



Department of Energy
Washington, DC 20585

FEB 9 1989

Robert E. Browning
Director, Division of High-Level
Waste Management
Office of Nuclear Material Safety
and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555

References:

- 1) Letter from J.Linehan to R. Stein; dated November 14, 1988; re: Meeting Summary from November 3, 1988, DOE/NRC meeting.
- 2) Letter from J.Linehan to R. Stein; dated December 1, 1988; re: Meeting Summary from November 23, 1988, DOE/NRC meeting.
- 3) Letter from J.Linehan to R. Stein; dated December 15, 1988; re: Meeting Summary from December 8, 1988, DOE/NRC meeting.
- 4) Letter from J. Linehan to R. Stein; dated December 19, 1988; re: Comments on Technical Assessment Review Notice.
- 5) Letter from R. Loux to R. Stein; dated December 19, 1988; re: State of Nevada Comments on Technical Assessment Review Notice.
- 6) Letter from R. Bernero to S. Rousso; dated January 31, 1989; re: Site Characterization Plan Acceptance Review

Dear Mr. Browning:

As a result of a series of meetings held in October and November 1988, (References 1, 2, and 3) on the Exploratory Shaft Facility (ESF) design, DOE undertook a number of activities to improve the NRC staff's confidence regarding the acceptability of the Title I design for use in the review of the Site Characterization Plan. NRC documented an approach to accomplish this role in the November 3, 1988, meeting summary (Reference 1). In addition to this approach, DOE also committed to provide comparative evaluations of alternate exploratory shaft locations with respect to waste isolation.

DOE presented its approach to accomplish these evaluations to NRC and the State of Nevada in meetings on November 23 and December 8, 1988, (References 2 and 3). At the December 8 meeting, DOE presented a Technical Assessment Review Notice, Rev. 6, which was the plan for the work. NRC and the State of Nevada provided comments on this plan (References 4 and 5). The final Tar Plan under which the assessment was conducted is provided in Appendix B-2 of the Review Record Memorandum.

8902100368 890209
PDR WASTE
WM-11 PDC

Volumes on shelf

*NH03
102
WM-11*

In the Department's view, the four enclosures to this letter are sufficient to allow a determination that the Title I design is adequate and acceptable to provide a basis for the review of the SCP. These enclosures are:

a) Applicability of 10 CFR Part 60 Requirements to the Yucca Mountain Exploratory Shaft Facility - Technical Oversight Group Report, December 1988.

b) DOE-NV Yucca Mountain Project ESF Title I Design Control Process Review Report, January 19, 1989.

c) Yucca Mountain Project Exploratory Shaft Facility (ESF) Title I Design Acceptability Analysis and Comparative Evaluation of Alternative ESF Locations - Review Record Memorandum, February 3, 1989. = VOL /

d) Addenda and Errata for YMP Review Record Memorandum dated February 3, 1989; resulting from DOE Headquarters Management Evaluation, February 8, 1989. = 5 pages attached

The analysis of 10 CFR 60 requirements that are applicable to the ESF, served as the starting point for the Design Acceptability Analysis portion of the Technical Assessment Review.

The Exploratory Shaft Facility Title I Design Control Process Review (DCPR) Report identifies the existing documentation describing the design control process and the quality assurance that governed the development of the ESF Title I Design. The DCPR provides historical information regarding the document development processes employed before and during the ESF Title I Design.

The Review Record Memorandum (RRM) contains the results of the Technical Assessment Review and consists of two parts: Part I, the Design Acceptability Analysis (DAA) which addresses NRC concerns regarding the acceptability of the ESF Title I Design for use in the review of the SCP; and Part II, the Comparative Evaluation (CE) of alternative exploratory shaft locations with respect to differences in waste-isolation potential. RRM Appendix B, (Pages B.2-153 through B.2-167) includes the Department's responses to the NRC and State comments on the TAR Plan.

Part I of the RRM contains the results of five tasks identified as Steps 1 through 5 of the suggested NRC approach, and focuses on the potential impacts of ESF construction related to the three major 10 CFR Part 60 objectives listed in Step 2 of the approach (Reference 1). Section 2.1 is an assessment of how the ESF Subsystem Design Requirements Document (SDRD) used in ESF Title I

Design addresses applicable requirements from 10 CFR Part 60 that are related to the three major objectives. Section 2.2 is a list of DAA criteria generated from these Part 60 requirements and a comparison of this list to the ESF Title I SDRD. Section 2.3 is an assessment of the Title I ESF Design with respect to the list of criteria.

