

## LINEHAN/STEIN/INTERACTIONS

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JUL 21 1989

Mr. Ralph Stein, Associate Director  
Office of Systems Integration and Regulations  
Office of Civilian Radioactive Waste Management  
U. S. Department of Energy, RW-24  
Washington, D. C. 20545

Dear Mr. Stein:

SUBJECT: TOPICS FOR TECHNICAL INTERACTIONS THROUGH 1990

Enclosed is a proposed list of topics of interactions which the U. S. Nuclear Regulatory Commission (NRC) staff would like to initiate with the U. S. Department of Energy (DOE). The list covers the period from August 1989 through December 1990. These are being forwarded to you as background for the upcoming meeting on July 26, 1989 to discuss and schedule future interactions. Three types of interactions are suggested:

1. Technical Exchanges are meetings to discuss technical aspects of the project. Attendance at these will mostly be individuals doing the work. No positions will be taken by either organization. These meetings are to allow each organization to gain insight into the technical work being done.
2. Formal Meetings, which are more structured than Technical Exchanges, are where official positions are taken by NRC and DOE.
3. Site Visits, which are Technical Exchanges that take place in the field, are used to gain orientation in or more knowledge of field activities.

Pursuant to your request, we have attempted to schedule a maximum of two technical exchanges, formal meetings, or combinations thereof, for any one month. This required postponing several interactions which the NRC staff would prefer to have in the near term (August to December of 1989). We have noted those changes by placing a preferred date in parentheses at the end of the description of affected interactions. However, in several months, we do not feel that it is reasonable to limit the number of interactions to two, given the priority of some of these interactions.

All of these interactions would be noticed in the Federal Register and open to interested members of the public. I am providing this list to you for your review and consideration so that the July 26, 1989 meeting can result in firm, agreed upon dates for interactions through at least 1989 as well as estimates for future interactions through December 1990.

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LINEHAN/STEIN/INTERACTIONS

- 2 -

We envision that Technical Exchanges may last up to three days with separate sessions possible for regulatory oriented topics and for detailed discussions of scientific and technical topics. To some extent we hope that separate sessions of the Technical Exchanges, to discuss scientific and technical issues, will address an NRC concern that NRC contractors working on high-level waste research need access, at the expert level, to research-related information on selected topics. However, we should consider developing a mechanism by which NRC scientific/technical contractor experts can meet with DOE contractor experts during informal visits and technical exchanges at the contractor laboratories. Some typical examples include contractors working on corrosion mechanisms, geochemistry data bases, and coupled processes of rock-water interactions. A full list of this kind of proposed contractor interactions is currently being developed and will be provided under separate cover.

Sincerely,

ORIGINAL SIGNED BY

John J. Linehan, Director  
Repository Licensing and Quality  
Assurance Project Directorate  
Division of High-Level Waste Management

Enclosure: As Stated

cc: R. Loux, State of Nevada  
M. Baughman, Lincoln County, NV  
S. Bradhurst, Nye County, NV  
D. Bechtel, Clark County, NV  
C. Gertz, DOE/Nevada  
K. Turner, GAO

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| LPDR         | ACNW             | PDR                | M. Delligatti |
| B. Bordenick | J. Moore         | <i>R. Stablein</i> |               |

~~DUPLICATE LETTER SENT TO R. LOUX WITH NO CC'S~~

|                 |            |           |   |   |   |   |
|-----------------|------------|-----------|---|---|---|---|
| OFC :HLPD       | :HLPD      | :HLPD     | : | : | : | : |
| NAME:Delligatti | :JHolonich | :JLinehan | : | : | : | : |
| DATE:07/ /89    | :07/ /89   | :07/ /89  | : | : | : | : |

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|              |                  |                | B. Bordenick / J. Moore |

DUPLICATE LETTER SENT TO R. LOUX WITH NO CC'S

|                  |             |            |   |   |   |   |
|------------------|-------------|------------|---|---|---|---|
| OFC : HLPD       | : HLPD      | : HLPD     | : | : | : | : |
| NAME: Delligatti | : JHolonich | : JLinehan | : | : | : | : |
| DATE: 07/10/89   | : 07/10/89  | : 07/21/89 | : | : | : | : |

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AUGUST 1989

Technical Exchange

- Substantially Complete Containment

Technical Area: Material Science

The U.S. Nuclear Regulatory Commission (NRC) staff is addressing the issue of clarification of the meaning of "substantially complete containment" (SCC) as used in 10 CFR Part 60. Resolution of the issue is seen as an iterative process that should involve interaction with the U.S. Department of Energy (DOE). Basic responsibility for clarifying SCC lies with the NRC, but it is desirable to determine whether the clarifications are practicable.

