



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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M E M O R A N D U M

DATE: February 24, 1993

FOR: Joseph Holonich
Repository Licensing and Quality Assurance Project
Directorate

FROM: Philip S. Justus, Sr. On-Site Licensing Representative,
HLPD

SUBJECT: YUCCA MOUNTAIN PROJECT ON-SITE LICENSING REPRESENTATIVE'S
(OLR) REPORT FOR DECEMBER 1992 AND JANUARY 1993

INTRODUCTION

During the fourth and fifth months as On-Site Licensing Representative (OLR), I participated in four meetings held in Nevada, visited the Yucca Mountain site three times, briefed Yucca Mountain Project Office (YMPO) staff in Las Vegas and NRC managers at HQ, among other things. This report summarizes those activities that I consider particularly relevant to staff work.

A principal purpose of these OLR reports is to alert NRC staff, managers and contractors to information from DOE's programs for site characterization, repository design, performance assessment and environmental studies that may be of use in fulfilling NRC's role during pre-licensing consultation. Relevant information includes such things as new technical data, DOE's plans and schedules and the status of activities to pursue site suitability and Exploratory Studies Facility (ESF) development. In addition to communication of information, any potential licensing concerns identified are reported, as appropriate. The principal focus of this and future OLR's reports will be on DOE's programs for ESF, surface-based testing, performance assessment, date management systems and environmental studies (at this time, mainly water resources).

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Rec'd with letter dtd
2/24/93

EXPLORATORY STUDIES FACILITY (ESF)

1) SCHEDULE FOR ESF CONSTRUCTION. Based upon briefings that I attended (TPO meetings of 12/11/92 and 1/20/93; Enclosures 1A, 1B), YMPD continues on schedule as follows: Release Design Package 1A
12/21/92

Receive TBM Vendor Proposals	2/9/93
Award Subcontract for Underground Construction	4/93
Award TBM contract	4/15/93
Begin Excavation of TBM Starter Tunnel	4/2/93.

2) RESPONSIBILITY AND SCHEDULE FOR TITLE II DESIGN. At the TPO meetings it was announced that (Enclosure 1A, 1B) the M&O contractor assumed full responsibility for ESF design effective 12/1/92; the M&O will complete 18 unfinished classification analyses on Design Package 1A; and will perform design of Package 1B - North Portal Surface Facilities (50% Review 4/12/93; 90% Review 7/9/93) and Package 2 - North Ramp: Surface to Repository Level (50% Review 4/22/93; 90% Review 8/11/93).

3) NRC STAFF POSITION ON 'SIZE' OF ESF RAMP/TUNNEL. In response to a question on the staff position on DOE's choice of ESF tunnel diameter (i.e., between 25' and 30'), I reflected the current general position which, simply stated, is that the size should not adversely impact DOE's ability to gather necessary data or the site's ability to isolate waste.

4) CONCEPTUAL REPOSITORY DESIGN. At a workshop on Natural Barriers Evaluation (see section on Quality Affecting Items, below) that I attended on 1/19, I noted the following items of interest to the staff mentioned during the "Overview of Conceptual Repository Design:" surface facilities design will be done by FluorDaniel; subsurface facilities design will be done by Morrison-Knudson; multi-purpose canisters are heavy (estimated on order of 120 tons) and of wide diameter, making drift emplacement relatively more feasible than borehole emplacement; no decision yet on fuel-rod consolidation; only about \$2M available for A&E work on these concepts this year; 57kw/acre continues as baseline goal; no decision yet on inclination angle of drifts.

5) CONCEPTUAL WASTE PACKAGE DESIGN. At the Natural Barriers Evaluation Workshop (see #4 above) I noted the following items of interest to the staff: the waste package baseline concept has changed internal to DOE, but the published waste package baseline has not yet been changed; stainless steel does not seem favorable due to its susceptibility to corrosion from chloride contamination; INCONEL seems better than copper in the Yucca Mountain environment; alloy 25 is "liked the best;" design goal of 350 Celsius at waste package boundary is being challenged on basis of degradation of cladding with time and temperature.

6) IN SITU HEATER TESTS. In response to a query from the CNWRA, I determined that existing test pits on the east flank of Fran Ridge will be used for prototype testing of instruments to be later deployed in the ESF for in situ heated-block experiments. The prototype tests, scheduled to begin in the summer of 93, will be used to scope the relevant Study Plans. This is an 8.3.4.2.4.4 activity. I will keep tabs on this activity and report developments.

SURFACE-BASED TESTING (SBT) PROGRAM

1) SEISMIC REFLECTION PROFILING. Profiling is due to start in late February or March. Details are sketchy at this time. Appears that there will be five lines shot close to the SCP layout. At least some lines will record 20 seconds of data for deep crustal probes. Vibroseis will be used for some lines. Line 5 may be the first with G-5 in Yucca Wash available for geologic control. Line 3 may be extended eastward to provide coverage of Fortymile Wash. Lines 1 and 2 in Crater Flat may provide data on nearby volcanoes. A test interference study may lead to the relocation of some shotpoints if it can be shown that high explosives (more than 200 lbs) threaten the stability of nearby drillholes. I will report on this next month.

2) GEOPHYSICS INTEGRATION TASK FORCE (GITF). A GITF has been established within YMPO to assist in coordination of all geophysics work, including development of geophysics-related documents addressing site suitability and issue resolution. The following persons constitute GITF: James D. Agnew M&O; Debra Edwards USGS; Ronald D. Oliver LANL; Forrest D. Peters SAIC; Charles M. Schlinger SAIC; Mark C. Tynan DOE and Chairperson. This group is coordinating the upcoming geophysics surveys. This information was discussed with A. K. Ibrahim and is based mainly on the memo from R. Dyer to W. L. Clark and others on "Geophysics Integration Task Force (GITF): Request for Information" dated 12/22/92 and forwarded to HQ on 1/14. The GITF appears to be a positive response to the staff criticisms of geophysics integration enumerated in the SCA.

3) EARTHQUAKE HAZARD IN SOUTHERN NEVADA. I attended an evening lecture by Prof. James Brune, Director, Seismological Labs, UNR, on "Recent Earthquake Activity in Southern CA, Southern NV and Southern UT, and Implications for Earthquake Hazard in Las Vegas" on 1/12. It seems clear to Prof. Brune that a large earthquake in CA triggered earthquakes in NV, CA and UT. Principal events in NV included the Little Skull Mtn earthquake, Mag 5.6, 280 km from the Landers, CA triggering event and 22.3 hours after it. Several NV events were felt in Las Vegas. There continues to be a seismic gap at Yucca Mtn, but not near Little Skull Mtn (LSM). The LSM main event was on a normal fault, 12-13 km depth, not obviously associated with the nearby Rock Creek Fault. Some aftershocks are Mag. 4 on strike-slip faults which signifies complex geology at

depth. After shocks are continuing. The data set is the best in the world for studying site effects in dry alluvium. There was less shaking at depth than at the surface based on X-tunnel recording. There appears to have been a slight shift in seismicity toward the Striped Hills to the south. He suggested that surface waves of the Landers caused the LSM event. The repeat time for NV earthquakes of about 10000yrs, a long time for strain buildup, poised the faults to fail when the Landers event occurred, he suggests. He suggested that Szymanski's dilational concept predicts microearthquakes, but there is a microearthquake seismic gap at Yucca Mtn. Also, Yucca Mtn is subjected to about 5 earthquakes per day per year on average.

Prof. Brune has made observations of pedestal rocks and precariously balanced rocks and their occurrence in CA and NV. He suggests that Intensity VIII knocks such rocks down, but VII doesn't do as well. Thus, the presence or absence of such rocks signifies earthquake activity or its absence. He has not found balanced rocks in areas of earthquake activity. Since Red Rock Canyon Park seems devoid of such rocks, he concludes that an earthquake has shaken them down. Yucca Mtn has quite a few precarious rocks; incredible balanced rocks in northern Solitario Canyon. In scale models of earthquake mechanics, it takes about .2g to .3g to topple a precarious rock. Precarious rocks at LSM have been shaken down. He suggests that the Algermissen concept of a "floating" Mag 6 earthquake is not valid due to evidence of still-balanced boulders in areas of floating earthquakes.

He did not answer questions about when the next big earthquake will occur and topple the rocks at Yucca Mtn. He did suggest that low angle normal faults may move by creeping, therefore explaining why, in the Yucca Mtn area, there has not been a big earthquake in about 10000yrs. Also, he raised a concern about Yucca Mountain site amplification and liquefaction. He thought that Las Vegas, while listed as being in Seismic Zone 2 may be a Zone 3. The short record would cause a debate on this point.

4) DRILLHOLE UZ-16. As of 1/27 this hole was cored to a depth of 1339.06.' The estimated total depth is 1663.' Light moisture was reported at 1109.' At staff request, I checked the explanation. Bob Craig, USGS, was concluding an investigation of the phenomenon and could report, preliminarily, that moisture that condensed on the deviation tool was the source of the moisture in the rock core. The bailer had come up dry. Detailed reports on moisture content will be available for staff review.

