few comprehensive, “all-purpose” sites *versus* a possibly larger number of sites, each with a more focused or restricted set of goals and purposes.

- Provide advice on how to best balance the resources expended on field sites against other competing demands for research funds

Please develop a interim report for me on these issues by January 15, 2004. I would like to have a final report from BERAC prior to but no later than the Committee’s spring meeting.

Thank you and your Committee for your continuing help as we plan the future of BER and for your advice on the role of environmental science in the DOE research portfolio.

Sincerely,



Raymond L. Orbach  
Director