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NOTICES

DEPARTMENT OF ENERGY

Program of Research and Development for Management and Disposal of Commercially Generated Radioactive Wastes; Record of Decision

Thursday, May 14, 1981

***26677** This Record of Decision has been prepared pursuant to the Regulations of the Council on Environmental Quality, 40 CFR Part 1505, on the selection of a strategy for the disposal of commercially-generated radioactive wastes and the supporting program of research and development.

Decision

The United States Department of Energy has decided to (1) adopt a strategy to develop mined geologic repositories for disposal of commercially-generated high-level and transuranic radioactive wastes (while continuing to examine subseabed and very deep hole disposal as potential backup technologies) and (2) conduct a research and development program to develop repositories and the necessary technology to ensure the safe long-term containment and isolation of these wastes.

Description of Alternatives

Three alternatives were considered:
(1) Emphasize Mined Repositories. The research and development program for waste management would emphasize use of mined repositories in geologic formations in the continental United States capable of accepting radioactive wastes from either the once-through or reprocessing cycles (while continuing to examine subseabed and very deep hole disposal as potential backup technologies). The program would concentrate on identifying specific locations for the construction of mined repositories. This action would not preclude further study of other disposal methods as possible supplementary methods for handling of specific isotopes.
(2) Parallel Technology Development. The research and development program would emphasize the parallel development of several disposal methods. The research and development program would be structured to bring the knowledge and development status of two or three disposal concepts to an approximately equal level. Based upon the Department's current evaluation, the likely candidate technologies for this parallel development strategy would be:
a. Geologic disposal using conventional mining techniques,
b. Placement in sediment beneath the deep ocean (subseabed),
c. Disposal in very deep holes.
Other disposal methods which were analyzed as candidates for consideration included:
a. Disposal by injection of liquid waste into underground cavities resulting in melting of surrounding rocks,
b. Geologic disposal on islands,
c. Disposal by melting into continental ice sheets,
d. Injection into porous or fractured strata beneath the earth's surface,
e. Transmutation of waste actinides in reactors to change to stable or short- lived isotopes, and
f. disposal by rocket transport into space.
(3) No-Action. Under this alternative, the Department's research and development programs for radioactive waste disposal would be eliminated or significantly reduced and a decision on a plan to dispose of commercially- generated wastes would be deferred indefinitely.

Basis for Decision

The Department has decided to proceed with a programmatic strategy favoring the disposal of

commercially-generated radioactive wastes in mined geologic repositories. This decision is based on the Department's commitment to the early and successful solution of the Nation's nuclear waste disposal problem so that the viability of nuclear energy as a future energy source for America can be maintained. The decision also will save money by focusing Federal funds on the further development of the most advanced disposal technique.

Environmental effects considered for each of the three programmatic alternatives--mined repositories, parallel technology and no-action--included regional and world-wide *26678 radiological impacts, commitment of natural resources and cost. Environmental effects were considered for five nuclear power growth scenarios and for both the once-through and reprocessing fuel cycles. Comparison of 70-year whole-body dose accumulations from normal operations revealed somewhat higher doses for the parallel technology than for the mined repository alternative, but the differences were not large enough to be significant and doses were only a small fraction of the naturally occurring dose even for the highest nuclear growth cases examined. Dose accumulations for the no-action alternative were somewhat lower. The analysis of the no- action alternative did not, however, consider the need for, and environmental effects of, additional facilities when those in use have exceeded their design lifetime, since it was assumed that no Federal funds would be used.

In reaching its decision to emphasize mined geologic repositories, the Department considered the requirements for economic resources. Required resources considered for each of the three programmatic alternatives included steel, cement, diesel fuel, gasoline, propane, electricity, and manpower. Requirements for the parallel technology generally ranged two-to-three times higher than those for the mined repository alternative. In no case was the quantity of a required resource more than a small fraction of the current United States rate of production of the resource.

