



Department of Energy  
Washington, DC 20585

March 30, 1994

Mr. Joseph J. Holonich, Director  
Repository Licensing & Quality  
Assurance Project Directorate  
Division of High-Level  
Waste Management  
Office of Nuclear Material  
Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

References: (1) Ltr, Shelor to Linehan, dtd 12/14/90  
(2) Ltr, Bernero to Bartlett, dtd 7/31/91

Dear Mr. Holonich:

On December 14, 1990, the U.S. Department of Energy (DOE) transmitted its responses to objections, comments, and questions presented in the U.S. Nuclear Regulatory Commission's (NRC) Site Characterization Analysis (SCA) (Reference 1). The NRC staff evaluated these responses, closing some of the items and creating open items of the remainder (Reference 2). One of the open items, identified below, has been addressed through actions and progress in the program.

The enclosure summarizes the administrative record with respect to SCA Comment 80.

DOE believes that the response provided is sufficient to close Comment 80 and awaits NRC confirmation.

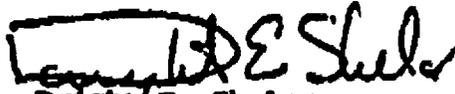
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If you have any questions, please contact Chris Binberg of my staff at (202) 586-8869.

Sincerely,



Dwight E. Shelor  
Associate Director for  
Systems and Compliance  
Office of Civilian Radioactive  
Waste Management

Enclosure:  
Administrative Record for  
Comment 80

cc w/encl:

R. Nelson, YMPO  
R. Loux, State of Nevada  
W. Offutt, Nye County, NV  
T. J. Hickey, Nevada Legislative Committee  
D. Bechtel, Las Vegas, NV  
Esureka County, NV  
Lander County, Battle Mountain, NV  
P. Nieldski-Sichner, Nye County, NV  
L. Bradshaw, Nye County, NV  
C. Schank, Churchill County, NV  
F. Mariani, White Pine County, NV  
V. Poe, Mineral County, NV  
J. Pitts, Lincoln County, NV  
J. Hayes, Humboldt County, NV  
B. Hettan, Inyo County, CA

**Enclosure**

**SCA Comment 80 and DOE Response**

**NRC Evaluation of DOE Response**

**DOE Supplemental Response to NRC Comment 80**

**ENCLOSURE**

Section 8.3.5.9 Issue resolution strategy for Issue 1.4: Will the waste package meet the performance objective for containment as required by 10 CFR 60.113? (Tentative goals for release from the waste packages) P. 8.3.5.9-19, Para 3.

#### COMMENT 80

Some performance goals related to the requirement for substantially complete containment do not appear to be consistent with DOE's revised interpretation of the containment requirement and the intent of the rule.

#### BASIS

- o This comment addresses the subject of performance allocation discussed previously in COSCP Comment 109. In response to COSCP Comment 109 (which is closely related to COSCP Comment 3), DOE extensively revised Section 8.3.5.9 with respect to the allocations of performance to waste package components and the associated quantitative goals for these components. DOE also revised its interpretation of "substantially complete containment." The revised DOE interpretation is in substantial agreement with NRC's intent in 10 CFR 60.113. However, there appear to be inconsistencies among the tentative performance goals. For example, the SCP states that DOE understands substantially complete containment to mean that the waste package will fully contain the total radionuclide inventory. Nevertheless, the stated overall goal for waste package performance is for all failures to be less than 5 percent in 300 yr or less than 20 percent in 1,000 yr (see Comment 46). Other inconsistencies are discussed in Questions 33, 34, 35, 38, and 39.
- o As tentative goals to address the substantially complete containment requirement, the SCP states that DOE considers it appropriate to require that release of isotopes with long half-lives from the waste packages be controlled at a stricter standard during the containment period than during the post-containment period. Accordingly, DOE has established the tentative criterion that release of these isotopes (listed in Table 8.3.5.10-3b) from the waste packages will be controlled such that their annual rates of release are less than 1 part in 1,000,000 for those isotopes present in sufficient quantity in the 1,000-year inventory. It further states that DOE has elected to limit releases of all other radioactive isotopes to an annual release rate of less than 1 part in 100,000 of the current inventory of that isotope in the waste packages.
- o While the first goal stated above is a stringent one for controlled release, it may not be consistent with NRC's interpretation of "substantially complete containment" because the NRC has not set numerical limits on the release of radionuclides during the containment period.
- o The second goal is clearly unacceptable and inconsistent with the containment requirement inasmuch as it would permit a rate of release during the containment period greater than that permitted during the post-containment period.

- o As indicated in Table 8.3.5.9-1, the goal of less than 0.001 for the fraction of containers failed in any given year in the 300 to 1000 year timeframe appears inconsistent with the containment requirement.

#### RECOMMENDATION

Establish goals which are consistent with the requirement for "substantially complete containment." While the first goal may be adequate, the second goal is judged to be unacceptable.

#### RESPONSE

This comment addresses a perceived inconsistency between some of the Site Characterization Plan performance goals and the revised interpretation of the containment performance objective and the intent of the rule. Specifically, the goal for containing radionuclides that are not important, because of their relatively short half-lives during the post-containment period, "is judged to be unacceptable."