The interaction should be initially at the technical staff level and should involve a small number of participants, not to exceed perhaps 10 in all. Subsequent interactions should draw in representatives from the NRC Office of General Counsel, and perhaps their counterparts from the DOE.

- Tectonics Issues

Technical Area: Geology-Geophysics Section

Concerns with DOE's tectonics evaluation program have been raised in the Site Characterization Analysis (SCA) and other documents. Due to the significance of the existence of adverse conditions with respect to tectonics at the proposed site, NRC staff considers that high priority should be given to early resolution of concerns that may have a significant impact on the ability of the proposed repository to isolate waste. These meetings on tectonics will provide a mechanism for the NRC staff to provide clarification to the DOE on tectonics concerns identified in the SCA. In addition, the DOE will have an opportunity to discuss their field data gathering programs for tectonics and their approach for dealing with uncertainty associated with tectonic processes. The scope of the exchange is intended to be an integrated and multi-disciplinary examination of tectonic concerns at the proposed site. The agenda will include a wide-ranging set of topics that will provide input into the approach to resolving tectonic concerns. Since many of the approaches to addressing tectonic factors are field related, part of the conference will be held in the field reviewing available data.

Formal

None

AUGUST 1989 (Continued)

Site Visit

- Multi-Purpose and Other Core Drilling Using Air

Technical Area: Rock Mechanics Design

The purpose of this interaction would be to discuss DOE's strategy for air-core drilling and contingency plans if air coring does not succeed. The scope should include a site visit by NRC staff to prototype drilling site, and a meeting to discuss plans, procedures, test results, and alternate methods, if needed.

SEPTEMBER 1989

Technical Exchange

- **Tectonics Issues**

**Technical Area: Geology-Geophysics Section**

**This meeting is a follow-up to the August Tectonics meeting**

Formal

- **10 CFR Part 60 Requirements Associated with Exploratory Shaft Facility (ESF)/Repository Interface**

**Technical Area: Rock Mechanics Design**

**The purpose of this interaction would be to discuss DOE's strategy for demonstrating compliance with the regulatory requirements of 10 CFR Part 60. In particular the focus of the meeting should be directed to DOE's plans for demonstrating compliance with 10 CFR 60.15(d)(2) and (4) requirements related to limiting the number of openings at the site to coordination of exploratory drilling, excavation, and in-situ testing with the design of the geologic repository.**

Site Visit

None

OCTOBER 1989

Technical Exchange

- Container Material and Development of Container Design

Technical Area: Material Science

The purpose would be to interact with DOE on its plan and schedule for selection of container material and development of the container design. Discussion of the plan for and schedule of selection criteria, selection process and data available to support the selection decision would be held along with discussions of the plan for and schedule of development of the container design following material selection, type of short-term and long-term data planned to be collected, and testing planned to support the development, including research and testing in fabrication and sealing/welding processes. There would be NRC discussions on plan and schedule with representatives from the DOE Yucca Mountain Project Office (YMPO), plus NRC discussions with DOE contractors to gain an understanding and appreciation of techniques used in the tests. This will also provide NRC with the opportunity to discuss how requirements may be expected to be verified at license application. (Preferred Date: November 1989)

- Technical Assessment Review (TAR) of the ESF Anomaly/Tectonic Models

Technical Area: Geology-Geophysics Section

In their review of the Site Characterization Plan (SCP) NRC staff identified a concern (SCA comment 127) with respect to the presence of an anomaly (based on geophysical and field data) at the planned ESF location. The presence of a fault in the area of the proposed shafts may have an impact on shaft location and should be addressed with respect to the potential impact on waste isolation at the site. The DOE staff is currently conducting a field evaluation of the ESF area and reviewing data relevant to the possible existence of a fault in that area. Following the completion of the review tasks, the DOE TAR team will compile a report summarizing the results of the assessment. Upon submittal of this report NRC staff should meet with the DOE TAR team members to discuss their findings and examine the field evidence documented in the report.

