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Jefferson O. Neff
U.S. Department of Energy
Salt Repository Program Office
505 King Avenue
Columbus, Ohio 43201-2693

Dear Mr. Neff:

Enclosed are the general comments prepared by the NRC staff on the Technical Report, Performance Assessment Plans and Methods for the Salt Repository Project, August 1984 (BMI/ONWI-545). These comments address NRC concerns that apply to significant aspects of the performance assessment plan as a whole, and are provided for your use in preparing the 1985 update. Our specific comments are being finalized and will be transmitted by September 6, 1985.

In our review, we have recognized that the document is an initial step in an iterative process of describing evolving procedures for performance assessment of a mined geologic disposal system. As such, the document provides a logical, reasonably comprehensive, but preliminary description of the status of DOE/SRPO's approach to performance assessment, as of August, 1984. Accordingly, the intent of NRC staff comments is to provide guidance that would be useful in preparing scheduled updates of the document. It is to be expected that as approaches to performance assessment of a repository are refined, the guidance provided by NRC staff will also be refined.

Original Signed By:

John Linehan, Section Leader
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material
Safety and Safeguards

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Enclosure:
NRC Staff General Comments on
BMI/ONWI-545

cc: Don Alexander, DOE Hdqtrs.

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Enclosure 1

NRC Staff General Comments
on
Performance Assessment Plans and Methods
for the Salt Repository Project, August 1984
(BMI/ONWI - 545)

1. Scope of the Performance Assessment Plan.

The scope of the Performance Assessment Plan (Plan) emphasizes almost exclusively the quantitative analyses of repository performance and there is very little treatment of qualitative analysis in the document. Thus, the impression is given that the approach to assessing performance of the repository will be a strictly quantitative one, based on models executed by computer codes. Although the analyses should be as quantitative and technically defensible as is practicable, the NRC staff considers that the quantitative evaluations will have to be used in conjunction with qualitative and semi-quantitative assessments to evaluate whether a license application complies with all requirements that it purports to meet. For example, qualitative judgments will be needed to evaluate the applicability of specific conceptual and numerical models for a site. (This view is consistent with the recently published recommendations of the Performance Assessment National Review Group -- see General Observation No. 7.) Thus, a performance assessment plan should identify (with supporting arguments) which areas would require qualitative and semi-quantitative analyses or expert judgment to provide support for licensing.

2. Emphasis on Licensing Requirements. Licensing requirements should be the major focus for performance assessments. However in the Plan, emphasis appears to have been placed (Chapter 1, page 6, paragraph 2 and Chapter 3) on DOE performance objectives established in 1981 and 1982 rather than on 10 CFR 60 (and, by reference, the EPA standard). While other sections of the Plan do address 10 CFR 60, it is important that the regulatory objectives be established in the initial chapter for proper emphasis and document consistency. A revised discussion, which places emphasis on 10 CFR 60 rather than on the DOE performance objectives would provide greater assurance that the assessments called for in the Plan address regulatory requirements and thereby provide an appropriate basis for licensing.

3. Performance Allocation Performance allocation and its role in establishing data, testing, and analysis requirements has not been addressed. It should be addressed in one of the initial chapters of the Plan. 10 CFR 60 gives DOE flexibility on a case-by-case basis to propose tradeoffs among system components (natural and engineered). An approach should be described for developing, to the extent practicable, tentative performance goals both for subsystems and for components of the major subsystems: waste package, repository, and site. The approach should allow for early establishment of conservative goals (i.e., in the SCP) that can be revised as more data are developed during site characterization. The Plan should describe the logic and analyses that would be used during site characterization to determine whether the goals are in fact being achieved and, if not, how appropriately revised goals would be established.
4. Identifying Data Needs. Much emphasis is given to using sensitivity and uncertainty analyses as well as geostatistical techniques such as kriging to identify data needs efficiently (See, for example, page 2, paragraph 1, page 49, Section 4.4.2.2, and page 124, Section 9.3). While such analyses will be an essential guide in determining what information needs remain as site characterization proceeds, they must be considered in the context of the need to achieve a basic understanding of the system from data and interpretation. In particular, alternative conceptual models that represent differing expert interpretations of conditions and processes of the natural system may be the driving force for determining the type, amount and location of initial geologic, hydrogeologic and geochemical data needs. This is consistent with the need for striking a balance between the development of a sufficient scientific and technical understanding of repository performance and for demonstration of compliance with regulations. (See General Observation No. 6 of the report from the Performance Assessment National Review Group.) The Plan should address the role that expert judgment will, of necessity, play in making licensing assessments and, in particular, in identifying information needs. The selected roles of quantitative analyses and expert judgment should be established in consideration of their respective strengths and weaknesses, and these should be discussed in the Plan.

