

D1016

PDR-1
LPDR Wm-10(2)
Wm-11(2)
Wm-16(2)

WM DOCKET CONTROL
CENTER



'87 MAY 21 A11:27

18 May 1987

David Tiktinsky - SS623
U.S. Nuclear Regulatory Commission
Division of Waste Management
Washington, D.C. 20555

"NRC Technical Assistance
for Design Reviews"
Contract No. NRC-02-85-002
FIN D1016

Dear David:

Enclosed is Itasca's trip report for the 5-7 May 1987 NRC/SRP Meeting on ESF Design, in Houston. Please call me if you have any questions.

Sincerely,

M Brand for

Roger D. Hart
Project Manager

cc: R. Ballard, Engineering Branch
Office of the Director, NMSS
E. Wiggins, Division of Contracts
DWM Document Control Room

Encl.
rdh/ks

8709280217 870518
PDR WMRES EECITAS
D-1016 PDR

Wm-RES
WM Record File
D1016
Itasca

WM Project 10, 11, 16
Docket No. _____
PDR ✓
XPDR ✓ (B, N, S)

87237932
WM Project: WM-10,11,16
PDR w/encl
(Return to WM, 623-SS)

+

WM Record File: D1016
LPDR w/encl

Distribution:
Tiktinsky
(Return to WM, 623-SS)

4/6/87

ITASCA TRIP REPORT

DATES: 4-7 May 1987

LOCATION: Hyatt Regency West (Houston, Texas)

PURPOSE: NRC/SRP Meeting on ESF Design

ATTENDEES: J. Daemen and L. Lorig (Itasca); R. Johnson,
J. Linehan, N. Tanious, and M. Nataraja (NRC)

PREPARED BY: M. Board

SUMMARY

The purpose of this meeting was for DOE and its subcontractors to present an overview of the Title I ESF design and the current status of the Title II design. In addition, the NRC/State of Texas observations on the ES shaft were solicited and discussed by DOE. A number of action items, including reviews of documents to be obtained by the NRC and future meetings or correspondence on related topics, were determined.

Detailed Comments

The meeting consisted of four days in which a pre-meeting among NRC participants was held on the initial day, followed by three days of the NRC/DOE meeting.

At the pre-meeting, topics of concern to NRC were determined for each of the agenda items (Attachment 1). These initial concerns were expressed in the NRC presentation by N. Tanious (Attachment 2).

The meeting was attended by 41 persons from DOE and its subcontractors, the NRC, the States of Texas, Utah and Mississippi, and officials from the Basalt and Tuff programs (Attachment 3). The morning of the first day covered an overview of the past NRC concerns, the ESF objectives and schedule, the physical interface of the ES shafts and repository, and an overview of the Title I design. A caucus session (of roughly two hours) resulted in the following NRC concerns and comments.

1. The shaft must not be treated simply as an access to the testing horizon but as a tool for site characterization.
2. The simplistic schedule presented by SRP does not appear to recognize involvement by the NRC and the State in review and comment.
3. The NRC requires clarification on the role which DOE assigns to the ES shaft within the repository. This includes a clarification of the role of pre-closure seals with respect to the post-closure seals.
4. The freezing and thawing process significantly disturbs the rock mass surrounding the shaft and may result in preferential pathways from cracking or deformation. In addition, extreme care must be exercised not to submit the freeze pipes to excessive deformations. Failure of a freeze pipe could result in large quantities of brine to be released into the shaft near field which could not be frozen. It must also be noted that the grouting of freeze holes will represent a final post-closure seal. The concern expressed by NRC is how these post-closure pathway and seal concerns are being addressed in the current ES design.
5. The shaft liner in salt plays a crucial role in pre-closure safety and waste isolation. The shaft must pass through two major aquifers, the Ogallala and the Dockum, prior to reaching the salt horizon. Any breach of the shaft liner during its projected 100-year service life (pre-closure) would prove disastrous from a personnel safety aspect as well as from the aspects of retrieval and waste isolation. The sealing techniques specified for the ES shaft use current coal and potash mining technology, which involves roughly 20-30 years of continuous service—at most. The NRC expressed concern over the design and service life of the seal components. In particular, what methodology was used for the liner design, what conservatism was present in the analysis, and what methodology will DOE use for ensuring the 100-year service life of the liner?
6. There does not appear to be a sufficient effort by DOE to obtain data on the effects of freezing, thawing and excavation on the isolation capability of the rock mass. In particular, a baseline of the deformation and hydrological response of the rock mass surrounding the shaft needs

to be established in advance of freezing/thawing and sinking. Then, the departure or disruption from this baseline needs to be established continuously, as freezing/thawing and excavation occur. It is not obvious that the present ES design accounts for this.

The State of Texas raised several concerns—many of which were the same as those expressed by NRC. These included the validity of a frozen shaft wall for site characterization, the hydrologic separation of the Ogallala and Dockum aquifers, the need to improve the State's role in review, and the decommissioning plans for the shaft in the event that a repository is not constructed.