RRM Sections 2.1 through 2.3 conclude that most of the DAA criteria for major objective 1 (waste isolation) were treated adequately in the ESF Title I Design or supporting documentation, and that criteria not treated explicitly can be addressed by Title II design activities or in the activities preparatory to the start of Title II. All of the criteria related to major objectives 2 and 3 were judged to be sufficiently addressed in the ESF Title I Design, although some were not addressed directly. Any specific changes to be made to the design criteria will be processed under the change control procedures during the Title II design process.

Section 2.4 of the RRM is a review of the reasonableness of data and appropriateness of parameters which are relevant to the three major objectives of 10 CFR Part 60. This includes treatment of data uncertainties and appropriateness of analyses, models, and methods. Section 2.5 is an assessment of any deficiencies identified in Section 2.1-2.4 resulting in recommendations for corrective actions. The RRM Sections 2.4 and 2.5 identify no deficiencies in the design and performance evaluations that would significantly impact the ESF Title I Design. The recommendations contained in Section 2.5 are being evaluated for implementation as part of the ongoing ESF design process.

Section 2.6 of the RRM assesses the impact on the ESF Title I Design of applicable 10 CFR 60 requirements, other than those related to the three major objectives of Part 60.

The results of the comparative evaluation of alternative exploratory shaft locations is discussed in the RRM Sections 3.1 through 3.3. Section 3.1 compares the five alternative exploratory shaft locations that were originally considered by the DOE with respect to waste-isolation potential assuming an ESF is not present. Section 3.2 assesses the impact of shaft construction on waste-isolation potential at each alternative location, and Section 3.3 compares the waste-isolation potential of the five alternative shaft locations to that of the overall site. The conclusion drawn from these evaluations is that consideration of waste-isolation potential in the shaft location process would not have changed the choice of the location.

The Addenda and Errata to YMP Review Record Memorandum dated February 3, 1989, resulting from DOE Headquarters Management Evaluation identifies clarifications, minor errors, and additions that were noted as part of the DOE-HQ management evaluation of the material included in this transmittal.

As agreed, the TAR was conducted as in accordance with the Yucca Mountain Project QA Plan, NNWSI/88-9. Procedure QMP-02-08, Rev. 0, "Technical Assessment Review" was used for this review and two QA surveillances were conducted during the TAR. Several Standard Deficiency Reports (SDRs) were developed on the basis of observations made during these surveillances. All SDRs have been closed-out and corrective actions approved.

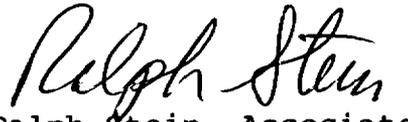
In summary, we conclude on the basis of the assessments and evaluations documented in the enclosures to this letter that the ESF Title I Design is acceptable with respect to addressing the applicable requirements of 10 CFR Part 60, given that the design is preliminary and that relevant Title II design packages will be completed before the start of ESF related construction. As a result, the Department concludes that there is adequate confidence that the design is suitable for its intended purpose and that the DAA recommendations are unlikely to result in significant changes to the ESF design schedule, configuration, or technical approach for site-characterization activities as described in the SCP.

This transmittal addresses all relevant items from the ESF design control meetings held in November and December 1988 among DOE, NRC and the State of Nevada. The documents forwarded with this letter should provide NRC with the added confidence needed to provide a timely review of the ESF design in the SCP and will allow NRC to provide comments on the ESF as previously requested. Receipt of the materials enclosed with this transmittal will allow NRC to make a positive determination on the acceptability for review of the Site Characterization Plan (Reference 6). The Department is anxious to work with the NRC to facilitate the timely receipt of your SCP comments, in particular, the earliest possible receipt of NRC comments on the Exploratory Shaft.

As part of the agreement reached at the November 3, 1988, meeting (Reference 1, Step 7), it is our understanding that the NRC staff will assess the need for conducting a visit to evaluate the QA and technical aspects of the ESF Title I Design and the design acceptability analysis. If NRC determines it is necessary to conduct such a review, DOE requests that NRC provide a plan for such a review to DOE along with a list of personnel or functions who should be available prior to scheduling the review.

