



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

August 5, 1999

MEMORANDUM TO: C. William Reamer, Chief  
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Assessment Branch, DWM/NMSS

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SUBJECT: TRIP REPORT - NUCLEAR WASTE TECHNICAL REVIEW BOARD  
MEETING ON REPOSITORY DESIGN AT BEATTY, NV  
ON JUNE 29-30, 1999

I attended the Nuclear Waste Technical Review Board (NWTRB) summer meeting at Beatty, NV, on June 29-30, 1999. The topic of the meeting was Repository Design. The focus of the meeting on the first day was the U.S. Department of Energy (DOE)/Management and Operations' (M&O's) selection of the repository design for the Site Recommendation and License Application phases of the program. The focus of the meeting on the second day was on-going scientific studies related to the characterization of a potential repository site at Yucca Mountain, Nevada.

DOE and M&O's presentation consisted of:

- (1) Overview of the program, budget, legislative initiatives etc.,
  - (2) Overall progress to date on site characterization and License Application Design Selection (LADS) process,
  - (3) Enhanced Design Alternatives (EDAs) - summary description and evaluation process,
  - (4) Consideration of WP, Drip-shield, and other uncertainties in EDAs, *99-138*
  - (5) Subsurface design considerations for EDA II (preferred design),
  - (6) Status of scientific studies - Drift-Scale thermal test and WP material corrosion studies, *NH16*
  - (7) TSPA and future plans,
  - (8) Integration of scientific programs,
  - (9) Nye county drilling program, and
  - (10) UZ tests at Busted Butte facility.
- WM-11*

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C.W. Reamer

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Most of the questions from the NWTRB were on the process or methodology used by M&O in recommending EDA II as the preferred design for License Application. The comments were focused on the process being not transparent and quantitative. Other design considerations such as low thermal load, flexibility in the design, use of drip shield, and backfill were discussed.

Public comments focused on the need for additional time to comment on the draft EIS and more money and time to complete drilling and testing planned in the Nye county drilling program.

Attached is a brief listing of the key items covered in the presentations and relevant questions/comments by the NWTRB and public. A set of the material presented at the meeting is available in my office for use by any one interested in it.

Attachment: As stated

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**PRESENTATION BY DOE AND M&O AT THE NWTRB MEETING  
June 29-30, 1999, Beatty, Nevada**

**OCRWM Update by L. Barrett (DOE/OCRWM)**

Highlights of his presentation were:

- (1) Expected reduction in DOE budget for FY2000 and its impact on the program - DOE is prioritizing to work on the most important science and engineering activities needed to support the site recommendation activity,
- (2) Legislative initiative in the U.S. Congress on DOE taking charge of the spent fuel at the reactor sites and other issues under consideration in the Senate bill,
- (3) Alternative designs to the VA-design, design evolution, and preference to the Enhanced Design Alternative II,
- (4) Brief mention of NRC's proposed Part 63 rule and EPA's draft rule for YM site,
- (5) Near-term milestones (draft EIS end of July 99 and final EIS in FY00), and
- (6) Announced that DOE's current M&O contract will expire in Feb 2001 and DOE plans to recomplete the contract.

**Yucca Mountain Site Characterization - Update by R. Dryer (DOE/YMSCO)**

Highlights of his presentation were:

- (1) Planned work for FY1999 and FY2000; products and milestones,
- (2) M&O's recommendation of a design for SR/LA, and DOE is reviewing the report,
- (3) Draft EIS will be available for public comment in July 1999,
- (4) Will prioritize future activities after LA design and FY00 budget are finalized,
- (5) Project will focus on EIS and SR processes, and
- (6) Projected schedule for EIS, draft SR, public comments, and final SR.

**NWTRB Questions/Comments:**

Is there a difference between Monitored Geological Repository (MGR) and Geologic Disposal concept? The response was that MGR allows flexibility for the future generation to decide on permanent closure of the site.

**Next four Presentations were focused on LADS Process**

## **License Application Design Selection Overview and DOE Requirements by P. Harrington (DOE)**

Presentation focused on the LADS process and directions by DOE to M&O on the LADS. DOE provided draft LADS report by M&O to NWTRB and solicited comments.

## **Overview of LADS Process by R. Snell (Fluor Daniel, Inc/M&O)**

Provided brief overview of the LADS process.

## **Enhanced Design Alternatives (EDAs) - Summary Descriptions by R. Dulin ( Duke Engineering Services / M&O)**

Highlights of the presentation included:

- (1) Common and variable features of several alternate designs evaluated in the LADS process,
- (2) EDA constraints, and
- (3) Key features of all the enhanced design alternatives considered.