5) UNSATURATED ZONE GEOHYDROLOGIC SETTING. I attended the Natural Barrier Evaluation Workshop in Las Vegas on 1/19 where A. Flint gave an overview of unsaturated zone geohydrology. The following are selected points of interest to staff technical reviewers from that overview. Dr. Flint reserves the term "perched water" for

zones with free water. If a zone is 99% saturated he will not call it a perched water zone. Most rock units have fairly uniform laterally extensive properties. Important hydrologic layers may be .5ft thick; be careful not to miss these in models. Vitrophyres in non-welded units tend to cause ponding. There is no recharge at Yucca Mtn; it's drying out; greater than 100% evaporation. Alluvium is a giant sponge; holds 90% of infiltration - retards water flow; allows evaporation. However, with a climate change - wetter - alluvium can be source of infiltration. The relative thickness of the Tiva Canyon is important factor in predicting perched water below it. Suggests that perching should occur at Topopah Caprock, but has not observed it yet. Suggests that highly saturated layers would be a barrier to upward-moving carbon14, but the gas might flow laterally out the side of Yucca Mtn to Solitario Canyon.

6) SATURATED ZONE GEOHYDROLOGIC SETTING. The following are selected points of interest to staff technical reviewers from an overview on saturated zone by Dr. William Dudley, USGS, presented at the Natural Barrier Evaluation Workshop on 1/19. The Paleozoic rocks thin to the south of the site and are not simple layer-cake terrain. Permeability is hard to predict in the Paleozoics, "permeability is where you find it." No unit is consistently permeable. A potential for upward movement of groundwater was suggested in wells 25P-1, USW H-1, USW H-3; in 25P-1 increased head with depth, when Paleozoic rocks were penetrated, caused rise of about 20m. See OFR 87-649 (Sass) regarding upward flow of warm water in Solitario Canyon and Midway Valley.

7) WORKSHOP ON FLOW AND TRANSPORT THROUGH UNSATURATED FRACTURED ROCK. This NRC and Center for Nuclear Waste Regulatory Analyses (CNWRA) workshop held at the Univ. of Arizona on 1/25-28 was mentioned to me by several USGS hydrologists in favorable terms. In particular, by identifying individual USGS researchers as potential participants, NRC organizers (T. Nicholson RES; R. Wescott DHLWM) focused the attention of the researchers' managers on those whose work was most relevant to the workshop themes. The limited scope of topics, limited number of participants and elimination of publication of abstracts and papers apparently allowed for a free exchange of ideas in an informal conference-type mode.

8) C-WELL TESTING. Upon request, I was briefed on this set of multiple-well interference cross-hole and pump test activities by C. Newberry, DOE, on 1/12. She provided me with a schedule sent to HQ on 1/14). Money is in the FY93 budget for these tests. They are to begin in March 93 or soon thereafter. The operative Test Planning Package is 92-09; Job Package is 92-21. The PI is M.J. Umari. Prototype multiple packer tests have taken place in the Raymond Quarry, CA by LBL. QA procedures are evolving from the prototype experience. After the large scale pump tests LANL will conduct conservative and non-conservative (bromine/polystyrene

microspheres) tracer tests to determine retardation coefficients. Mrs. Newberry also discussed the possibility of recycling discharge water from the tests for use in future construction activities nearby. The Blue Tanks might serve as storage for such water. Consideration will be given to discharging water in Fortymile Wash downstream from J-13 so as not to contaminate J-13 well with tracers that may be in the discharge water.

9) GEOLOGIC SETTING. The following are selected points from R. Spengler's (USGS) overview of the geologic setting presented at the Natural Barriers Evaluation Workshop on 1/19. These should be of interest to staff technical reviewers. The Paleozoics that underlie the northern half of the site are more argillaceous (clayey) than those in the south (limey). The repository will include part of the Prow Pass unit. Isopachs of the Topopah Spring Formation are at 350m for much of the Yucca Mtn immediate area. Fractures increase from south to north across the site, with a dominant NW trend. Fault zones appear to be structurally linked. Ghost Dance Fault (GDF) has movement down-to-east as well as down-to-west. Modeling of GDF shows little effect on infiltration, but possible effect on gaseous flow. Consider that there may be more faults in the Topopah Springs Fm. than in the Tiva Canyon Fm. due to the onset of faulting in pre-Tiva Canyon time.

10) MINERAL THERMAL STABILITY STUDIES. Dr. David Bish, LANL, summarized some of his work on, "Mineral stability: thermal studies of past, present and future mineral alterations," at the TPO meeting in Las Vegas on 12/11 (Enclosure 2). Some points from his presentation are of particular interest. The Timber Mountain volcanic event appears to be the last episode (about 11mya) of major mineral alteration. This bears on the Szymanski hypothesis. Significant mineral interactions can occur at 40-100Celsius, in fractures, for example. The altered zone (read - "disturbed zone") starts at the waste package - tuff boundary and extends to ambient regime. He recommends that thermal load models include the effect of reversible water loss in zeolites and smectites at very low temperatures.

STUDY PLANS

1) KEY STUDY PLANS FOR ESF CONSTRUCTION. On 12/17 this office was alerted by YMPD to the desire for NRC staff review of three Study Plans needed to be in place in April for ESF construction: 8.3.1.2.2.4 On perched water; 8.3.1.4.2.2 On geological mapping; 8.3.1.2.2.2 On chlorine³⁶. These were to be submitted to NRC in January to allow the full 90 days staff requires for a review. SP..4.2.2 R2 was submitted on 1/6 and NRC Phase I review completed on 2/8. SP..2.2.4 R1 was submitted on 1/21 and 2.2.2 R1 on 2/19.

PERFORMANCE ASSESSMENT (PA)

1) UNCERTAINTIES INTRODUCED BY THE ENERGY ACT OF 1992. At least

one YMPD manager suggested that the Energy Act calls into question the structure of 10 CFR 60, such as the gradual release performance objective and the concept of multiple barriers. In my opinion, this and other comments that I heard, such as on implications of an individual dose standard, reflect a widespread discomfort engendered by changes portended by the Act. Clear, frequent, factual communications of activities and actions among the agencies involved (e.g., NAS, EPA, DOE, NRC) should help alleviate such anxiety.

TOPICAL REPORTS

1) EXTREME EROSION TOPICAL REPORT. DOE was appreciative of the CNWRA comments on a draft of the Extreme Erosion Topical Report. They were received in time to be useful. In December I asked the staff project officer to relay this response to M. Miklas of CNWRA.

2) SEISMIC HAZARD METHODOLOGY TOPICAL REPORT. Issue date is 30 September 1993. The team apparently will not wait for the ASCE Guidelines to be published (in summer 93?) in order to begin. Team consists of D. Fenster, R.C. Quittmeyer WCFS, D. Schwartz USGS, T. Stratton WCFS, T. Sullivan DOE, J. Whitney USGS. I will periodically report on this document.

DATA MANAGEMENT

1) REQUESTS FOR TECHNICAL DATA FROM DOE. DOE has established a formal procedure by which technical data can be distributed to any interested individual or organization. To initiate a request for data staff/manager will need to: a) write a request and submit it to Carl Gertz to the attention of Ardyth Simmons at the address shown below; b) cite the specific source of data, such as the publication in which the data were referenced, or the ID number of the data (such as the DTN in a Technical Data Catalog); c) include the following information - requestor's name, organization, address, phone number, scope of the data requested, description of the intended use of the data, specify format preferences.

Carl Gertz, U.S. DOE

Yucca Mountain Site Characterization Project Office

P.O. Box 98608 Las Vegas, NV 89193-8608

ATTN: Ardyth Simmons

If any staff member who needs data would like an OLR to peruse data housed in Las Vegas prior to making a formal request (for reasons such as to evaluate its currency, to evaluate its adequacy for a particular purpose) let me know.

2) COMPILED DOE DATA. The previously announced "Parameter Dictionary" is due to be published in February. It features the parameters enumerated in the SCP, normalized. It is scheduled for annual revisions. The first edition will cover GENISES and GEMBOCHS databases. GENISES itself is not expected to be available

for NRC on-line use in FY93, but data dumps can be arranged. I can help staff initiate probes of databases by phone.

3) DATA MANAGERS. This list is intended to facilitate the formulation of requests for data: S. Bodner M&O 'administers' RIB, Parameter Dictionary; R. Lewis M&O 'administers' Automated Technical Data Tracking System; J. Beckett EG&G 'administers' GENISES; E. Ezra EG&G 'administers' entire photo/map/dbase of EG&G.

QUALITY-AFFECTING PROCEDURES

1) Q-LIST ITEMS. I attended the first day of a 3-day workshop of the Assessment Team (AT) on 1/19 to identify items for placement on the Q-List that are natural barriers important to waste isolation. The AT has responsibility for this in accordance with YMP Admin. Procedure 6.17Q. NUREG-1318, "Technical Position on Items and Activities in the HLW Geologic Repository Program Subject to QA Requirements," instructed DOE on the need for this. The agenda (Encl. 3A), background and objectives (Encl. 3B) were discussed by D. Hoxie USGS. Also enclosed is, "Yucca Mtn Site Characterization Program AT Manager Guidelines for Early Classification of Natural Barriers, Rev.0" (Encl. 3C), "Barriers Important to Waste Isolation" from the SCP (Encl. 3D), list of references to sources of information for early classification of natural barriers (Encl. 3E), and the participants' identification (Encl. 3F). This background information is useful for assisting staff in its review of the Q-List items. No action by NRC seems necessary on this matter until the Q-List items and bases are reported. The AT is due to make its recommendations to DOE in February.