It was the observation of the authors during this first day that DOE has not applied past NRC concerns to the level of the design contractors, who seemed unaware of possible questions regarding post-closure seals in the ES shaft. It seemed apparent that some coordination problems were presently occurring between DOE headquarters/SRPO and the contractors.

The second day of the meeting opened with Gordon Appel, of SRPO, providing a flow sheet to illustrate how the issues hierarchy (or the SCP) influences the ES design and schedule. This is given as Fig. 1. Here, the systems management plan is shown to consist of three major portions—information which presently exists, requirements, and issues to be addressed. The information and requirements feed into the ES driving schedule; however, the issues hierarchy does not (apparently, since, as discussed later, SRP assigns no issues important to waste isolation to the ES shaft). The Requirements Document (RD) is a compilation of the various regulations, laws, etc. which must be satisfied. These include 10 CFR 60 regulations.

This diagram (Fig. 1) brought up several questions regarding the SCP and the ES design which will be presented in it. DOE stated that the Title I (preliminary) design will be presented in the SCP—not the Title II design, which will be completed by that time. NRC expressed the concern that the Title II design needs to be addressed in the SCP. In response to the questions from that day, DOE provided the following.

OCRWM BASELINE

OGR BASELINE
(consists of the following SRPO documents)

- SEMP — Systems Eng. Management Plan
- GR/MDS — Generic Requirements for a Mines Disposal System
- SCP — Annotated Outline

Examining the SEMP More Closely

SEMP

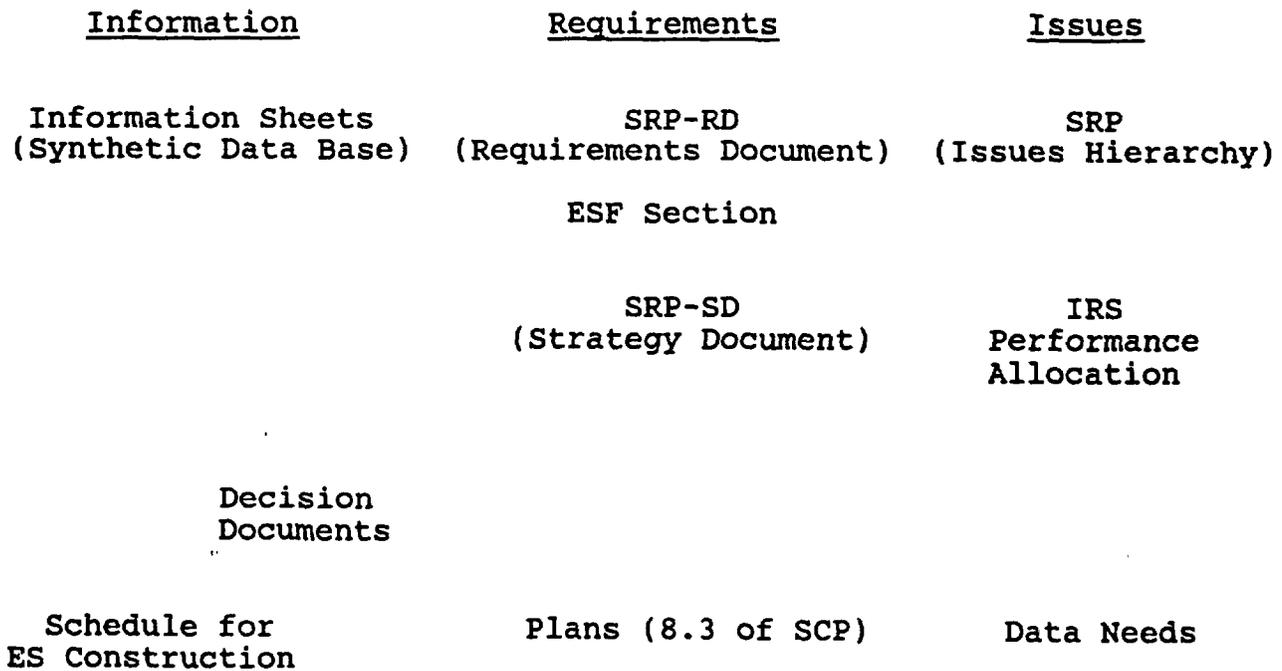


FIG. 1 SRPO Logic Diagram for Effects of Requirements on ES Construction

1. The shaft is treated as a site characterization tool. These requirements were taken into account in design and scheduling in the Title II design. The site characterization information to be obtained is addressed in the shaft test plan. The link between tester (Golder) and design is defined in the TIS (Testing Interface Specification) document and is controlled by the Interface Control Working Group, which consists of Golder, ONWI and Parsons staff.
2. The NRC/State involvement in future Title II design activities are as follows:
 - (1) observers at 60%, 90% design reviews;
 - (2) attempt to expedite release of key documents;
and
 - (3) development of future meetings with NRC to address specific ES topics.
3. The ES shaft is considered to be part of the permanent, licensed repository; however, there is nothing concerning the shaft or its liner/seals, which is considered important for post-closure waste isolation. Performance analysis (currently under review, according to DOE) will show that the pre-closure seals, construction or freezing/thawing has no impact on long-term waste isolation. The current idea is to place seals within the salt strata at the bottom of the shaft, as well as within drifts in the salt. These will be shown to be sufficient in themselves; therefore, no concern exists regarding the post-closure function of shaft Title II seals.
4. Because the shaft is not considered crucial to waste isolation, the assumption has been made that ground freezing is not important to waste isolation.
5. The conservatism in the liner design is derived from taking the worst case properties from the synthetic data base. The purpose of the liner in salt is to conform to the "dry shaft" requirements. The basis for the shaft over excavation are preliminary creep characteristics of salt from WIPP and elsewhere. Design for lithostatic pressure was not chosen for cost effectiveness. (Both state and NRC asked for the data base of experience quoted by PB/PB-KBB for liner design.)