NWTRB Questions were:

- (1) How critical is the age of the fuel to closure? Response - Age of fuel coming in initially is approximately 26 years. Age of the fuel coming in later is critical; thermal load management is a component of the design.
- (2) Will a large surface facility offer flexibility in thermal load management? Response - WP thermal loading flexibility is important.
- (3) Are all 5 EDAs safe, is your analysis detailed enough to establish safety? Response - DOE performed limited TSPA for all five EDAs to establish that all five EDA's are safe.
- (4) Does EDAs design use more steel support than the VA design? Response - Yes more steel. NWTRB commented that the effect of radiation from the WP surface on the drift support steel liners should be investigated.
- (5) Is there flexibility to accommodate more waste if the Government desires so? Response - EIS discusses the flexibility issue.
- (6) Which uncertainties are reduced? Response - uncertainty of the geochemical impact of concrete, and uncertainty of the VA design WP are reduced in the EDAs.
- (7) Comment - Design is heavily WP oriented rather than mountain and WP oriented.

## **EDA Evaluation Process by K. Coppersmith (Geometrix/M&O)**

Highlights of the presentation included:

- (1) Requirements of the LADS Decision Process,
- (2) Team of Decision Analysis Experts were used,
- (3) Process used by the Decision Analysis team,

- (4) LAD Integration Group consisting of DOE and M&O management decided the LAD decision process,
- (5) EDA evaluation criteria, comparative evaluation of the alternates considered, and rankings, and
- (6) Thought process in arriving at EDA II as the M&O recommended design.

**NWTRB Questions/Comments:**

- (1) Flexibility, one of the important criterion in selecting the preferred design, is a moving target as it is not clearly defined. Response - Yes, design has to respond to changing requirements and flexibility is a major criteria; however, changes are expected to be minimal.
- (2) Why are licensing and safety issues lumped together in the decision process? Response - the LADS process laid out the method.
- (3) Board needs to know the relevant values placed for each criteria in the decision process. Response - Criteria were qualitative.
- (4) Board liked EDA I, which is a below boiling temperature design, why was this not selected? Response - EDA I required extensive preclosure ventilation.
- (5) Concept of defense-in-depth is not explicitly shown. Response - defense-in-depth is more judgmental.
- (6) The decision process is not transparent and judgments made on closure period, ventilation, and uncharacterized site conditions need to be explicitly identified. Response - These were discussed as bounding issues and were considered in arriving at the recommended design.

**Consideration of Uncertainties in the EBS for LADS by J. Blink (LLNL/M&O)**

Uncertainties in corrosion of WP and Drip Shield materials, and water chemistry on the surface of the WP were presented.

**Consideration of Uncertainties in the Near-Field Environment and Coupled Processes Effects in the LADS Process by E. Hardin (LLNL/M&O)**

Presentation included:

- (1) Selection and development of process,
- (2) Review of uncertainties,
- (3) How uncertainties were discussed in the EDA development (WP and Drip Shield were not included in this presentation)

NWTRB questions/comments:

- (1) Was safety part of the decision process? Response - Dose took care of safety in the post closure and operations took care of safety in the preclosure.
- (2) Why flexibility in closure? Response - Flexibility in time for closure retained for next generation.
- (3) Would rankings be different if the team had more engineers rather than scientists? Response - No, the team was balanced.

- (4) Was EW drift data used in the decision process? Response - Bounding analysis took care of this uncertainty.

**EDA-II Detailed Description and Future Plans by J. Blink (LLNL/M&O)**

Presentation included EDA-II description and future plans in detail

**Nye County Workshop on Alternative Repository Design by M. Murphy of Nye county NWPRO**

The presentation briefly mentioned the advantages of a naturally ventilated repository design. Details in report by Nye County (Website [www.nyecounty.com](http://www.nyecounty.com))

**Repository Subsurface Design by D. McKenzie, III, (M&O/MK)**

The presentation included:

- (1) Comparison of preclosure ventilation proposed for VA and EDA-II designs,
- (2) DBEs,
- (3) Drift Stability Panel report on roof support in the drifts, and
- (4) Scope of Performance Confirmation program.

NWTRB questioned if the moisture to be removed by ventilation is considered in the proposed design? - Response - No; conservative step for preliminary design.

**SUMMARY REPORT OF PROCEEDINGS WORKSHOP ON VENTILATED REPOSITORY DESIGN by M. Murphy of Nye County NWPRO**

Made a very short presentation on the workshop that recommended Naturally Ventilated Repository. Results from two models were briefly mentioned and an appeal was made to seriously evaluate "naturally ventilated repository design" concept.

**THERMAL TESTING PROGRAM: DRIFT SCALE TEST; BY D. Barr, USBR/DOE**

Presentation included:

- (1) Overview of thermal testing program,
- (2) Drift Scale Test; status and preliminary results,
- (3) Integration of thermal tests, and
- (4) Applicability of DST results.

Comment: The condensation water always collected below the DST excavation.