5. Subsystem Definitions In the System Description (Section 1.3), three subsystems are described and defined: the very-near field or waste package subsystem, the near-field or repository subsystem, and the far-field or site subsystem. These subsystems do not correlate with the barriers identified in the performance objectives of 10 CFR Part 60. For example, the repository subsystem or near-field is defined as the repository and surrounding salt, and the far-field includes the regional groundwater basin. The NRC staff recognizes that these concepts are useful in performance analyses since each includes not only a major barrier but also the surrounding environment in which the barrier performs its function. To more clearly link the performance assessments to the regulations, however, we suggest that the Plan explicitly recognize that barrier performance will be evaluated at the boundaries specified in 10 CFR Part 60.113(a).
6. Definition and Consistent Use of Terms. Many important terms have not been defined, are defined ambiguously, or are used inconsistently within the document. For example, although the terms "validation" and "verification" are used clearly and appropriately in Chapter 11, Appendix A and the glossary, the last paragraph on page 42 under Section 4.1.2 appears to have confused "benchmarking" and "verification." Specifically, it states that, "The correctness of results predicted by a model will be tested against similar models (verification)" This type of testing is more commonly known as benchmarking.* Certain terms have been defined in 10 CFR Part 60. They should be used only in accordance with the precise meaning in the rule. Examples of such terms are "disturbed zone" and "site." Both of these terms were defined in 10 CFR Part 60; however, on page 112, the term "disturbed zone" is used as a vague geologic term and on page 119, "site" is defined in a confusing way.

We recommend that the glossary be expanded to include additional basic terms such as those mentioned above and that the glossary be used to insure consistent usage of terms throughout the document. Further, we suggest that the glossary be brought into conformity with the definitions provided in Chapter 9 of the Draft Site Characterization Analysis for BWIP (NUREG-0960) and similar definitions in the NRC staff's draft Generic Technical Position on Licensing Assessment Methodology for High-Level Waste Geologic Repositories.

*Benchmarking. The process of establishing that a computer code will perform numerical calculations that agree with appropriate analytic solutions (see verification); that the numerical solutions of the code adequately represent the range of physical situations to which the code is likely to be applied (see validation); and that a new code can reproduce results of a previously qualified code to an acceptable level of precision. (Draft Generic Technical Position on Licensing Assessment Methodology for High-Level Waste Geologic Repositories.)

7. Scenario Analysis. The methodology for screening and analyzing scenarios should take into account the need for constructing Complementary Cumulative Distribution Functions (CCDFs) to conform to the EPA standard, 40 CFR 191. Constructing CCDFs requires comprehensive identification of scenarios, each of which is specified so as to allow determination of consequent radionuclide releases to the accessible environment and the probability of occurrence of the scenario. It is not clear that the scenario identification and analysis methodology described in the performance assessment plan will achieve this objective.

The methodology described does not clearly produce comprehensive scenarios. The six elements of a complete scenario in salt repositories were developed for the WIPP project which does not have to comply with 10 CFR 60 requirements. This approach to scenarios may prove to be incompatible with the needs of 10 CFR 60 performance objectives. In Appendix C of NUREG-0960, NRC staff used an approach to identifying issues, which involves a systematic and comprehensive identification of scenarios. You might consider this approach, which is compatible with the performance objectives of 10 CFR 60.

Regarding the information content of identified scenarios, the Plan appears to base performance assessments on four bounding events, each of which represents a class of scenarios. It is not clear that this approach preserves all the information needed to construct a CCDF. The Plan should either clarify how the approach can be used to show compliance with the EPA standard or adopt a revised approach.