If you have any questions on the material provided or require additional information, please contact Mr. Gordon Appel at 586-1462 or myself at 586-6046.

Sincerely,



Ralph Stein, Associate Director
Office of Systems Integration and
Regulations
Office of Civilian Radioactive
Waste Management

Enclosures, as stated

cc: B. J. Youngblood, NRC
J. J. Linehan, NRC
R. Loux, State of Nevada
M. Baughman, Lincoln County
S. Bradhurst, Nye County
D. Bechtel, Clark County

ADDENDA & ERRATA TO YMP REVIEW RECORD MEMORANDUM
DATED FEBRUARY 3, 1989 RESULTING FROM DOE HEADQUARTERS
MANAGEMENT EVALUATION

1) General Clarifications:

a) In Section 2.1 and in Appendix G of the RRM, individual reviewers provided their comments on the data parameters, methods, and analyses used to support the SCP Section 8.4. Specific recommendations of the reviewers are provided. While a number of the individual comments do not assess the impact on Title I-ESF Design, the summary of recommendations (Section 2.4.4) does conclude that there are no issues identified which called into question the Title I design. This summary was concurred on by the reviewers.

b) The RRM includes a number of TAR Plans which show the development of the TAR activities as a result of various meetings and reviewers' comments. The final version used by the TAR team is included in Appendix B-2, pages B.2-1 through B.2-15.

2) Section 2.4.4, page 2-36

The second paragraph of this section refers to seventeen issues raised by the reviewers; several issues were added to the list as the document was being brought to completion, bringing the total count to 19. These 19 issues correspond to the listed items in Section 2.4.3, and to 19 individual comments presented in Appendix G on Technical Assessment Review Comment Record forms.

3) Section 2.5, pages 2-50, Table 2.5-1

Item 9 in the table should read: "Evaluate the effects of fire on materials used in testing, relative to waste isolation."

4) Section 2.5, page 2-52, Table 2.5-1

The heading at the top of the table should read:
"RECOMMENDATIONS PERTAINING TO NRC CONCERN #2 (ABILITY TO CHARACTERIZE)"

5) Section 2.5, page 2-53, Table 2.5-1

The heading at the top of the table should read:
"RECOMMENDATIONS PERTAINING TO NRC CONCERN #3 (DATA REPRESENTATIVENESS)"

6) Section 2.6, page 2-59

The parenthetical note in line 14 of the first paragraph should cite the DOE/OGR Generic Requirements Document, Appendix E, as a compilation of applicable regulations, rather than giving the example of 30 CFR 57.

7) Section 2.6, page 2-65

Add the following section before "f) Performance Confirmation Requirements" (Items (f) and (g) on pages 2-65 and 2-67, respectively, should be changed to (g) and (h) in accordance with this addition.):

f) Additional design criteria related to preclosure performance and retrievability:

- (i) The underground facility shall be designed to permit retrieval of waste in accordance with the performance objectives of 60.111. [60.133(c)]

The ESF shafts and associated drifts have been designed to assume a ventilation intake function during repository operations. This function will enable the repository to meet regulatory limits imposed for operational releases of radioactivity, radiation levels, and radioactive exposures, in accordance with the conceptual repository design basis (SNL, 1987).

As described in Section 2.6.1.1 through 2.6.1.3 the design of the ESF shafts and associated drifts is consistent with retrievability requirements. No waste will be transported through the exploratory shafts. Failure of the ESF drifts that are to be used for waste transport, or of the ventilation function of the ESF items could be accommodated by rerouting, by reliance on other repository components, and/or by reconstruction of the affected items within the permissible schedule for retrieval.

- (ii) Openings in the underground facility shall be designed so that operations can be carried out safely and the retrievability option maintained. [60.133(e)(1)]

The design of the ESF underground openings is consistent with mine safety and health requirements, by virtue of features incorporated in accordance with the Title I

ESF SDRD which addresses the applicable federal, state and local mine safety regulations. Safety of ESF operations, and that of repository operations within ESF-related openings, is addressed by design features and other measures to ensure that the openings can be adequately supported, monitored, and maintained.

Lifetime criteria for ESF-related openings in the shaft pillar area were assessed in the DAA and found to be satisfied by the Title I design. Other ESF-related openings will be designed and constructed to substantially the same specifications including standard methods of ground support. Also, repository use of ESF exploratory drifts will likely require drift enlargement and reinstallation of ground support.