2) DRILLING AND PROCESSING OF CORE. On 12/16 I accompanied J. Gilray on-site to review and evaluate selected DOE activities pertaining to drilling and the processing of core. For a more detailed account see the memo from B.J. Youngblood to R.M. Bernero, "Items of Interest to the Commission," dated 12/21/92. Stop - UZ-16: drilling temporarily stopped due to fishing operation to retrieve core barrel, about 1200ft. Stop - NRG-6: processing of core interval 97.6 to 102.9 was observed to be in accordance with appropriate quality-related procedures. YMP QA has identified deficiencies regarding use of the tracer sulfur hexafluoride and calibration of related instrumentation. OLRs are monitoring this issue and will keep staff informed. Stop - RSN office: QA verification paperwork associated with trench T5 surveys lacked clearly documented accountability that the required verification had been properly carried out. OLRs will continue to monitor this issue to assure the concerns are resolved.

DOE PROGRAM MANAGEMENT

1) FY93 BUDGET. The FY93 budget with carryover is \$251.6M. This

includes \$52.4M for WBS 1.2.3 Site Investigations and \$49.0M for WBS 1.2.6 ESF. The largest contractor, measured in dollars, is REECo \$53.2M, followed by M&O \$51.1M (Enclosures 4A, 4B from TPO meetings of 12/11 and 1/20).

2) MISSION 2001. This continues to be the baseline plan (From TPO meeting of 1/20). Given that there will be a need for the ESF and for site characterization, regardless of what disposal strategy is emphasized (read - politics), Mr. Gertz considers that YMPO site activities will not change much from current plans for the next year, or two or three.

3) CONVERGENCE TASK FORCE REPORTS. The draft implementation plans to establish single points of contact for the three main program areas: site suitability evaluation, NEPA process, License Application and compliance are due 12/92, 2/93 and 3/93, respectively.

4) NRC ROLES. DOE summarizes NRC's roles as follows: *NRC statutory responsibility cuts across entire regulatory process *NRC concurred on 10 CFR 960 and must concur on any changes *NRC comments on sufficiency of site data must be included in Site Recommendation Report *NRC must adopt DOE's EIS, to the extent practicable, or issue its own EIS *NRC reviews the LA prior to authorizing construction of repository (Enclosure 4A).

5) NEW HLW DISPOSAL STRATEGY PURPORTS TO INVOLVE NRC IN PHASED LICENSING. In his letter of 1/12 to Sen. Johnston, former DOE Secy Watkins indicated that DOE would investigate an alternative strategy to the current disposal program. Mr. Gertz has indicated that DOE is doing so, and will issue a proposed strategy (or strategies) in April. The strategy would likely require NRC to make periodic formal findings on matters yet to be defined.

GENERAL

1) GEOLOGICAL HAZARDS IN LAS VEGAS VALLEY. I attended a guided field trip to locations of the main geological hazards in the Las Vegas valley on 12/12. Trip was sponsored by the Assoc. of Engineering Geologists (AEG). Trip leaders were experts from County and State government agencies, or consultants. My purpose was to learn the nature of the hazards and mitigation measures with an eye toward transferring this knowledge to the Yucca Mtn project 100 miles along strike. The main hazards are flooding, land subsidence and ground cracking due to groundwater withdrawal, surface fault displacements and earthquake vibratory motion. Soil liquefaction is considered a potential hazard. Flooding is mitigated by channelization, divergence and detention. Subsidence and cracking are mitigated by restraining water pumping. Most damage occurs along cracks that had a large horizontal component of displacement; a surprise observation. Fault displacements were considered to be aseismic compaction faults until last decade.

Faults are now considered to be capable of Mag 6.5 earthquakes, but may have a recurrence interval on the order of 10-30000yrs. These hazards are starting to be assessed. The AEG brought together scientists and engineers who work for various organizations with divergent purposes. In my opinion, this trip emphasized the need for clear, frequent and factual communication among hydrologists, geologists, seismologists, civil and hydraulic engineers who work on hazards in the same area.

OLR ACTIVITIES

1) **SELECTED ACTIVITIES.** Participated in the following activities during 12/92 and 1/93: American Association of Petroleum Geologist's course, Operational Seismic Stratigraphy; FOCUS '93 steering committee meeting; provided input to DHLWM Quarterly Report; helped organize farewell dinner for predecessor, Paul Prestholt. Also, with J. Gilray, brief R. Dyer's division staff on role of OLR's (Enclosure 5); provide NRC and DHLWM organization charts to DOE IG representative; brief and be briefed by NRC HQ management on my first quarterly visit to HQ.

2) **NRC COMMISSIONER AND STAFF VISITORS.** Commissioner J. Curtiss visited the site in December along with Region V Administrator J.B. Martin and Commissioner's Ass't. J. Kotra. There were no visitors in January.

Enclosures:

1A.	TPO - ESF - Simecka -	12/11/92
1B.	TPO - ESF - Simecka -	1/20/93
2.	TPO - Minerals - Bish -	12/11/92
3A.	Workshop Agenda -	1/19/93
3B.	" Background -	"
3C.	" Guidelines -	"
3D.	" SCP -	"
3E.	" References -	"
3F.	" Participants -	"
4A.	TPO - Gertz -	12/11/92
4B.	TPO - Gertz -	1/20/93
5.	OLR - Briefing -	1/21/93

cc: w/encl.: C. Gertz, DOE
D. Shelor, DOE
T. Hickey, State Senator
W. Patrick, CNWRA

cc: w/o encl.: C. Abrams, M/S 4 H 3
B. Youngblood, M/S 4 H 3
J. Linehan, M/S 4 H 3
R. Bernero, M/S 6 E 6
H. Thompson, M/S 17 G 21
S. Gagner, M/S 2 G 5
S. Schwartz, M/S 3 D 23
J. Fouchard, M/S 2 G 5
E. O'Donnell, M/S NLS 260
R. Loux, State of NV
G. Cook, Region V
J. Martin, Region V
D. Kunihiro, Region V
S. Jones, DOE
R. Dyer, DOE
D. Foust, M&O
S. LeRoy, M&O
J. Russell, CNWRA

