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cc: Paschal

To: N. Tanious, NRC, WMEG
From: J. Daemen
Re: -Draft DOE Position on Retrievability and Retrieval
for Geologic Repository, June 28, 1985
-Preparatory meeting, Silver Spring, 7-17-85, for DOE-NRC
retrievability meeting
Date: 7/24/85

The letter requesting me to review the above DOE document only reached me after the above meeting. My comments only include comments that have not been made explicitly at the 7-17 meeting, or comments which might deserve more emphasis than received at the meeting, as well as my major observations on the Draft Position.

The DOE draft position is an excellent document, and forms a solid basis for developing a common DOE-NRC understanding on retrievability. A number of aspects, mostly details, but including some important topics, remain to be ironed out.

DOE clearly identifies its dual responsibility with regard to retrieval, i.e. the NWPB requirements and the 10 CFR 60 requirements. It will be important to always remain aware of this ambiguity, and of its implications.

A very encouraging aspect of the document is the firm commitment by DOE (note especially section 3, page 12 and following) that retrieval requirements and criteria must be incorporated into the repository design. The detailed discussion, recognition of potential problems, etc., clearly confirms this DOE commitment.

The most serious concern raised by the document is with regard to the approach taken to provide reasonable assurance, in the License Application, that retrievability will be maintained for the period required by the Rule. The License Application will depend heavily on the Proof-of-Principle Demonstration. This demonstration emphasizes strongly the mechanical-equipment aspects of retrieval, but pays insufficient attention to the overall retrieval system operations. It is recognized that this demonstration "shall include an analysis of the retrieval system" (p. 16, 1st sentence), and that the document discusses ventilation requirements at some length. Nevertheless, one has a strong impression that the access problems (hole, room, drift stability) should have received considerably more, and explicit, attention. A second, although closely related, criticism might

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be that the DOE treats the retrieval issue as totally isolated from other repository issues, in particular with regard to in situ testing. Although such a separation might be desirable for the sake of clarity, it tends to hide the fact that extensive information will be obtained during in situ testing that is directly relevant to retrieval, even though it is not obtained exclusively or even primarily for retrieval demonstration.

Based on these concerns, the following major two recommendations could be made:

- 1) DOE could strengthen its position considerably by being more explicit in its requirements of "an analysis of the retrieval system" (p. 16).

A separate section on this topic would seem appropriate. Such a section would address issues such as:

- hole stability and canister loading throughout the retrieval period
- emplacement room and access drift and shaft stability
- thermal regime along the entire access path
- ventilation design
- re-entry design

A comprehensive retrieval system analysis will be particularly important because a physical demonstration of the entire system, taking into account time effects, clearly is not feasible.

- 2) DOE could strengthen its position considerably by providing an explicit discussion of information directly related to retrieval, i.e. by requiring the design analysis to integrate a significant fraction of the vast amount of information that bears on retrieval. Specific examples of this might be:

- BWIP has demonstrated in the NSTF that some basalts can withstand very high temperatures for extended periods of time without significant hole deterioration. Any additional heater tests performed in situ, if they give equally positive results, will further enhance the confidence that emplacement holes will remain stable.
- Many tunnels and mines have been excavated in tuff. Can a data basis be developed providing reasonable assurance that excavations in tuff will remain stable for several decades?

-Waste emplacement tests in salt in Asse indicate extensive salt decrepitation, but the canisters could be removed. If the SRPO hole design were similar, this experience would be relevant.

Obviously many more examples could be listed.

Although the above are listed as recommendations to DOE, they apply equally well to NRC. It is very clear that, at the time of License Application, NRC will have to make a decision based on extremely limited, if any, in situ demonstrations of retrievability, and certainly without any demonstration of the total retrieval system. It would therefore seem highly desirable for NRC to develop a strategy for assessing the retrieval aspects of the LA, possibly by developing its own retrieval system analysis along the preceding recommendations.

A third recommendation to DOE might be to consider adding a section on site-specific or medium-specific retrieval problems, primarily to stress that retrieval from salt almost certainly is fundamentally different from retrieval from other (non-viscous) media.