This exchange will also be to discuss in greater detail the alternative tectonic models (integrating faulting and volcanism) that DOE intends to consider in their evaluation of the proposed repository site and what model assumptions will be made with respect to estimating performance. Present information on faulting at the Yucca Mountain site allows for the application of a wide variety of possible alternative tectonic models. NRC staff has raised various concerns related to the dating of fault movement, fault mechanisms, determination of amount of offset, and projection of expected faulting characteristics in both the pre- and post-closure periods. The purpose of this part of the meeting is to

OCTOBER 1989 (Continued)

Technical Exchange

discuss investigative methods that will be utilized to resolve these concerns, as well as discuss the various mapping, drilling, and geophysical activities that will be conducted as input to the definition of appropriate tectonic models to be considered. These discussions will aid NRC staff in evaluating the adequacy of the proposed program of investigations to resolve faulting concerns and differentiate between alternative conceptual models. (Preferred Date: November 1989)

Formal

None

Site Visit

None



NOVEMBER 1989

Technical Exchange

- Multi-Purpose and Other Core Drilling Using Air

Technical Area: Rock Mechanics Design

This meeting is a follow-up to the August site visit.

- Characterization of the Calico Hills Formation

Technical Area: Hydrologic Transport

NRC staff has raised concerns about how the Calico Hills nonwelded unit is to be characterized (refer to comments 14 and 16 of the SCA). A technical interaction focusing on the plans to characterize this unit could serve the purpose of clarifying staff concerns and providing DOE with an opportunity for feedback.

Formal

- Integration of Performance Assessment into Site Characterization Program

Technical Area: Performance Assessment

The NRC staff has raised concerns about how and when performance assessments will be integrated into the site characterization program in SCA Comment 1, bullets 3 through 5. A formal technical meeting focused on these concerns could serve the purpose of clarifying them and providing DOE with the opportunity for feedback. Specific issues to be discussed include: (1) how site characterization data and performance analyses based on them will be used to modify performance allocation goals, (2) how periodic performance assessments will be used during site characterization to aid in understanding the value of the data collected, and (3) how performance assessment will be used to resolve issue 1.8, the NRC siting criteria.

Site-Visit

None

DECEMBER 1989

Technical Exchange

- Performance Assessment Methodology Workshops

Technical Area: Research

These workshops would be a periodic continuing open meeting between the staff, DOE, and the State of Nevada to review significant progress in performance assessment modeling. Discussions would include typical analyses run and the results. Areas of particular interest would be:

- (1) modeling of unsaturated flow in a fractured media;
- (2) geochemical transport, with the emphasis being on experiments in and modeling of retardation coefficients; and
- (3) model validation strategy, with emphasis on understanding the DOE strategy for validating models, and exchanging ideas between the participants.

- Scenario Development and Screening

Technical Area: Performance Assessment

The NRC staff has raised concerns, in SCA Comments 1, 95, 100, and 103 about the underlying methodology used to develop and screen scenarios, used to help guide the site characterization program. A technical meeting focused on these concerns could serve the purpose of clarifying them and providing DOE with the opportunity for feedback. Specific issues to be discussed include: (1) the current operational definition of scenarios, (2) how scenarios are to be generated from elemental events and processes, (3) what initial set of scenarios or elemental events and processes are to be screened for the purposes of site characterization, (4) appropriate methods for screening scenarios and how such methods should be implemented and documented.

Formal

- ESF Testing

Technical Area: Rock Mechanics Design

The purpose of the interaction would be to inform DOE of the NRC concerns on adequacy of DOE's proposed test plan suitability. The scope should include discussion of: (i) potential construction to test interference; (ii) test to test interference; (iii) sequencing and duration of tests; (iv) extent of exploratory drifting; and (v) exploratory drilling including clustering of surface based boreholes in the southeast area outside the repository block.

DECEMBER 1989 (Continued)

Formal

- Anticipated Processes and Events (APEs) and Unanticipated Processes and Events (UPEs)

Technical Area: Geology-Geophysics Section

The NRC is presently undergoing rulemaking to modify the definition of APEs and UPEs. The purpose of this meeting is to discuss the proposed modifications and possible effects on the program. Included would be a discussion of the definition of APEs and UPEs and their application. Discussions will include the relationship of this rulemaking process to other proposed rulemakings. The purpose of this technical/management meeting is to provide this information on proposed modification to APEs and UPEs to the DOE early so that they can evaluate possible effects on the site characterization program.

Site Visit

- Core and Drillhole Logging, Storage and QA

Technical Area: Geology-Geophysics Section

DOE has drilled, logged and stored samples from many boreholes for the Yucca Mountain project under procedures which were not QA approved. DOE has recently spent a large effort in establishing the Sample Management Facility and in modifying the drilling, logging and storage procedures. The purpose of this field trip would be to visit and inspect the facility and review the procedures which will be used to qualify old information, review the status of the qualification activities to date, and review procedures which will be used on all new drilling activities. While this activity is not intended to be a QA audit, it could be combined with a QA audit of the facility.

