

Challenges Posed by Nuclear Waste Disposal Call for Attention of World Leaders

The focused attention of world leaders is needed to address the substantial challenges posed by the disposal of spent nuclear fuel from reactors and high-level radioactive waste from processing such fuel for military or energy purposes, according to a report from an international committee of the National Academies' National Research Council (NRC). The biggest challenges in achieving safe and secure storage and permanent waste disposal are societal, the committee said.

Committee chair D. Warner North, president of NorthWorks Inc., Belmont, Calif. said, "Waste-management programs around the globe should direct their efforts beyond technical development to emphasize public participation in the decision-making process."

The NRC initiated the study after observing that many nations were encountering significant difficulties and delays in their plans for geological disposal of nuclear waste.

"Properly disposing of this waste will require international collaboration," said committee vice chair Charles McCombie, consultant, Gipf-Oberfrick, Switzerland. "Collaboration at the technical level already exists, but coordination at the strategic and political levels should intensify."

The committee said it believes some internationally shared surface-storage facilities or geological repositories will eventually become a reality, which could benefit nations with small nuclear programs or unfavorable geology for underground disposal.

The United States, Finland, and Sweden have plans to begin placing waste in geological repositories early in this century, while other countries, such as Germany, Japan, Switzerland, China, and the United Kingdom, are considering midcentury dates. The Netherlands does not plan to implement geological disposal for at least 100 years, and Canada has not made a decision. Likewise, France passed a law specifying that no decision will be made before 2006. Russia has identified candidate sites for deep repositories, but no timetable has been set for their construction and use. Many countries with small nuclear programs do not yet have plans for long-term disposition of their high-level waste. No country plans to permanently seal a geological repository in less than 50 years. Whether, when, and how to move toward geological disposal are societal decisions that each country must make, the committee said.

Most current surface-storage facilities

are intended to hold waste for 50–100 years. If resources were dedicated to their upkeep and expansion, however, they could be a feasible waste-management option for even longer. In addition, because these facilities are designed for easy retrieval of waste, they leave the door open for future options for treatment and disposal. There is no need for nations to rush implementation of permanent disposal so long as waste is managed responsibly in safe and secure surface facilities, the committee said. On the other hand, it emphasized that it is not prudent for a country to pursue only surface storage without also pursuing geological disposition unless the nation can credibly commit to permanent monitoring and active management of surface sites.

The report was sponsored by the U.S. Department of Energy, U.S. Nuclear Regulatory Commission, and organizations responsible for radioactive waste management in eight other countries. The report, "Disposition of High-Level Waste and Spent Nuclear Fuel: The Continuing Societal and Technical Challenges" can be accessed at URL www.nap.edu or obtained from the National Academy Press, 2101 Constitution Ave., NW, Washington, DC 20055; tel. 202-334-3313 or 800-624-6242.

NRC Committee Advises Presidential Administration on Global Warming

In a report requested by the Presidential administration, a committee of the National Academies' National Research Council summed up science's current understanding of global climate change by characterizing the global warming trend over the last 100 years and examining what may be in store for the 21st century and the extent to which warming may be attributable to human activity. After the one-month study, the Committee on the Science of Climate Change also determined that much more systematic research is needed to reduce current uncertainties in climate-change science.

The committee said the conclusion of the Intergovernmental Panel on Climate Change (IPCC) that the global warming that has occurred in the last 50 years is likely the result of increases in greenhouse gases accurately reflects the current thinking of the scientific community. However, it also cautioned that uncertainties about this conclusion remain because of the level of natural variability inherent in the climate on time scales from decades to centuries; the questionable ability of models to simulate natural variability on such long time scales; and the degree of

confidence that can be placed on estimates of temperatures going back thousands of years.

The greenhouse gas of most concern is carbon dioxide, since the naturally occurring chemical also is generated by the continuing burning of fossil fuels; it can last in the atmosphere for centuries and "forces" more climate change than any other greenhouse gas, the committee said. Other significant greenhouse gases include methane, nitrous oxide, water vapor, tropospheric ozone, and chlorofluorocarbons (CFCs), which together have a "forcing" effect on climate change approximately equal to that of carbon dioxide. Human-made sources of methane, nitrous oxide, and ozone have resulted in substantially increased concentrations in the atmosphere in the 20th century, although each of these gases also has natural sources. CFCs are entirely synthetic compounds.

The committee also was asked by the administration to examine whether there were any substantive differences between the IPCC reports and their abridged technical and policy-maker summaries. The IPCC was established by the United Nations and World Meteorological Organization in 1988, and its reports and summaries have been influential in international negotiations related to the Kyoto protocol.

The committee said that the full IPCC Working Group 1 report does an admirable job of reflecting research activities in climate science and is adequately summarized in the technical summary. The corresponding summary for policy-makers, it added, placed less emphasis on the scientific uncertainties and caveats. Looking to the future, the committee suggested that improvements to the IPCC process may need to be made to ensure the best scientific representation possible and to keep the process from being seen as too heavily influenced by governments "which have specific postures with regard to treaties, emissions controls, and other policy instruments."

To reduce some of the uncertainties inherent in current climate-change predictions, a strong commitment must be made to basic research as well as to improving climate models and building a global climate observing system, the committee said. More comprehensive measurements of greenhouse gases and increased computational power also will be needed.

The report, "Climate Change Science: An Analysis of Some Key Questions," can be accessed at URL www.nap.edu or obtained from the National Academy Press, 2101 Constitution Ave., NW, Washington, DC 20055; tel. 202-334-3313 or 800-624-6242. □