TPO MEETING

**EXPLORATORY STUDIES FACILITY (ESF)
STATUS**

PRESENTED BY

DR. WILLIAM SIMECKA

**DIRECTOR, ENGINEERING AND DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

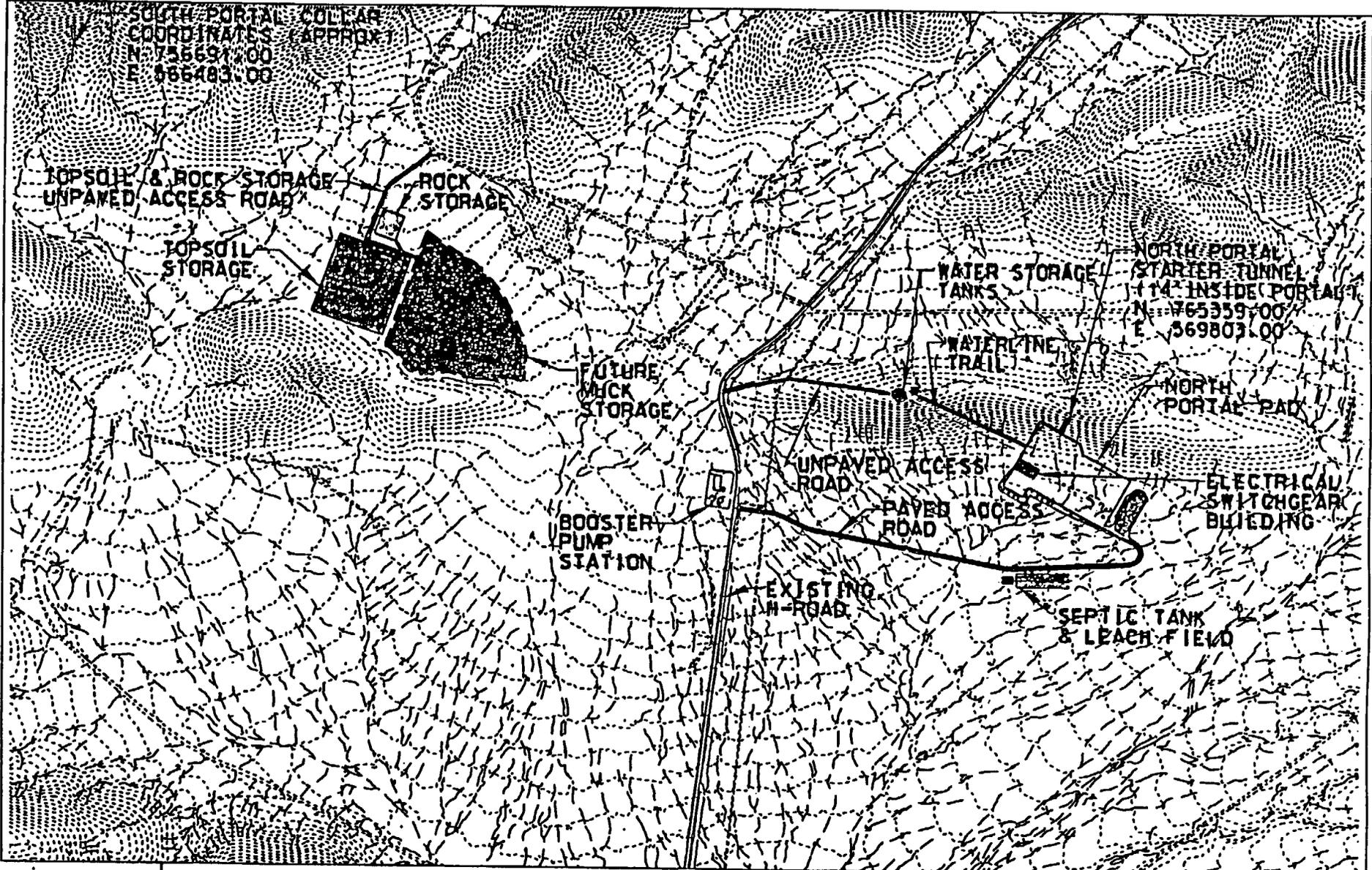
DECEMBER 11, 1992

Enclosure 1A

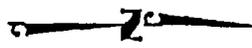
**ESF CONSTRUCTION
IS UNDERWAY**

RECENT EVENTS

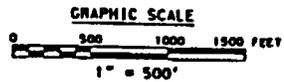
- **The initial portion of ESF Design Package 1A was issued for construction, (20 NOV 92) enabling YMP to initiate construction activity on 25 NOV 92**
- **The review process is underway for the balance of Package 1A. Release for construction expected by 21 DEC 92**
- **The specification for the first Tunnel Boring Machine (TBM) has been completed, and the Request For Proposal (RFP) is expected to be issued on 18 DEC 92**
- **ESAAB approval to begin construction was received 25 NOV 92**



ESF PACKAGE 1A
 OVERALL SITE
PLAN
 REFERENCE
 YMP-025-1-CIVL-PL111



ELECTRICAL POWER LINE
 FROM CANYON SUBSTATION



TO WELL
 J-13

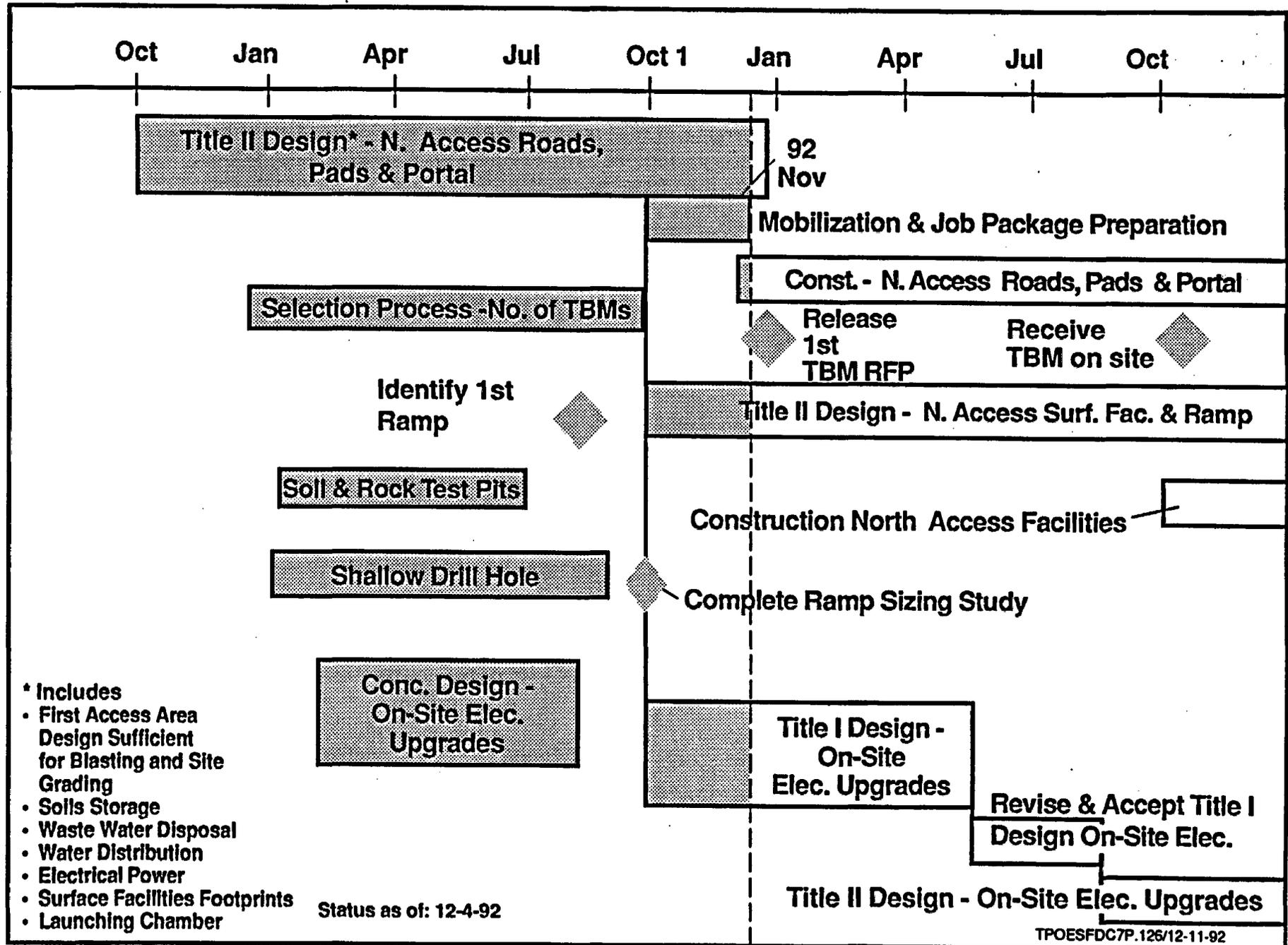
ESF TITLE II DESIGN

- **CRWMS M&O has assumed full responsibility for ESF design, effective 1 DEC 92**
- **M&O will complete 18 unfinished classification analyses on Design Package 1A**
- **M&O will perform design of Package 1B (north portal surface facilities) and Package 2 (north ramp, surface to Topopah Spring Level)**

ESF CONSTRUCTION

- **All readiness review open items closed (25 NOV 92)**
- **Site preparation activities started (25 Nov 92)**
- **ESF subsurface contractor selection (source selection board recommendation) due (24 DEC 92)**
- **Starter tunnel excavation scheduled to begin (2 APR 93)**