The Department's decision also included a consideration of total system cost, i.e., the cost of waste treatment, storage, transport and disposal. The Department's research and development and repository site qualification costs, which are to be recovered through fees charged to the utilities for storage and disposal, were also considered. Based on cost information summarized in its Final Environmental Impact Statement, the Department concludes that the parallel technology alternative is generally more costly than the mined repository alternative. This cost of waste management and disposal is expected to add about two-to-six percent to the consumer's cost of electricity.

The no-action alternative could be construed as contrary to the mandate given the Department of Energy by law, and in any event would be undesirable because of the temporary nature of the present storage of wastes and the need to construct additional facilities for extended storage as present facilities reach their design lifetime. The Department also feels the no-action alternative is unacceptable because of the long-term radiological risk posed by the lack of effective containment of the wastes. The Department has, for these reasons, rejected the no-action alternative.

A number of waste disposal methods other than mined repositories were evaluated in the Department's Final Environmental Impact Statement. Factors which were considered in evaluating each of these disposal methods included: (1) Radiological effects during the operational period, (2) non-radiological effects, (3) compliance with existing National and international law, (4) independence from future development of the nuclear industry, and (5) potential for corrective or mitigating actions. The analysis of each of these factors showed a clear preference for the mined geologic alternative.

From a consideration of technical feasibility, only two of the alternative waste disposal methods appeared promising enough to warrant further study: subseabed and very deep hole. For subseabed, the Department has decided to continue studies of the environmental technical, legal, and institutional feasibility of isolating wastes within the sedimentary geologic formations of the deep seabed. This concept is considered a longer-term supplementary disposal method to mined repositories. The Department also feels that very deep hole disposal warrants some additional study as a possible backup for high-level waste disposal. Further development of the very deep hole concept will emphasize the capability to take corrective or mitigating actions.

While not a viable alternative for the disposal of all high-level wastes, the Department has concluded that space disposal may be profitably studied for its application to special disposal concerns, e.g., more remote isolation of long lived and environmentally mobile radionuclides such as 99 Tc and 129 I.

The other disposal methods considered by the Department (island, transmutation, rock melt, ice sheet, and well-injection) were found to have no clear advantage over mined geologic disposal and to provide no additional complementary function. In some cases these other technologies appeared clearly less desirable (for instance, in the rock melt disposal concept the waste is expected to be

liquid for the first 1000 years and thus is most mobile during the period of greatest fission product hazard).
Although the level of knowledge of alternative technologies to mined geologic disposal is not comparable, sufficient evidence exists to support the Department's finding that there is little likelihood that any of these technologies would be superior, from an environmental perspective, to the geologic alternative.

Discussion of Environmentally Preferable Alternative(s)

Based on the information presented in the Final Environmental Impact Statement, the Department concludes that the environmental impacts of the program to emphasize mined repositories are similar to those of the parallel technology development program. The evaluation of long-term effects presented in the Final Environmental Impact Statement indicates that mined geologic disposal, and those other technologies which justify further consideration, would have similar environmental impact. The Department has concluded that the no-action alternative is environmentally unacceptable from a long-term perspective and that neither of the two remaining programmatic alternatives can be identified as clearly preferred from an environmental viewpoint.

Mitigation

Given the programmatic nature of the proposal, it is difficult to address specific measures that will be taken to minimize adverse environmental impacts resulting from this decision. However, the Department will evaluate the adverse impacts of specific site characterization activities and repository construction at each candidate site in site specific environmental impact statements and will undertake mitigation activities where appropriate. Mitigation activities which may be needed were considered in Section 5.4 of the Final Environmental Impact Statement. Conditions which may require mitigation include fugitive dust depositions from surface handling of mined material and runoff to nearby surface waters.

Conclusion

The Department has considered the benefits, impacts, and costs of reasonable alternatives and has concluded that the research and development program on disposal of commerically-generated radioactive wastes should focus on mined geologic repositories, while continuing to examine subseabed and very deep hole disposal as potential backup technologies.
***26679** Dated: April 16, 1981.

Mahlon E. Gates,

Acting Assistant Secretary for Nuclear Energy.

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