JANUARY 1990

Technical Exchange

- Integration of ESF Design with Repository Design

Technical Area: Rock Mechanics Design

The purpose would be to discuss DOE's pre-advanced conceptual repository design work and seismic and tectonic design criteria as it affects the ESF test plan. The scope should include a meeting with the DOE contractors and the subcontractors responsible for the repository design. The meeting should involve discussion of all design reports completed after the conceptual design report, e.g., vertical vs. horizontal emplacement mode selection, repository layout and configuration. The scope should also include: (i) development of seismic design bases; (ii) exploratory shaft design including seismic collar; (iii) design of emplacement holes; (iv) sub-surface stand-off distance from faults; (v) design of surface facilities against seismic loads; and (vi) use of analytical models and databases in repository design, including rock-failure criteria, code validation and verification, etc.

- 10,000 Year Cumulative Slip Earthquake and Seismic Hazard TP

Technical Area: Geology-Geophysics Section

This meeting will be a follow-up to seismology discussion in the tectonics issues meeting of September. In both the Consultation Draft SCP and SCP DOE has proposed the use of what has been termed as the 10,000 Year Cumulative Slip Earthquake in preclosure design and analysis. The NRC staff has raised concerns with this proposed methodology. The purpose of this technical meeting is to discuss the theory behind this concept, to compare the results obtained using this methodology with other, more conventional methodologies, and to evaluate the site investigation program to determine if it is sufficient to obtain information for alternative methodologies prior to determination as to which methodology will be brought forward to licensing. In addition, the technical position on seismic hazard analysis will be out for public comment at this time and this document should be included as an agenda item for discussion and NRC staff explanation.

Formal

None

Site Visits

None

FEBRUARY 1990

Technical Exchange

- Groundwater Travel Time

Technical Area: Hydrologic Transport

SECY-88-285 identified groundwater travel time as a potential candidate for rulemaking and established a schedule of rulemaking milestones. The staff is preparing a rulemaking options paper in which the regulatory and technical advantages and disadvantages of possible options will be discussed. This technical interaction will provide NRC and DOE with an opportunity to discuss technical aspects of groundwater travel time. (Preferred Date: January 1990)

- Construction of Cumulative Distribution Function (CCDF)

Technical Area: Performance Assessment

The NRC staff has raised concerns about how DOE intends to construct a CCDF and how this methodology relates to the site characterization program in SCA Comments 95, 98, and 99. A technical meeting focused on these concerns could serve the purpose of clarifying them and providing DOE with the opportunity for feedback. Specific issues to be discussed include: (1) use of a definition of scenarios consistent with the logic used to construct the CCDF, (2) inclusion of human intrusion scenarios in the CCDF, (3) use of Expected Partial Performance Measures (EPPMs) to guide site characterization.

Formal

- Investigations, Evaluations and Research Related to Repository Sealing

Technical Areas: Rock Mechanics Design

The purpose of this meeting would be to discuss DOE plans for repository seal investigations and research and to discuss NRC concerns related to design, construction and waste emplacement considerations affecting drainage associated with the underground facility.

Site Visit

- Performance Assessment Field Trip

Technical Area: Performance Assessment

The NRC Performance Assessment staff would visit the Yucca Mountain site to obtain a better, hands-on appreciation of the nature of the site, the proposed site characterization program, and the relation of these to performance assessment activities.

MARCH 1990

Technical Exchange

- Engineered Barrier System (EBS) Performance Assessment Modeling

Technical Area: Material Science

These interactions should include the ongoing efforts by DOE to develop performance assessment models for the EBS, including the waste package and waste form, to demonstrate compliance with 10 CFR 60.113. These discussions will also include the methodologies and models to be used by DOE to make long-term predictions (i.e., up to 10,000 years) based on short-term measurements and data. Such predictions will have to be based on models which are actually simplified representations of actual processes affecting those materials. Validation of the predictions will have to be based on indirect techniques such as comparison with archaeological analogs.

There should be periodic interactions at the technical staff level, again in small groups, to permit intensive discussion for the bases being developed for the models, and predictions, and the validations. A consensus is developing in the technical community that the models should incorporate as much mechanistic understanding of the operative processes as possible. (Preferred Date: October 1989)

- Significance of Individual Features, Events, and Processes of the Hydrogeologic System in Demonstrating Compliance with Performance Objectives of 10 CFR Part 60

Technical Area: Hydrologic Transport

NRC staff has raised concerns about the technical basis for initial assessments of the significance of individual features, events and processes of the hydrogeologic system to performance measures or design and performance parameters (refer to comments 10 and 18 of the SCA). A technical exchange focusing on existing or planned sensitivity studies by the DOE could serve the purpose of clarifying staff concerns and providing DOE with an opportunity for feedback.

