

research, focusing on the development of fossil fuels and renewable energy sources. At the same time, a broad range of legislation* strengthened and expanded the rationale for ERDA's program of health and environmental research by establishing a regulatory framework by which the results of this research could be integrated directly into the planning and development of energy technologies.

Although ERDA was relatively short-lived, these research functions were retained intact by the new Department of Energy (DOE), established in 1977. Within the Department today, these responsibilities have been carried on by OHER.

What, then, has been the net result of OHER's history of changing roles and mandates? A central mission has evolved, requiring the integration of three fundamental areas of study: (1) the "source," or potentially toxic agent of concern; (2) its "transport," or path from its point of release; and (3) the "effects" that it may produce upon populations and the environment.

The first of these areas of study involves the understanding and characterization of the material, pollutant, or agent of concern. Despite the seemingly limited scope of this phase of study, it can lead to unexpected rewards of a much broader nature. For example, the OHER mandate under the Atomic Energy Act required an understanding of radiations of various kinds and their interactions. This, in turn, created a need for the development of a host of radiation detection instruments, some of which became essential to the field of nuclear medicine, as noted later.

The second facet of the mission—source transport—began as an effort to understand the paths that

*This legislation, beginning with the National Environmental Policy Act in 1969, included the Clean Air Act, Safe Drinking Water Act, Toxic Substances Control Act, and the Resource Conservation and Recovery Act.

might be taken by radioactive materials through the environment. But, as the range of energy options under development increased, the transport of materials from other technologies—coal fly ash, combustion gases, synthetic fuel components—also came under study.

The final segment of OHER's integrated mission is to detect the nature and extent of any possible danger to man and his environment from the potentially toxic source materials. Once again, initial research in this area was confined to radiation biology, the study of mechanisms and magnitudes of effects produced by radiation. These studies included the uptake and distribution of radioactive materials in animals and man to determine potential toxicity. This knowledge, when coupled with developments in nuclear instrumentation, provided the basis for the parallel development of nuclear medicine. The latter was but one of the new directions in research to receive its impetus from radiation biology. The quest for answers to the mysterious response of cellular deoxyribonucleic acid (DNA) to radiation spawned an unparalleled research program in basic genetics.

Thus, the objective of the OHER mission has been straightforward—to perform fundamental research on the energy-related triad of *source-transport-effect* and to integrate its basic findings toward the solution of practical questions.

The OHER Program employs a multidisciplinary "team" of nearly 1000 scientists in specialized facilities that have come to be regarded as National resources for biomedical and environmental research. (Table 1). For example, in FY 1985 other Federal, State, and local agencies, and private industry invested over \$115 million in DOE laboratories to conduct health and environmental research to help address their own mission needs. Additional research supported by the OHER Program is conducted at some 100 academic

Table 1. Health and Environmental Research Laboratories

1. Multiprogram Laboratories
 - Argonne National Laboratory (ANL)
 - Brookhaven National Laboratory (BNL)
 - Lawrence Berkeley Laboratory (LBL)
 - Lawrence Livermore National Laboratory (LLNL)
 - Los Alamos National Laboratory (Los Alamos)
 - Oak Ridge National Laboratory (ORNL)
 - Pacific Northwest Laboratory (PNL)
 - Savannah River Laboratory
2. OHER-Dedicated Laboratories
 - Environmental Measurements Laboratory
 - Inhalation Toxicology Research Institute
 - Oak Ridge Associated Universities
 - University of California, Davis Laboratory for Energy-Related Health Research
 - University of California, Los Angeles Laboratory of Biomedical and Environmental Sciences
 - University of California, San Francisco Laboratory of Radiobiology and Environmental Health
 - University of Georgia, Savannah River Ecology Laboratory
 - University of Rochester Biomedical Laboratory
 - University of Utah Radiobiology Laboratory