PLANNED ESF DESIGN/CONSTRUCTION ACTIVITIES FY 1992 & 1993



TPO MEETING

STATUS OF ESF

PRESENTED BY

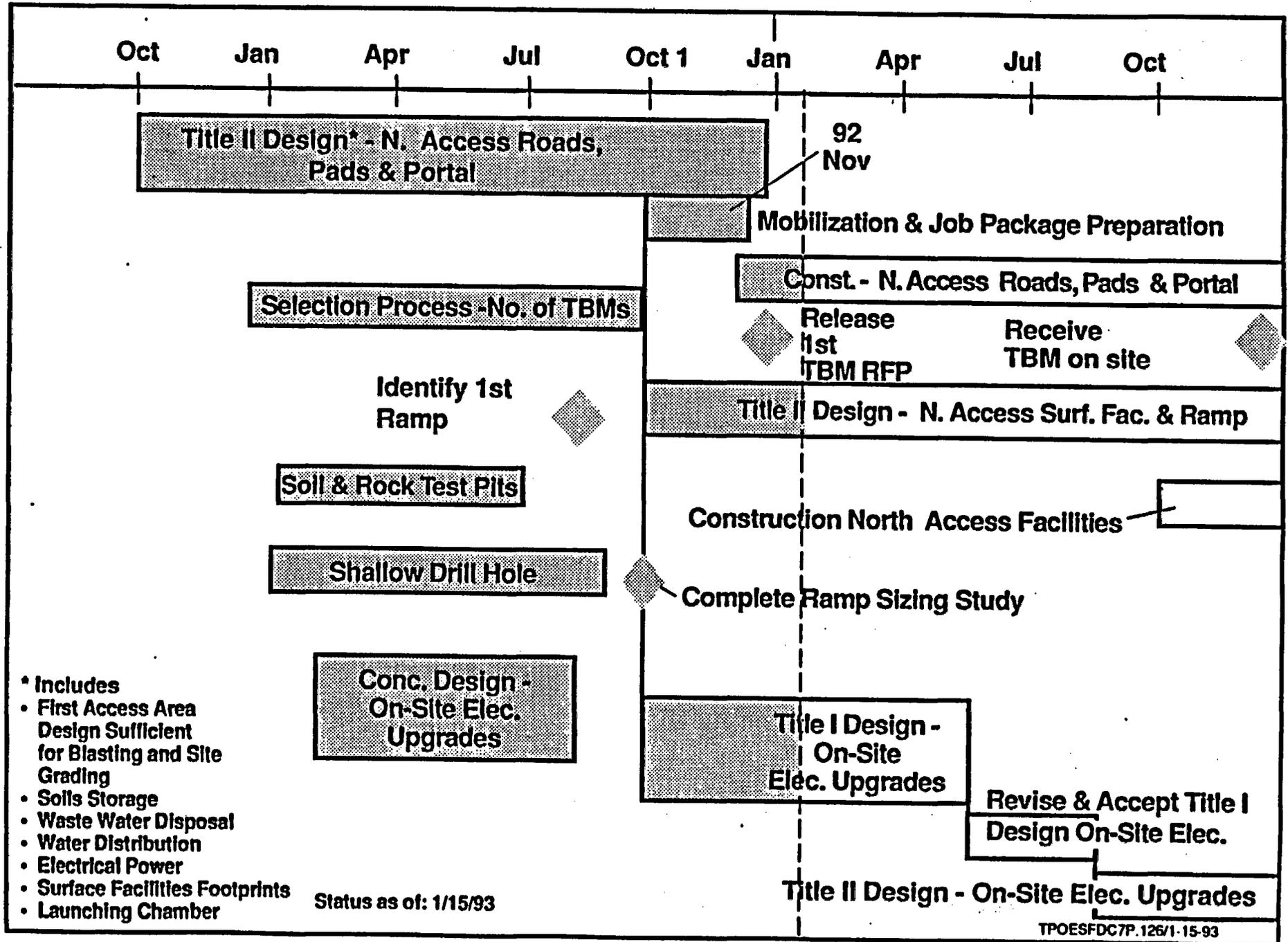
DR. WILLIAM SIMECKA

**DIRECTOR, ENGINEERING AND DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

JANUARY 20, 1993

Enclosure 1B

PLANNED ESF DESIGN/CONSTRUCTION ACTIVITIES FY 1992 & 1993



ESF CONSTRUCTION MILESTONES

<u>Milestone/Activity</u>	<u>Planned</u>	<u>Expected</u>
Submit recommended ESF underground construction subcontractor to DOE for approval (award)	9/15/92	1/20/93(E)
Select ESF underground construction subcontractor	10/15/92	4/15/93(E)
Release TBM RFP	11/16/92	12/16/92(A)
Start ESF site preparation	11/30/92	11/30/92(A)
Hold TBM pre-bid meeting	1/6/93	1/7/93(A)
Receive proposals for 1st TBM	2/9/93	2/9/93(E)
Start excavation of North Ramp starter tunnel	4/2/93	4/2/93(E)
Award TBM contract	4/15/93	4/15/93(E)

ESF DESIGN MILESTONES

<u>Milestone/Activity</u>	<u>Planned</u>	<u>Expected</u>
Start Title II design activity Packages 1B and 2	10/1/92	10/1/92(A)
Start 50% review, Package 1B	4/12/93	4/12/93(E)
Start 50% review, Package 2	4/22/93	4/22/93(E)
Start 90% review, Package 1B	7/9/93	7/9/93(E)
Start 90% review, Package 2	8/11/93	8/11/93(E)

ESF RECENT ACCOMPLISHMENTS (THROUGH 1ST QUARTER - FY93)

- **Started ESF construction on schedule**
- **Released request for proposals for first TBM**
- **Successfully transitioned ESF design responsibility to new A/E**

December 9, 1981

"The reported negative coefficient of thermal expansion for nonwelded tuff may be incorrect."

"It is unlikely that the reported negative coefficient of thermal expansion is a true material property of tuff."

**Robert J. Wright
Senior Technical Advisor
High-Level Waste Tech. Dev. Branch
Division of Waste Management
Nuclear Regulatory Commission**

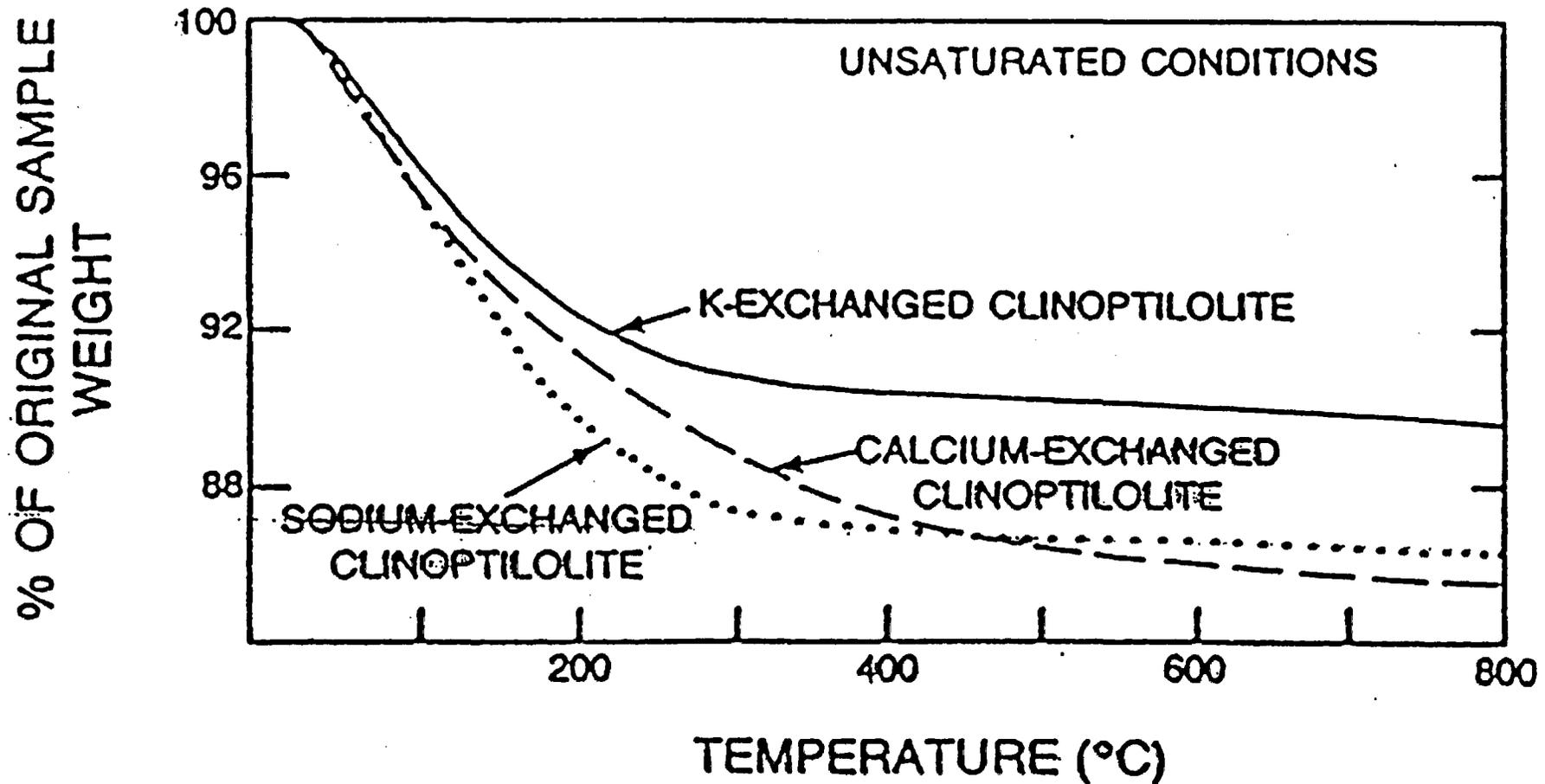
Los Alamos Mineral Stability/Alteration Studies