6. DOE states that site characterization data will be obtained during construction and that this is detailed in the testing plan. DOE stated that this needs to be the topic of a subsequent meeting and was not considered to be a topic for the present meeting.

There was additional minor discussion on succeeding DOE topics, followed by a caucus for the remainder of the evening. At this time, NRC and its consultants agreed on the major topics of concern. These were written up for presentation in the meeting minutes.

The final day of the meeting was spent in completing the NRC observations and review of documents which were placed in the rear of the meeting room. The action items for NRC included:

- (1) to obtain and review the documents listed below
 - Shaft Design Guide
 - Requirements Document
 - Appendix E of the OGR Baseline Document
 - TIS
 - Synthetic Data Base
 - Detailed Design Criteria
 - Latest Version Underground Test Plan
 - ES Flexibility Analysis
- (2) consideration of future meeting topics as listed below
 - performance allocation/assessment for the ES shafts
 - shaft liner design methodology
 - interface of performance assessment and design
 - in-situ testing in ES

Author Observations

Several additional observations were made by the authors during the meeting.

1. Several design areas do not appear to be well under the control of the A/E. For example, the final freeze design will be made and carried out by the construction contractor. The apparent lack of concern for design control is based on the idea that the ES shafts and seals are unimportant to waste isolation. It needs to be pointed out that this program is nearing the completion of Title II (final) design and has yet to release a performance assessment which justifies the lack of credit for the pre-closure seals and surrounding rock mass. DOE, by its own admission, is proceeding "at risk" with the design, and any major change in philosophy concerning the performance allocation to pre-closure seals could result in significant re-thinking of the Title II design.
2. It is our concern that, because DOE has made the decision that the shafts are unimportant to waste isolation, sufficient field data may not be gathered upon which to base performance of pre-closure seals in the event they are necessary for long-term isolation.
3. As regards comment (2), there does not appear to be an adequate baseline of hydrologic and geomechanical data gathered prior to freezing and thawing, as well as subsequent information on ground disturbance.
4. Data does not presently exist on the long-term (to 100 years) performance of shaft liner materials. The integrity of the liners is vital in this program and will necessitate a long-term program of instrumentation and maintenance.
5. The freeze hole casing will be left in place, perforated, and pressure grouted as a final post-closure borehole seal. Because these holes have been judged to have no importance to waste isolation, no extraordinary design efforts have been made in regard to their sealing.
6. At this stage, virtually no information is available concerning creep of the salt in situ. The "dry shaft" design depends on over-excavation of the salt and backfilling with a resin foam. We see virtually no hard data basis for any estimation of creep rate or liner loading

over the 100-year time span. Additionally, the lack of hard data presented at the meeting does not allow for an evaluation of the conservatism of the liner design. There was an apparent lack of understanding by ONWI and its A/E of why NRC was asking these questions. Consequently, many of the answers received did not concern the specifics or hard data but were, instead, based on personal experience. This was particularly true of discussions about liner and seal design.

7. DOE refused to discuss post-closure seals and the relation of pre- and post-closure seals. There was also a refusal to discuss the performance assessment studies which have been conducted regarding the ES.
8. DOE does not appear to have instituted the recognition of NRC concerns from top to bottom in the program. Although the regulations exist in requirements documents, they do not appear to be imposed on the practical day-to-day design planning.

Conclusions

The meeting was invaluable in that a major difference in approach between DOE and NRC was determined and explored. This regards the decision that the ES shaft is unimportant to waste isolation. This is a point with which the NRC takes exception at this time. The DOE philosophy has resulted in many NRC concerns regarding the ES program, including:

- (1) lack of baseline and detailed disturbed zone long-term monitoring; and
- (2) apparent lack of concern regarding permanent sealing of freeze boreholes.

Recommendations

It is now important to perform a detailed review of the details of the shaft design prior to future meetings and the SCP issuance. The documents referred to earlier should be obtained at the earliest opportunity and reviewed in detail. Future meetings (or other appropriate methods of interchange) should be arranged and held at the earliest opportunity since DOE will be at the 60% final design review by August. The obvious disparity between DOE and NRL in its views regarding the importance of the ES to waste isolation necessitates a clear statement of NRC's position on this matter. We suggest a point paper on this topic to be completed prior to the 90% Title II design review. Finally, NRC needs to determine its policy on the applicability of a preliminary design as the SCP basis.

Respectfully submitted,

Mark Board

Mark Board

ljl/ks