

Emerging Energy Technologies

OBJECTIVE: Through Research, Examine the Potential for Adverse Effects on Human Health and the Environment from Emerging Energy Technologies.

It is the purpose of this Act... to advance the goals of restoring, protecting, and enhancing environmental quality and assuring public health and safety...

—Sec. 102, Public Law 95-91

The functions which the Secretary shall assign...shall include...conducting a comprehensive program of research and development on the environmental effects of energy technologies and programs....

—Sec. 203, Public Law 95-91

This new organization act identified, for the Department of Energy (DOE), responsibilities for public health and safety that were virtually identical to those of the AEC in its nuclear development and production programs and ERDA in its development of energy conservation and both nuclear and non-nuclear energy-supply technologies. In all three charters the intent of Congress was clear: to foster a better understanding of the potentially adverse effects on human health and the environment of emerging energy technologies. The dramatic dislocations following the oil embargoes of 1973 and 1979 gave impetus to the development of the emerging technologies—synthetic and renewable, as well as nuclear, fuels—and, thus, added to the urgency of these responsibilities.

Identification of Human Health Effects

Early in the OHER Program, concerns centered around the responses of humans and animals exposed to radiation. Specific experiments to measure radiation effects were initiated and led very quickly to the realization that to recognize damage, scientists first had to understand the structure and functioning of healthy cells, tissues, animals, and, ultimately, humans. The resulting research program would make, and continues to make, major contributions to biology, medical diagnosis and

treatment, ecological science, genetics, biophysics, immunology, DNA repair, and the study of the causes of cancer, to mention only a few of the affected and enriched scientific areas.

The next decades could see a rising potential for new pollutants from such technologies as oil shale and synthetic oil from coal or from diesel emissions. The movement of these pollutants through the air, land, and water and possibly back to human beings would have to be evaluated. It is important to understand the ability of the environment to break down, detoxify, and absorb the residuals from these new chemicals. Testing their ability to cause cancer, mutagenic effects, or somatic damage is also needed to help minimize health and environmental effects. The time when guidance can be most helpful and least expensive is before billions of dollars are invested in new energy technologies.

Finally, should the unexpected occur, the OHER has developed capabilities to respond to emergency situations and realistically assess the potential public health hazards of toxic releases to the atmosphere. These systems were originally designed to predict fallout from atmospheric nuclear weapons testing but have evolved into an especially effective atmospheric-dispersion forecasting for chemical releases as well.

Nuclear Technology The biological and medical research program initiated during the World War II "Manhattan Project" has sponsored extensive research studies and measurements to determine the mechanisms and extent of radiation effects on human health through direct studies on exposed human populations and by experiments on animals, tissues, cells, and individual molecules of interest. Data on the health impacts of different types and levels of radiation exposure, the interaction of radiation with living tissue, and the manner in which radioisotopes are taken up into the body have been evaluated and used to determine the risks posed by radiation