- **Mineral stability studies**
- **Long-term mineralogical alterations**

Mineral Stability

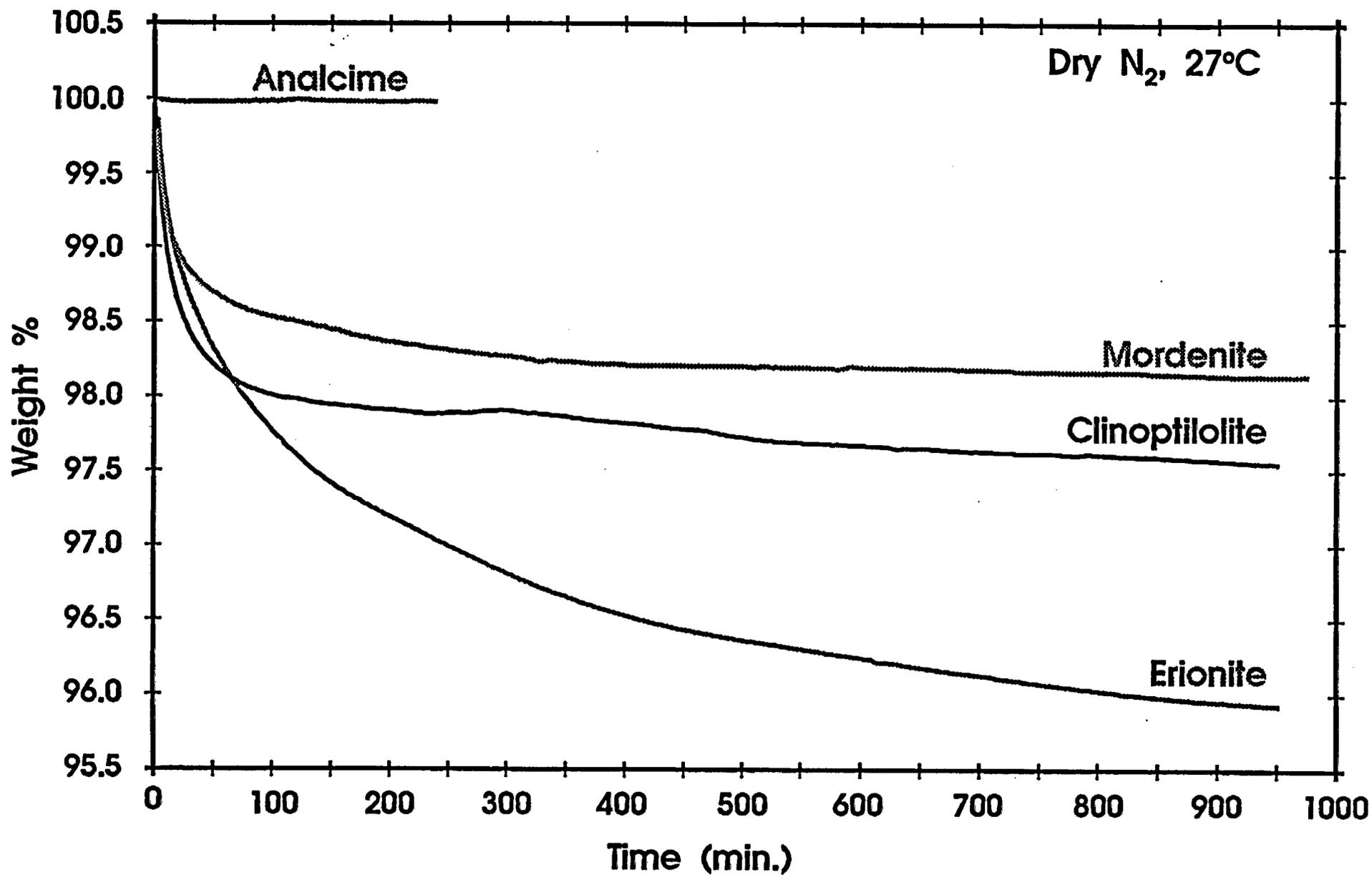
- **Temperature- $P(\text{H}_2\text{O})$ effects on clinoptilolite, mordenite, smectite, and volcanic glass under non-ambient conditions**
 - dehydration-rehydration effects
 - zeolite and smectite water content as a function of T, $P(\text{H}_2\text{O})$
 - kinetics of dehydration/rehydration reactions
 - contraction/expansion reactions
 - molar volume as a function of T, $P(\text{H}_2\text{O})$
- **Effects of heating on sorption properties**
 - do these dehydration and contraction reactions affect the sorption properties?

