These responsibilities were assumed by the agency's Division of Biomedical and Environmental Research, which initiated a significant program of nonnuclear 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 the Energy Research and Development Administration was relatively short lived, these research functions were retained intact by the new Department of Energy, which was established in 1977. Within the Department of Energy, these responsibilities have been carried on by the Office of Health and Environmental Research.

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 the potentially toxic agent of concern; (2) its *transport,* or the path from its point of release; and (3) the *effects* that it could produce upon populations and on the environment.

The first of these areas involves the understanding and characterization of the material, pollutant, or agent of concern. Despite the seemingly limited scope of this phase of study, unexpected rewards of a much broader nature can result from this research. For example, the OHER mandate under the Atomic Energy Act required an understanding of radiations of various kinds and of 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 might be taken by radioactive materials through the environment. As the range of energy options under development increased, however, the transport of materials from other technologies, such as coal fly ash, combustion gases, and synthetic fuel components, also came under study.

The final segment of OHER's integrated mission is to determine the nature and the extent of the potentially toxic source materials on man and his environment. 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 in man to determine potential toxicity. This knowledge, when coupled with developments in nuclear instrumentation, provided the basis for the development of nuclear medicine, which 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 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 descriptions of program accomplishments that follow provide a glimpse of some of the more tangible products of this research process. But, with the background for the presentation of these products provided, some caveats are first in order.

As in any other research enterprise, there is a continuum of effort, and a "snapshot" of selected OHER program accomplishments can easily create a distorted view of the overall workings of the program. It has already been noted that, although many of the accomplishments described have proved to be of considerable economic importance, this occurrence is not necessarily a measure of the effectiveness of the research within the context of the OHER mission; nor is it a factor in shaping the OHER research agenda. The course of research is complex and can lead to a number of dead ends as well as to successes and breakthroughs. A seemingly fruitless effort can sometimes be useful, however, by virtue of its indication of more productive pathways, and one of the accomplishments described, which eventually ended in a treatment for Parkinson's disease, provides a case in point. Basic research, a key part of the program, is of a long-term nature and often contributes no immediately measurable benefit. Yet, even in the event of negative results, it adds incrementally to our storehouse of information, which, in itself, is a major accomplishment. The bone-marrow-transplantation work undertaken early in the program is an example of basic research which ultimately provided much of the information that underpins the current state of the art for organ-transplantation work in medicine.

Thus, in summarizing the accomplishments of a research program designed for a mission as far-reaching as that of OHER, one must take care to avoid judging its worth solely on the basis of economic benefit or immediate applicability. The result of research may be a tangible product (e.g., a nuclear scanner or a radiopharmaceutical) of readily calculable value. But the "product" may also be the answer to the riddle of self-repair to cell injury, the mechanism by which a particle is transported, or the definition of the risk of bone cancer from radiostrontium.

*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.