Because the containment performance objective is stated in qualitative terms, the U.S. Department of Energy (DOE) finds it necessary to provide a quantitative interpretation to establish a basis for design and a "yardstick" for judging compliance. In searching for a basis for this interpretation, DOE turned to the U.S. Nuclear Regulatory Commission (NRC) record for guidance. From the standpoint of public health and safety, it was determined that those radionuclides that have the greatest potential for reaching the accessible environment were those that would be present in the engineered barrier system following the containment period. Therefore, the containment performance goal for those isotopes was established that is a factor of ten more stringent than that required during the post-containment period ( $10^6$  vs  $10^5$  controlled release limit).

On the other hand, for those radionuclides that decay rapidly and are therefore not likely to reach the accessible environment, DOE relied on the wording used by the NRC in NUREG-0804, for guidance. Specifically, the statement that "It is expected that ... release during the containment time (will be) limited to a small fraction of the inventory present." This is in contrast to the wording in the post-containment performance objective, when the inventory of concern is "that calculated to be present at 1,000 years following permanent closure." For quantitative guidance, DOE concluded that the "one part in 100,000 per year of the inventory" of any radionuclide, as used in the post-containment objective, qualified as a "small fraction" and was therefore consistent with the intent of the rule regarding containment.

#### REFERENCES:

NRC (U.S. Nuclear Regulatory Commission), 1983c. Staff Analysis of Public Comments on Proposed rule 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories, NUREG-0804, pp. 518-520.

**Section 8.3.5.9** Issue resolution strategy for Issue 1.4: Will the waste package meet the performance objective for containment as required by 10 CFR 60.113 (Tentative goals for release from the waste packages) p. 8.5.9-19, Para. 3.

**SCA COMMENT 80**

Some performance goals related to the requirement for substantially complete containment do not appear to be consistent with DOE's revised interpretation of the containment requirement and the intent of the rule.

**EVALUATION OF DOE RESPONSE**

- o DOE considers that the numerical goals stated in this section are consistent with the intent of NUREG-0804 which states "It is expected that ... release during the containment time (will be) limited to a small fraction of the inventory." While this may be true, NUREG-0804 does not give any further amplification of what the performance expectation is that would provide useful guidance to DOE.
- o The NRC staff has not defined explicitly acceptable limits for the release of radionuclides during the containment period; however, the staff has an ongoing effort to develop guidance on the meaning of "substantially complete containment" which, when complete, may aid in resolving this issue.
- o The NRC staff considers this comment open.

**DOE Supplemental Response to NRC Comment 80****Response**

The U.S. Nuclear Regulatory Commission (NRC) stated in NUREG-1347 concerning substantially complete containment (SCC) that "The revised DOE interpretation is in substantial agreement with NRC's intent in 10 CFR 60.113." The staff noted, however, that inconsistencies existed among the tentative goals based on the desire to limit the release of radionuclides from the Site Characterization Plan (SCP) waste package design, which relies on a thin-wall, single-barrier, corrosion-resistant container.

The DOE now proposes a new performance goal in place of the previous goals, focused on containment of radionuclides within intact waste packages. The goal is to achieve mean waste package lifetimes well in excess of 1,000 years. This means that the number of failures at the initial tail of the distribution, i.e., during the containment period, will be very small. This is consistent with the containment requirement and the intent of the rule. The performance goal will be reflected in lower-level barrier functions and performance measures being developed.

At the August 24, 1993, DOE/NRC Technical Exchange on Substantially Complete Containment, the DOE discussed its current waste package design activities. The DOE is developing a number of waste package design concepts which incorporate multiple barriers with more than one failure mode. The emphasis is placed on the multi-purpose canister waste package as a result of a recent baseline change to the CRMS Requirements Document and the system requirements documents. This approach permits the peak of the failure distribution of the combined waste package to be reduced and the distribution itself extended in time. Thus, the fraction failed at 1,000 years will be extremely small, on the order of 1%. The design concepts do not currently take credit for the additional containment provided by spent fuel cladding and spent fuel and high-level waste glass canisters.

The waste package and repository design options being considered will have an effect on the containment of radionuclides. These options include thermal loading, emplacement mode, canister size, and engineered packing and backfill materials. SCC, therefore, is a primary consideration in ongoing design studies.

The DOE plans for the development of this waste package include the consideration of design alternatives and take into account technological limitations and uncertainties. The plans provide for obtaining a substantial body of technical and scientific information, including short- and long-term materials testing, in situ testing, model development, environmental studies, and performance evaluation, as well as fabrication studies and prototype testing. These studies are detailed in the Waste Package Implementation Plan (WPIP) (WMP/92-11, Rev. 0, ICN 2), which was sent to the NRC on August 2, 1993. Interim Change Notices 1 and 2 to the WPIP are included herein.

The DOE plans to demonstrate compliance with its performance goal and therefore with the containment requirement, will include the waste package development effort, comprehensive design verification, performance assessment, and performance confirmation programs.

The DOE's approach to meeting the NRC SCC requirement is focused on containment with a performance goal of extended waste package lifetimes. This approach is consistent with NRC's emphasis on containment during the initial postclosure period. The DOE believes that this approach, coupled with a very conservative waste package design, will provide the NRC with the basis required for it to find that compliance has been achieved with reasonable assurance.