DEHYDRATION PROPERTIES OF CLINOPTILOLITE AS A FUNCTION OF COMPOSITION AND TEMPERATURE

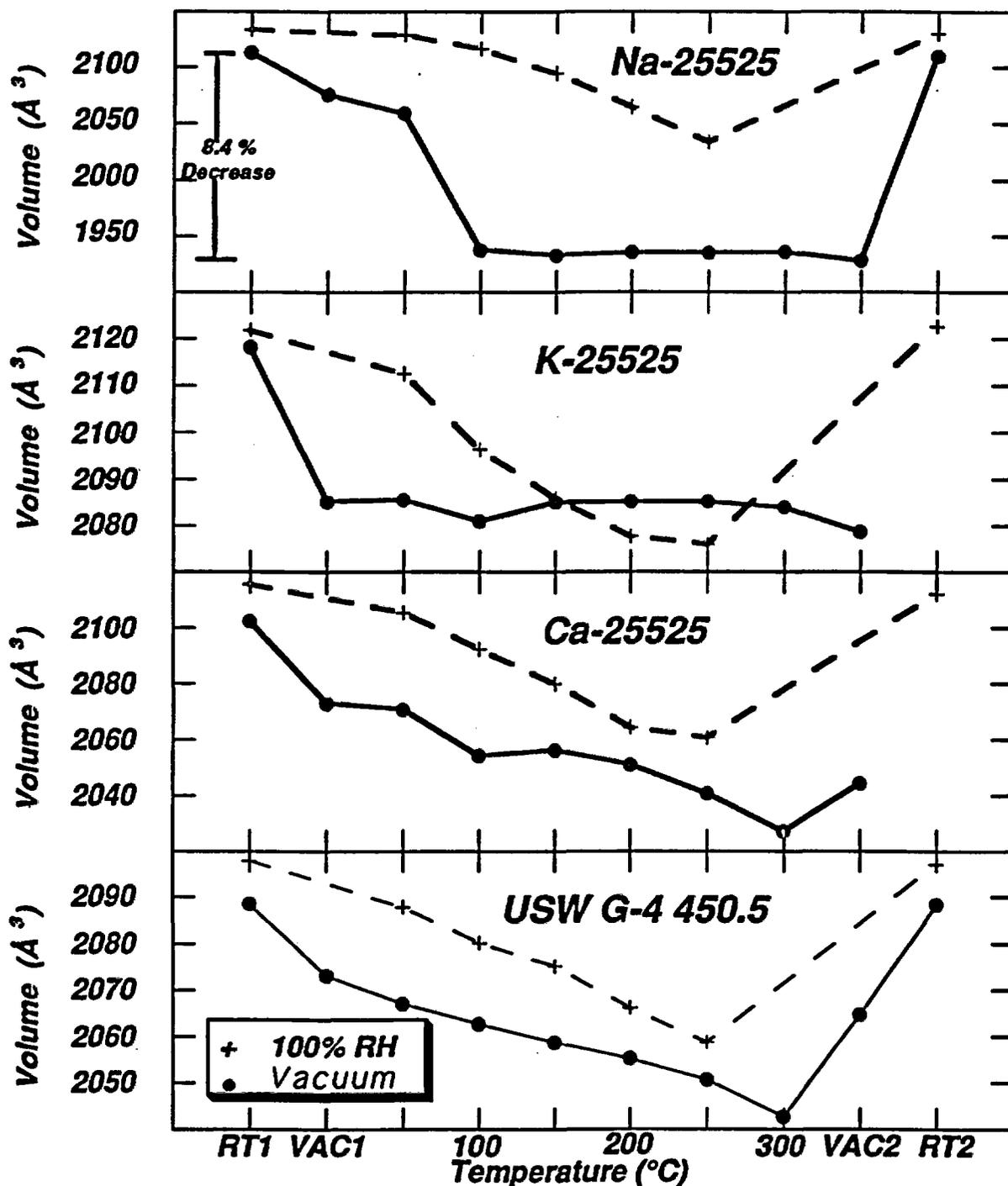


FROM BISH, 1985

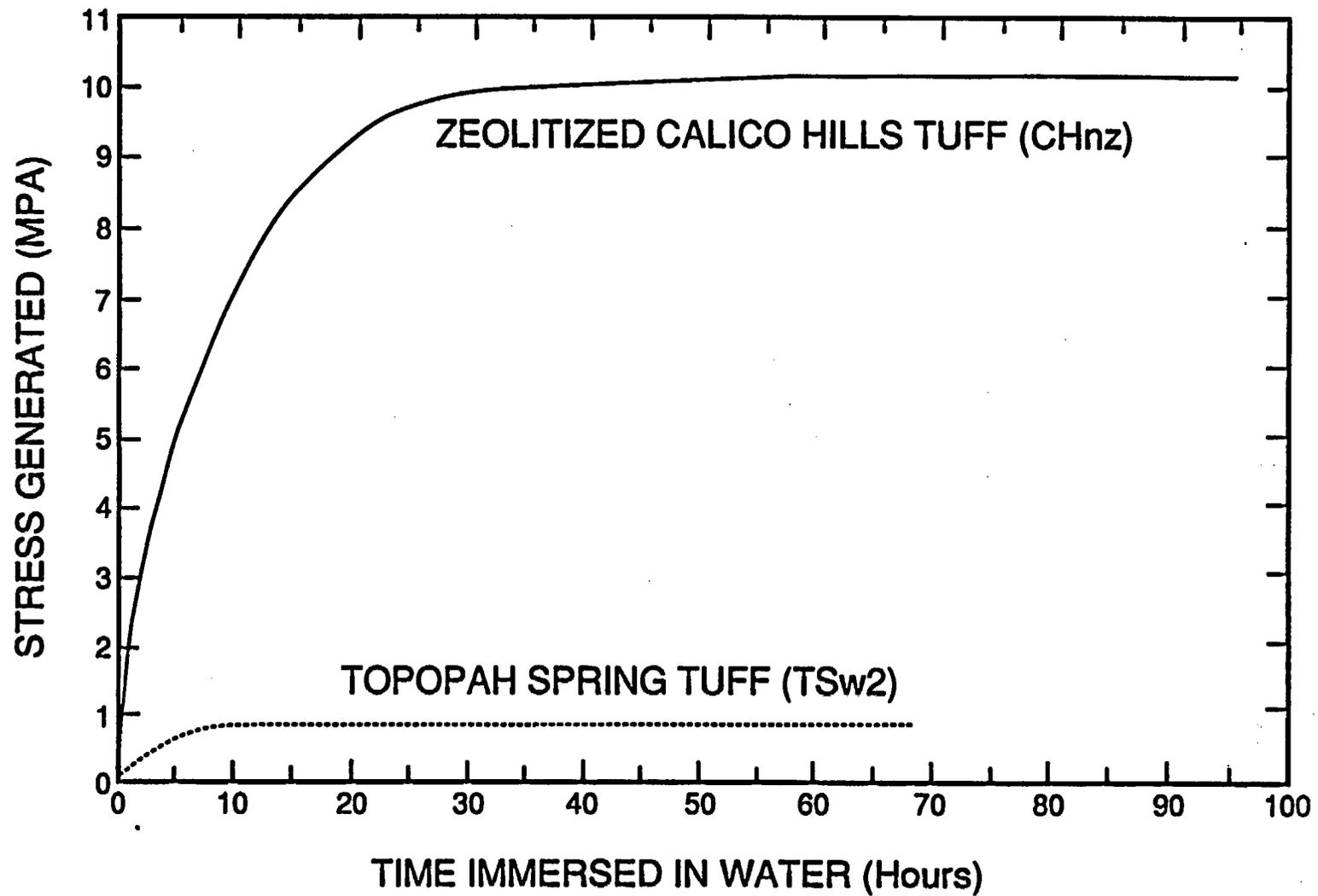
Zeolite dehydration kinetics



EFFECTS OF TEMPERATURE AND P_{H_2O} ON CLINOPTILOLITE UNIT CELL VOLUME



YUCCA MT. TUFF
AXIALLY CONFINED HYDRATION



Sorption Ratios (R_D)¹ for Heated and Unheated Clinoptilolite

	Unheated	105° C ²	200° C ²
Sr	19100 (9000)³	17000 (1800)	29000 (5200)
Cs	13700 (100)	22700 (1700)	37000 (2000)
Ba	433000 (8000)	418000 (65000)	244000 (31000)
Eu	1950 (100)	2800 (300)	2400 (100)

¹ $R_D = \frac{\text{activity on solid phase per unit mass of solid}}{\text{activity in solution per unit volume of solution}}$ (measured at 23°C)

² All heatings for 385 days, dry

³ Values in parentheses are estimated standard deviations

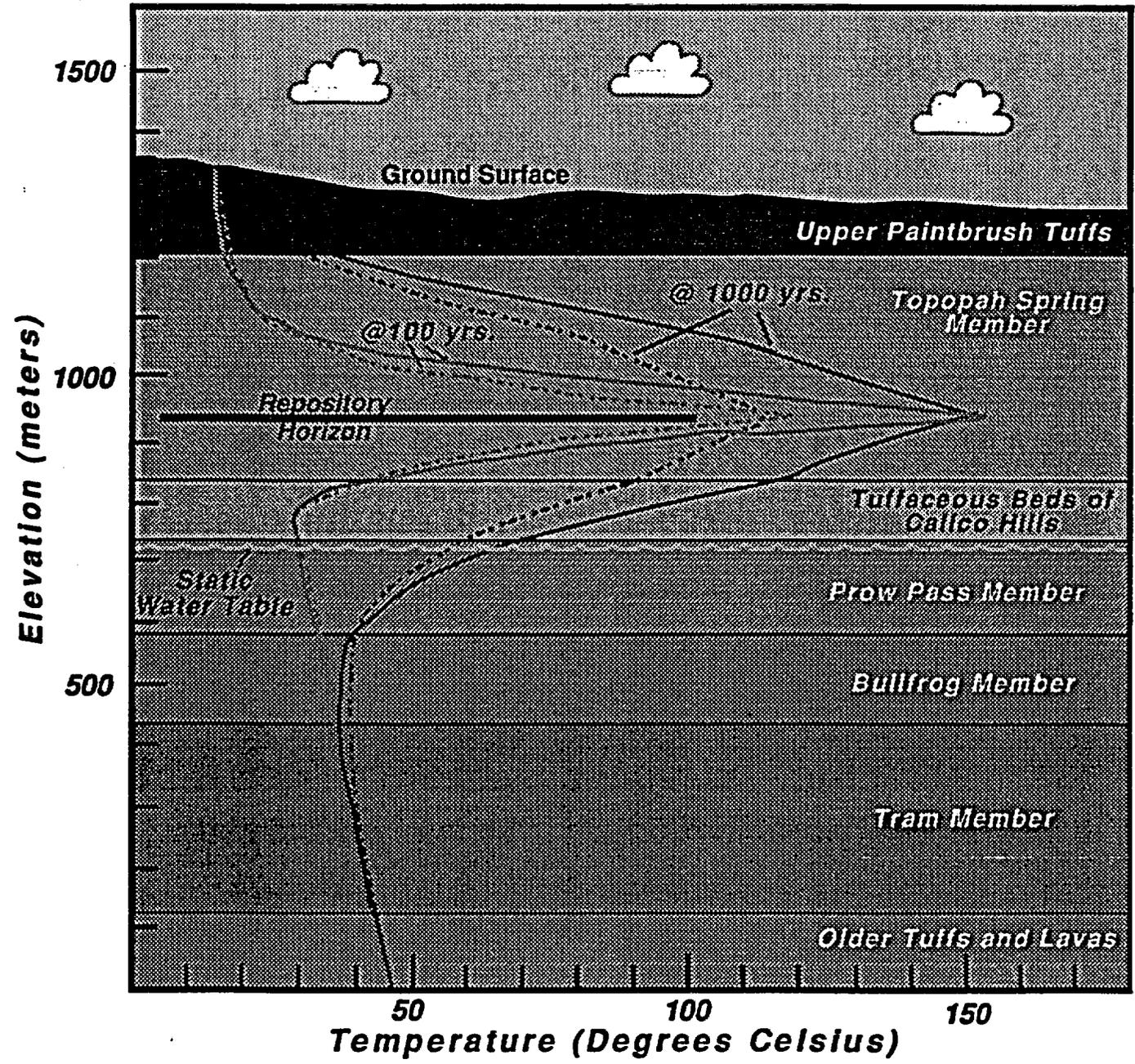
Mineral Stability (cont.)

- **Molar volume and amount of water in zeolites as $f[T,P(H_2O)]$ feed into EQ3/6 modeling at Livermore**
- **Vitrophyre dehydration**
 - significant dehydration unanticipated
 - 20% of F lost at 100°C (142 $\mu\text{g/g}$)
- **Application of mineral stability studies depends on the thermal calculations**
 - expected T-P(H_2O) history; any overpressuring?
- **Zeolites and smectites are active players when the rock is heated**
 - both zeolites and smectites reversibly give off H_2O
 - this phenomenon should be incorporated in the thermal models
- **Need zeolite volume and % H_2O at saturation (H_2O isotherm data)**

Chemical Variations in Vitrophyre Sample USW G-4 1330
 after Dry Heating for 3.3 Years
 [all values in $\mu\text{g/g}$ except Na]

	unheated	100°C	400°C
Na	2.76(14)%	2.81(14)%	2.85(14)%
Br	1-3	1-3	1-3
Cl	688(150)	693(150)	744(164)
F	733(44)	591(36)	275(17)
P ₂ O ₅	52(12)	55(13)	61(15)
S	21(5)	21(5)	23(6)

HEATING OF TUFFS IN THE VICINITY OF REPOSITORY DUE TO RADIOACTIVE DECAY OF WASTE



<p>----- APD = 57 kW/a</p> <p>———— APD = 80 kW/a</p> <p>APD = Areal Power Density</p>

Modified from Brandshaug (Figs. 6-1 and 6-2, SAND87-7079). Geologic contacts for USW G-4; position of repository and geotherms adjusted to stratigraphy in USW G-4.

Mineralogical Alteration

- **Goal is to predict the effects of repository-induced temperature and $P(\text{H}_2\text{O})$ changes on the present-day mineral assemblages.**
 - **will the zeolites transform to higher-temperature, less sorptive phases (w/ lower molar volume and H_2O content)?**
 - **e.g., will clinoptilolite transform to analcime?**
 - **will the non-welded vitric tuff of Calico Hills react if in contact with warm (or hot) water shed from the potential repository?**
 - **what times and temperatures are required to produce mineral reactions (e.g., clino to analcime, crist to quartz)?**

Information on Mineralogical Alteration

- **Using Yucca Mountain as a natural analogue**
 - deeper mineral assemblages
 - alteration zone between Topopah Spring devitrified tuff and vitrophyre
- **Deep paleohydrothermal system**
 - provide temperatures of silica phase and zeolite reactions
 - timing of alteration event (~11 Mya)
 - information on the paleohydrologic system
- **Topopah Spring alteration zone**
 - dynamic alteration, concentrated around fractures
 - alteration to clino, smectite, and silica phases occurred at 40-100°C
 - significant interactions can occur within fractures

Mineralogical Alteration (cont.)