- Validation of Models

Technical Area: Performance Assessment

The NRC staff has raised concerns about how the DOE will develop and implement specific plans for validating models in SCA Comments 120 and 6. A technical exchange focused on these concerns could serve the purpose of clarifying them and providing DOE with the opportunity for feedback.

MARCH 1990 (Continued)

Formal

None

Site Visit

None

APRIL 1990

Technical Exchange

- Waste Package In-Situ Testing Program

Technical Area: Materials Science

The purpose would be to interact with DOE on YMPO's plan on a waste package in situ test program. Discussions would be held with DOE if YMPO intends to run any in situ waste package experiments to collect data to support waste package performance analysis. If no such experiments are planned, what program YMPO would use to relate laboratory collected data to the repository processes. Discussions on DOE's planned strategy would include NRC, YMPO, and the DOE contractors.  
(Preferred Date: September 1989)

Formal

None

Site Visit

None



MAY 1990

Technical Exchange

- Testing of the Saturated Zone at Yucca Mountain

Technical Area: Hydrologic Transport

NRC staff has raised concerns about plans to characterize saturated zone hydrologic boundaries, flow directions and magnitudes, and flow paths (refer to comments 19, 20, 21 and 22 of the SCA). A technical meetings focusing on hydraulic and hydrochemical testing of the saturated zone at Yucca Mountain could serve the purpose of clarifying staff concerns and providing the DOE with an opportunity for feedback.

Formal

- Formal use of Expert Judgement

Technical Area: Geology-Geophysics Section

The NRC staff has raised concerns about the criteria the DOE will use to determine whether the formal use of expert judgment is appropriate in a particular instance. A formal meeting focused on these concerns could serve the purpose of clarifying them and providing DOE with the opportunity for feedback. It is expected that the NRC legal staff would participate.

Site Visit

None

JUNE 1990

Technical Exchange

Formal

Site Visit

JULY 1990

Technical Exchange

- Exploratory Shaft Facility Design and Construction

Technical Area: Rock Mechanics Design

The purpose would be to discuss DOE's plans for exploratory shaft facility design and construction procedures. The scope would cover: (i) multi-purpose boreholes; (ii) controlled blasting; (iii) investigations and evaluations of work excavation techniques and their effects on repository performance; (iv) limit on chemical contents of explosives; (v) measurement of the extent of the damaged zone; (vi) test blasts; and (vii) limits on water use. NOTE: This meeting could be moved to September 1990, if necessary.

- Retardation Modeling

Technical Area: Hydrologic Transport

NRC staff has raised concerns about the use of Kd's in modeling retardation in assessments of radionuclide releases to the accessible environment (refer to comment 96 of the SCA). A technical meeting focusing on retardation modeling could serve the purpose of clarifying staff concerns and providing DOE with an opportunity for feedback.

Formal

None

Site Visit

None

AUGUST 1990

Technical Exchange

- ESF Surface Preparation Activities

Technical Area: Rock Mechanics Design

The purpose of this interaction would be to discuss DOE's plans for ESF site preparation as it affects site characterization and waste isolation. The scope should include cut and fill design, drill and blasting for the cut, surface water drainage pattern as modified by construction, and the stability of rock slope adjacent to exploratory shafts. (Preferred Date: October 1989)

- Underground Mapping Methods

Technical Area: Geology-Geophysics Section

DOE has proposed the use of a mapping methodology for underground facilities which is significantly different from standard methods. The purpose of this technical meeting would be to review and compare the methodology with other more established methodologies, or discuss how such a comparison could be made to assure the applicability of this methodology and observe a demonstration of its implementation. (Could possibly be combined with Exploratory Shaft Study plans. See above.)

Formal

None

Site Visit

None

SEPTEMBER 1990

Technical Exchange

- Thermal Effects of Emplaced Waste on Hydrologic System

Technical Area: Hydrologic Transport

NRC staff has raised concerns about the thermal effects of emplaced waste on the hydrologic system (refer to comment 11 of the SCA). A technical exchange focusing on the thermohydrologic aspects of the Yucca Mountain site could serve the purpose of clarifying staff concerns and providing DOE with an opportunity for feedback.

Formal

None

Site Visit

None

OCTOBER 1990

Technical Exchange

Formal

Site Visit

NOVEMBER 1990

Technical Exchange

Formal

Site Visit

DECEMBER 1990

Technical Exchange

Formal

Site Visit



JANUARY 1991

Technical Exchange

Formal

Site Visit