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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 22, 1978

Waste Management



OFFICE OF THE
CHAIRMAN

The Honorable Morris K. Udall
Chairman, Committee on Interior
and Insular Affairs
United States House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

This letter is in response to your letter of August 18, 1978 which requested Commission comments and reaction to the Office of Science and Technology Policy (OSTP) July 3, 1978 draft report, "Isolation of Radioactive Wastes in Geologic Repositories: Status of Scientific and Technological Knowledge."

NRC is a "non-voting" member of the Interagency Review Group on Nuclear Waste Management (IRG). Dr. Clifford V. Smith, Jr., Director, Office of Nuclear Material Safety and Safeguards, has been designated as NRC's official representative on the IRG; in addition, several NRC staff members have been participating in the activities of several subgroups. The nature of the staff participation has been to provide technical input and information on agency schedules and programs.

With respect to your first question, the Commission itself has not reviewed the OSTP draft report but has been kept informed of staff participation in the IRG. In conjunction with its participation in the IRG, the NRC staff provided the enclosed comments on the early July version of the subgroup reports. In summary, the staff felt that the OSTP draft report was a commendable initial attempt to provide a broad overview of the status of knowledge regarding geologic disposal as part of background information for the development of a national waste management policy. Regarding your second question, the Commission obviously would not support revising the report to reflect a "more positive view" if such revisions were inappropriate or misleading; however, we do believe that it is appropriate to revise the report in response to valid comments.

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The July 3, 1978 draft was widely distributed for public comment by OSTP and the revision of that draft is expected to be available soon. It is our understanding that OSTP has received comments from a large number of sources reflecting widespread interest in the report, and that significant resources have been applied to reviewing the comments and incorporating changes. In our opinion the accommodation of public comment is a vital part of the process of preparing a final draft.

I hope these comments have been helpful in addressing your concerns.

Sincerely,

Joseph M. Hendrie

Joseph M. Hendrie
Chairman

Enclosure:
Comments on OSTP Report

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NRC Staff Comments on
2. OSTP Document - Status of
Scientific and Technological Knowledge (Appendix A)

General

As a brief clarification of the general issues and the nature of the state of knowledge the report is excellent. Several sections of the paper indicate the need for a systems approach to the problem of repository siting and development. This is considered quite wise and appropriate. It leads to recognition of the fact that the repository system as a whole must be optimized, not just a single component of it. This point has been overlooked at times in the past and indicates the need for considerable flexibility in site selection criteria (also noted in the paper). The NRC staff is in agreement with this view. The paper also appropriately points out that non-geologic factors will undoubtedly play an important part in preliminary site selection and that in final site selection "some uncertainties will always remain and we must be careful not to demand more data than can be obtained or than is really needed." To make this document more useful to the general reader and decision-maker, it should contain a summary and conclusions section. This section should spell out--clearly--the state of current knowledge, the degree of uncertainties, the priorities for research, and the time and resources required to expand the base of knowledge and reduce uncertainties to acceptable levels.

Introduction

The introduction should include a statement of qualification such as: "This report is a general summary of the issues, state of the knowledge and uncertainties concerning isolation of waste in geologic repositories for use in providing a background for program decisions. It is not intended as an authoritative report that reflects accurately all of the particulars on geological waste isolation or one with which all scientists and researchers would necessarily agree. Many items, such as the importance of certain phenomenon, or factors, such as cost, are still open to serious debate; nor is the list of issues and uncertainties necessarily complete."

P. 4

The value for the amount of fuel discharged through 2000 does not agree with a comparable value in the issue paper which uses data from NUREG-0404 to define the amount of spent fuel discharged. The data in the issues paper and supporting appendices should be carefully reviewed for consistency.

The composition of the radioactive part of defense wastes is given as 98% fission products and 2% actinides. This statement should be clarified to indicate radioactivity level or mass.

P. 6

Apparently this Appendix is structured on the assumption that spent fuel is reprocessed for uranium recovery only. This is considered by many knowledgeable nuclear technologists as the last likely alternative concept. The rationale for adopting this concept should be developed and stated and the disposition of the plutonium and collected gases should be explained.

The last paragraph on p. 6 and the table on p. 7 are confusing. The description of the table states that the data represent plutonium; however, they do not appear to be consistent with other data in this regard. (Note that ORNL-4451 (Tables 3.17 and 3.13) show 9,050 g of Pu generate 124 watts, equivalent to 0.013 watts/gram Pu, or 13 kW/MTPu.)

P. 8

Some idea should be given of the approximate length of the operational period. It may range from a few to several tens of years depending on decisions regarding retrievability.

P. 8, paragraph 2

Natural gas should be included in the list of flammable gas sources.

P. 8, paragraph 3

Thermoelectric effects are mentioned but not discussed. What are these?

P. 8 and 9

The statement is made that physical or chemical changes within the waste form that would affect waste/container/media interactions, would proceed at the highest rate during the thermal period (the first few hundred years). This is not obvious; it should be substantiated in the document.

P. 9, line 7

The stresses produced during the thermal period may have ended; however, some non-reversible effects, such as fractures, will remain. The opening of fractures produced may decrease and the driving mechanisms for transport will certainly diminish but some residual effects of such penetrative deformation must be anticipated.

P. 11

Item (b) can be interpreted to imply either site-specific waste form criteria or site-specific waste packaging criteria. Which is intended?

P. 14

This paper indicates that operation of a demonstration repository may be necessary. On the other hand, the Issues Paper appears to argue that a demonstration repository is unnecessary. More consistency on this point seems warranted.

P. 14, paragraph 1

The statement concerning uncertainties being less important in an environment providing "...long groundwater flow paths, slow water velocity..." does not demonstrate any awareness that these conditions may well change over the period of interest.

P. 15

It would appear that a NEPA requirement for an EIS for site testing programs may be necessary and should be noted and discussed.

P. 19, paragraph 2

The statement that rock mechanics as applied to repository design is well in hand appears to be supported in the report by reference to Project Salt Vault. However, the NRC staff notes that Project Salt Vault research report (ORNL-4555) resulted in development of an equation for pillar shortening under pressure, but at the same time observed:

"...deviation [from predicted behavior] at higher...temperatures [is] believed to be due to the effects of pillar spall and lateral pillar expansion in the heated sample, which undoubtedly affect deformation...and which have not been taken into account in the equation."

Thus, it would appear that the technical judgment noted above concerning rock mechanics may be subject to question.

P. 19, 24, elsewhere

A more technical description of the "thermal pulse" should be provided.

P. 22, bottom

Progress on containers and waste forms performance criteria must be developed in coordination with information on the basic forms of disposal planned by DOE.

P. 29, line 27 and P. 30

This line and the following lines on to the end of the paragraph are not clear with regard to the meaning of "tectonic overburden stresses." The last sentence of the paragraph states that "the region will still be in a state of compression." Is it projected that this compression is due to the effects of the repository or that the origin of compression is in the regional stress field?

P. 40, end of first paragraph

Another uncertainty that should be noted is: the ability to develop models and obtain accurate mathematical solutions (e.g., numerical computer calculations often lose significant information).

P. 69, top

While this discussion of the Nevada Test Site conditions discusses the cost of rock bolting in shale, it seems the same may be true of salt.

P. 71, line 19

The added protection from a barrier underlying the repository will only be realized if confidence can be placed in the downward flow of water from the repository before it moves toward the biosphere.

P. 73, line 15

Can the sorptive capacity of a relatively clean sandstone, such as might be found in parts of an alluvial sequence, be characterized as moderate to high?

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