The retrievability option is affected by the ESF permanent items to the extent that: (1) ESF-related openings used to transport waste remain serviceable; (2) ESF-related openings do not adversely affect other openings upon which retrievability may depend; and (3) the repository-related functions of the ESF permanent items affect retrievability. The lifetime specifications and the means to implement them will ensure that ESF-related openings remain serviceable under normal conditions. Stand off criteria (assessed by the DAA) provide assurance that ESF-related openings will not interfere with other repository openings. It is not expected that failure of the repository ventilation intake function of the ESF permanent items would preclude the capability to meet waste retrieval objectives, as discussed in Section 2.6.1 above.

- (iii) The [U/G facility] ventilation system shall be designed to:
- (1) Control the transport of radioactive particulates and gases within and release from the underground facility in accordance with the performance objectives of 60.111(a),
 - (2) Assure continued function during normal operations and under accident conditions; and

- (3) Separate the ventilation of excavation and waste emplacement areas. [60.133(g)]

The repository conceptual design indicates that radiation levels and exposures will be limited by shielding and encapsulation of the waste, and if releases from the waste canister do occur, controlled and diluted by ventilation airflow. The repository conceptual design, which is based on engineering practice, is thus consistent with the required function. Separation of ventilation for excavation and waste emplacement areas is a principal feature of the conceptual repository ventilation system.

The repository ventilation function of the ESF permanent items may be needed during accident conditions, but an intake is likely to be unaffected by a radiological accident occurring elsewhere in the repository. The ESF items are also designed to withstand certain disruptive event (e.g., seismicity, flooding) of natural origin, and will have intrinsic features (e.g. use of non-flammable materials) that contribute to safety with respect to fire and other such disruptions. If the ESF items are determined to be important to safety, any associated changes to the design are unlikely to result in significant modification to the schedule, configuration or technical approach for ESF-related site characterization activities, as discussed in Section 2.6.1.

- 8) Section 3.1, page 3-9, Table 3-1
The table number should be "Table 3-1" as it is cited in the text of Section 3.1, instead of "Table 3" as presented on page 3-9.
- 9) Appendix F, page F-1
Items 7 and 8 in the list of correspondence are reversed.
- 10) Appendix G, page G-5
The item number "6." should be one paragraph down on the form.
- 11) Appendix G, page G-15
The word "Include" in the second sentence of item 21. should be deleted.

2/8/89

Page 5 of 5

- 12) Appendix G, page G-32
Change "how" to "shows" in line 9 of the comment on this page.
- 13) Appendix I-1, page I.1-11, Table I-1
Delete the word "does" from footnote d.
- 14) Appendix I-2, page I.2-1, Table I-2
In the explanatory note, the first line should read:
"This table associates Performance Criteria, Constraints, and Assumptions from the ESF SDRD. . ."
- 15) Appendix I-2, page I.2-28, Table I-2
The following footnote should be added: "CSubsequently modified by Engineering Change Request"
- 16) Appendix I-4, page I.4-46, Table I-4
The spanning header "NRC Concern 2" should appear before entry for requirement 60.74 at the bottom of the page. Accordingly, the header on the following page should appear "NRC Concern 2 (continued)."
- 17) Appendix I.5, page 118, 119, 130, 131
The reference to 10 CFR 60.11113 should read 60.113.
- 18) Appendix I.5, page 291
"extraction ration" should read "extraction ratio."
- 19) Appendix I-6, page 80, paragraph 2,
The date 1985 should be changed to 1988.
- 20) Appendix B, page B.2-159, Comment 14
DOE considers the consideration of alternatives to major design features applicable to the design process. DOE will consider alternatives to major design features that are determined to be important to waste isolation as part of the Title II design process.

U.S. DEPARTMENT OF ENERGY

**O
C
R
W
M**



YUCCA MOUNTAIN PROJECT

REVIEW RECORD MEMORANDUM

EXPLORATORY SHAFT FACILITY (ESF) TITLE I DESIGN ACCEPTABILITY ANALYSIS AND COMPARATIVE EVALUATION OF ALTERNATIVE ESF LOCATIONS

VOLUME 1

FEBRUARY 3, 1989



UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE/YUCCA MOUNTAIN PROJECT OFFICE