Detailed comments.

Section 2.3 Duration: unclear and questionable

Section 2.4 - Third sentence

It is difficult to see how all plans and contingencies could be tested realistically, given that many aspects (e.g. hole deformation, access drift stability) unquestionably depend on time, i.e. will be different after 30-40-50 years. The second paragraph is an excellent summary of retrieval time requirements.

Section 3.2 Ventilation

The commitment to design retrieval ventilation requirements at the same time as the repository design is an extremely positive development.

Section 3.4 Demonstration

It remains unclear what is meant by "simulated repository conditions," but it is important to recognize that this is physically not possible, because the time factor (e.g. duration of exposure to elevated temperature) cannot be simulated, and is likely to be significant (more so in some rock types, e.g. salt, than in others).

Proof-of-Principle

The "analysis of the retrieval system" is extremely important, because it, together with equipment demonstrations, will be an essential requirement to provide reasonable assurance that retrieval is feasible.

I strongly disagree with the assumption (second paragraph) that mock-up testing can demonstrate that retrieval is in principle feasible, because mock-up testing cannot simulate the full range of repository conditions. Successful mock-up testing, nevertheless, will provide a high level of confidence that the necessary equipment for canister removal from an emplacement hole will be available.

Development of Prototypical Equipment

I would recommend including with the geotechnical conditions listed in the last sentence of the first paragraph such factors as depth, stress, and deformation.

4.3 Monitoring and Verification

Contrary to the claim in the first sentence of the third paragraph, and for reasons discussed earlier (section 3.4), only a very partial verification is possible by means of the proof-of-principle demonstration.

4.5 Equipment Reversibility

There appears to be a contradiction between the second paragraph, "no equipment needed solely for retrieval need be located at the repository. Such equipment need be available only at the time retrieval becomes necessary," and p. 20, first paragraph "The operating equipment needed for retrieval shall be maintained in working condition until the end of the retrieval period."

To: S. Bhattacharya, Engineers International
From: J. Daemen *JD*
Re: Trip Report *JD* 7/16-18/85, NRC, Silver Spring, MD
Date: 7/23/85

Meetings attended:

7/16: Pre-DOE/NRC ES Meeting
7/17: Pre-DOE/NRC Retrievability Meeting
7/18: DOE/NRC ESF Meeting

DOE/NRC ESF Meeting 7/18 Main Observations

A broad consensus appears to exist between DOE and NRC about most topics to be discussed at the project meetings.

NRC has repeatedly, clearly and forcefully emphasized its need for a comprehensive response to its ESF letters from each project.

DOE explicitly recognizes the need to comply with major NRC concerns: prevent adverse impacts and do not preclude data acquisition. Only after detailed project meetings will it be possible to judge the extent to which projects will comply with these requirements.

DOE does not yet have a policy on the use of performance assessment/allocation as a design tool for site characterization/in situ testing. Methodology for determining testing requirements ("how much is enough") remains judgemental, vague.

Main generic concerns:

- performance assessment/allocation will not be available in foreseeable future (e.g. in SCP).
- in situ testing schedule is extremely tight. It would seem highly desirable for NRC to start developing a strategy for dealing with a license application that might contain an extremely limited data basis of results from in situ site specific tests.
- the representativeness issue has barely been touched upon (but probably will be addressed much more explicitly in project meetings).
- no coupled tests are planned during site characterization. It is likely that a vocal visible segment of the scientific/engineering community will raise concern about this. It will be essential that both DOE and NRC anticipate the concerns and prepare a credible response.

Site-Specific Concerns

SRPO

-discussed ES only, not in situ testing

-no at-depth retrievability will be demonstrated by license Application
(although this is true for all sites, it is of particular concern for
salt)

-very short term creep data only will be available by license Application

BWIP

-no agreement yet on site-specific workshop

NNWSI

-it appears that several significantly different potential repository
designs will be carried through for a prolonged period of time.