## **WASTE PACKAGE: CORROSION TESTING AND MODEL DEVELOPMENT; BY J. FARMER, M&O**

Presentation included results of tests and model predictions. Moisture and temperature play a significant role in corrosion.

NWTRB Comment - Radiolysis of roof support steel needs to be investigated in detail. DOE has not evaluated this aspect yet.

## **OVERVIEW OF FUTURE YMP TOTAL SYSTEMS PERFORMANCE ASSESSMENT MODELING PLANS - by Mark Tynan, YMSCO/DOE**

Presentation included:

- (1) TSPA-VA Peer Review Panel report and NRC comments,
- (2) TSPA- SR/LA iterations; Process Model Reports (PMR) and Analysis Model Reports (AMR),
- (3) Implication of design changes, and
- (4) Schedule for TSPA SR/LA

NWTRB questions/comments:

- (1) Impact QA on TSPA work. Response - PA has considered QA issues, most of the data to be used in the PMRs will be qualified but definitely by LA time all data will be qualified.
- (2) How do you quantify the uncertainty in data? Response - SR will have similar discussions on this topic as in the VA. In the SR, DOE intends to present the range of the parameters considered and will clearly communicate to non-technical persons the implication of the selected values.

## **SCIENTIFIC PROGRAM OVERVIEW by Mark Peters M&O/NEPO**

Presentation included:

- (1) Update on all the testing underway at YM,
- (2) Plan for scientific program; SR and LA integration, Process Model Reports, long-term testing and Performance Confirmation.

Board questioned:

- (1) Prioritization of work in the current budget. DOE responded that key uncertainties related to principal factors noted in VA-TSPA will receive high priority.
- (2) Last chance for data to get into PMRs? Response - August 1999 for PMRs (Rev. 0) supporting SR, and April-May 2000 for PMRs (Rev.1) supporting SR. SZ data from Nye County Drilling program and data from tests planned in the cross drift will not be available for PMR (Rev.0).

## **NYE COUNTY EARLY WARNING DRILLING PROGRAM by Tom Buqo, County Contractor**

Presentation included:

- (1) Aquifer testing program,
- (2) Hydro stratigraphy,
- (3) Water chemistry and
- (4) Planned program for FY2000.

NWTRB asked about K testing in Topopah Spring Lower lith unit. Response was the data will be available in Aug, 1999.

## **STATE OF NEVADA RESEARCH- SATURATED ZONE & INFILTRATION by Linda Lehman, County Contractor**

Presentation included:

- (1) Conceptual model for Saturated Zone Flow and Transport,
- (2) Conceptual Model of the Unsaturated Zone Infiltration, and
- (3) Analysis of representativeness

No comments.

## **Use of Chlorine-36 and CI Data to Determine Hydrologic Pathways at Yucca Mountain by P. Dixon et.al. LLNL**

Presentation included:

- (1) Update of Busted Butte Transport Test; data will be used in SR and LA, and
- (2) Final report on Busted Butte study expected in end of FY2000.

Board questioned about travel time through Calico Hill formation. Response - Calico Hill block modeled in TSPA based on mineral deposits known to be in the Calico Hill block. Busted Butte will provide some data for the final TSPA.

## **USE OF CHLORINE-36 AND CI DATA TO DETERMINE HYDROLOGIC PATHWAYS AT YM by P. Dixon et.al. LLNL**

Presentation included:

- (1) Data from the CI-36 study and modeling,
- (2) Average flux at YM is higher than 1 mm/yr and is most likely in the range of 1-10 mm/yr, and
- (3) Possible reasons for discrepancy between modeled and observed  $^{36}\text{Cl}/\text{Cl}$  ratios.



## **PUBLIC COMMENTS AT THE END OF THE MEETING**

- (1) NWTRB is the only one left to judge the suitability of the site. Public can not rely on the federal agencies. Please do the right thing.
- (2) Not all data will be available for the SZ model development at the time of Site Recommendation.
- (3) NRC should review the SR report after critically considering whether the information in SR is sufficient to demonstrate with reasonable assurance that the site meets NRC requirements.
- (4) Not all data will be available from DST (cool down phase) at the time of SR.
- (5) DIES is based on VA design which is not the preferred design. Revise DIES based on preferred design (EDA II).
- (6) By not defining the closure time, DOE has deferred the repository closure decision to future generation.
- (7) Consultant to Nevada Attorney General reiterated his longstanding concern about up-welling of thermal waters from deep sources and added that this concern should be resolved before SR goes to the president.
- (8) HLW should be processed rather than buried in a repository .
- (9) Indian tribes' representative appealed that they are deprived of their place of worship (YM area) by this project.

### **Closing remarks by NWTRB Chairman**

The project is reaching an important stage in the history of the HLW program. The chairman was encouraged by the Nye County Drilling Program. Thanked all the participants for their input.

I have a copy of the presentations in my office; any one interested in the details contact me at 415 6653 or through E-mail (BNJ).