- **Short- and long-term heating experiments as a function of T and P(H₂O).**
 - **scoping experiments under low H₂O:rock ratios (2:1)**
 - **significantly different than previous experiments done by YMP**
 - **will the nonwelded vitric Calico Hills tuff alter rapidly?**
 - **will steam conditions produce unexpected results?**
 - **provide guidance for future experiments to be done at Livermore**

Important Conclusions

- **There is no "magic" temperature, below which repository-induced heating will have no impact.**
- **Any repository-induced heating will change the water vapor pressure and will affect the zeolites and smectites.**
- **Reducing the thermal load will modify the nature and extent of these reactions, will not eliminate all reactions.**
- **The "altered zone" starts at the waste package-tuff boundary and extends out to the point where ambient conditions are reached.**

**NATURAL BARRIERS EVALUATION WORKSHOP
19-21 January 1993
Las Vegas, NV**

AGENDA

19 January 1993

- 1:00 INTRODUCTIONS: D. Hoxie (USGS),
Workshop Coordinator**
- 1:15 OPENING REMARKS: M. Voegele (T&MSS),
Assessment Team Manager**
- 1:30 WORKSHOP OBJECTIVES AND LOGISTICS: D. Hoxie**
- 1:45 OVERVIEW OF SITE GEOLOGIC SETTING: R. Spengler (USGS)**
- 2:30 BREAK**
- 2:45 OVERVIEW OF SITE UNSATURATED-ZONE
GEOHYDROLOGIC SETTING: A. Flint (USGS)**
- 3:30 OVERVIEW OF SITE SATURATED-ZONE
GEOHYDROLOGIC SETTING: W. Dudley (USGS)**
- 4:15 CONCEPTUAL REPOSITORY DESIGN: H. Dokuzoguz (M&O/Fluor)**
- 4:30 CONCEPTUAL WASTE PACKAGE DESIGN:
T. Doering (M&O/B&W)**
- 4:45 SESSION WRAP-UP**
- 5:00 ADJOURN FOR DAY**

NATURAL BARRIERS EVALUATION WORKSHOP

AGENDA (cont'd)

20 January 1993

- 8:00 RESOLVE PRELIMINARY ISSUES
- *DEFINITION OF "NATURAL BARRIER"
 - *CONCEPT OF "IMPORTANT TO WASTE ISOLATION"
 - *NATURAL BARRIER FUNCTIONAL REQUIREMENTS, CHARACTERISTICS AND PROPERTIES
- 9:45 BREAK
- 10:00 BITE THE BULLET: IDENTIFY THE SITE NATURAL BARRIERS
- 11:30 LUNCH
- 1:00 EVALUATE NATURAL BARRIERS FOR IMPORTANCE TO WASTE ISOLATION
- 3:00 BREAK
- 3:15 CONTINUE EVALUATIONS
- 4:45 SESSION WRAP-UP
- 5:00 ADJOURN FOR DAY

21 January 1993

- 8:00 COMPLETE EVALUATIONS AND DEVELOP CONCLUSIONS AND RECOMMENDATIONS
- (Breaks and lunch will be scheduled to complete workshop task and to meet scheduled mid-afternoon workshop adjournment)
- 2:30 WORKSHOP WRAP-UP
- 3:00 ADJOURN WORKSHOP

**YMP AP-6.17Q ASSESSMENT TEAM
NATURAL BARRIERS EVALUATION WORKSHOP**

INFORMATION COPY

January 12, 1993

Distribution

**NATURAL BARRIERS EVALUATION WORKSHOP PURPOSE, OBJECTIVES,
AND BACKGROUND**

The Natural Barriers Evaluation Workshop will be held in the Raytheon Services Nevada (RSN) conference room in Suite P-250 above the Yucca Mountain Site Characterization Project (YMP) Training Center in the Bank of America Center at 101 Convention Center Drive, Las Vegas, Nevada. The workshop will commence at 1:00 pm on January 19, 1993, and is scheduled to close by 3:00 pm on January 21, 1993.

Enclosed please find, for your reference, copies of (1) a draft workshop agenda and schedule; (2) the AT guidelines for conducting the workshop; (3) Section 6.1.5, "Barriers Important to Waste Isolation," from the Site Characterization Plan (SCP); and (4) a preliminary (and no doubt incomplete) list of reference documents that may be of value to support the workshop evaluations, conclusions and recommendations. The final product of the workshop will consist of a written report summarizing the workshop proceedings and deliberations and presenting the workshop conclusions and recommendations. The workshop report will be submitted to the AT for use by the AT in fulfilling its mandated responsibility to identify items for placement on the Q-List. Questions regarding the workshop should be directed to the workshop coordinators: Dwight Hoxie at (702) 794-7286 or Charlie Schlinger at (702) 794-7440.

As a follow-on from the teleconference held on January 8, 1993, the following information is being provided as background material for the workshop participants. Hopefully, this material will expedite the workshop process and stimulate rumination prior to the workshop.

A. WORKSHOP PURPOSE

In issuing NUREG-1318, "Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance

Requirements," the U.S. Nuclear Regulatory Commission (NRC) instructed the U.S. Department of Energy (DOE) to compile a Q-List for the potential repository at the Yucca Mountain Site. As defined by the DOE in Section 2.2.3 of its Quality Assurance Requirements and Description (QARD), the Q-List shall consist of a listing of the engineered items important to preclosure radiological safety, the engineered items important to postclosure waste isolation, and the natural barriers important to postclosure waste isolation. According to NUREG-1318, the natural barriers important to waste isolation are those natural barriers "which are relied on for achieving the postclosure performance objectives in 10 CFR 60 Subpart E."

By explicit statement in Section 2.2.3 of the QARD, the DOE directs that the quality assurance program shall apply to all items on the Q-List and to all activities related to items on the Q-List. In particular, the quality assurance program shall apply to the natural barriers on the Q-List and to all activities, such as site-characterization activities, that could affect the ability of a Q-Listed natural barrier to perform its waste-isolation function. It, therefore, would seem to behoove the YMP to place on the Q-List only those natural barriers (regarded as components within the overall geologic and hydrologic setting at the Yucca Mountain Site) that will be relied on to meet the repository-system postclosure performance objectives.

The task of this workshop is to perform an evaluation to identify and to delimit the vertical and lateral extent of the natural barriers important to waste isolation at the Yucca Mountain Site. This task is being conducted under the direction of the Assessment Team (AT), which, in accordance with YMP Administrative Procedure (AP) 6.17Q, has the responsibility for identifying items for placement on the Q-List.

B. WORKSHOP OBJECTIVES

The following are the specific objectives of the Natural Barriers Evaluation Workshop:

1. Explicate the concepts "natural barrier" and "important to waste isolation" based on definitions and concepts contained in existing regulatory and guidance documents.
2. Define the functional requirements to be satisfied by those natural barriers considered to be "important to waste isolation," for example:
 - a) To prevent or discourage human intrusion;

- b) To geochemically or physically retard the migration of water-borne or air-borne radionuclides;
 - c) To impede the movement of groundwater into the repository environment and from the repository to the accessible environment.
3. Identify the features, characteristics, properties, and conditions to be possessed by a natural barrier in order to perform a waste-isolation function.
 4. Identify the natural barriers at the Yucca Mountain site, i.e., the individual components of the natural barrier system.
 5. Evaluate each natural barrier with respect to its importance for waste isolation.
 6. Identify and delimit the lateral and vertical extent of those natural barriers to be relied on to meet the repository-system postclosure performance objectives and, thus, to be recommended for placement on the Q-List.
 7. Identify appropriate management controls to be placed on those natural barriers that are not recommended for placement on the Q-List.
 8. Document the rationale and justifications for the decisions made in objectives 6 and 7 above with specific reference to published data and analyses.
 9. Identify information needs to guide a longer-term, quantitative, performance-based evaluation of the natural barriers.

C. REGULATORY BASIS

The designation of natural barriers as being important to waste isolation derives from the following subparts of 10 CFR 60:

1. 10 CFR 60.102(e)(2)

"Following the containment period special emphasis is placed upon the ability to achieve isolation of the wastes by virtue of the characteristics of the geologic repository. The engineered barrier system works to control the release of radioactive material to the geologic setting and the geologic setting works to control the release of radioactive material to the accessible environment. *Isolation* means inhibiting the transport of radioactive material so that amounts and

concentrations of the materials entering the accessible environment will be kept within prescribed limits."

2. 10 CFR 60.112

"The geologic setting shall be selected and the engineered barrier system and the shafts, boreholes and their seals shall be designed to assure that releases of radioactive materials to the accessible environment following permanent closure conform to such generally applicable environmental standards for radioactivity as may have been established by the Environmental Protection Agency with respect to both anticipated processes and events and unanticipated processes and events."

3. 10 CFR 60.113(a)(2)

"The geologic repository shall be located so that prewaste-emplacement groundwater travel time along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment shall be at least 1,000 years or such other travel time as may be approved or specified by the Commission."

D. DEFINITIONS OF "NATURAL BARRIER"

The term "natural barrier" is not defined explicitly in either 10 CFR 60 or NUREG-1318. The term "barrier" however, is defined in both 10 CFR 60 and NUREG-1318 to be "Any material or structure that prevents or substantially delays movement of water or radionuclides." The term "natural barrier" has been defined variously in YMP documents as follows:

SCP, Page G-67: "The physical, mechanical, chemical, and hydrologic characteristics of the geologic environment that individually and collectively act to minimize or preclude radionuclide transport."

AP-6.17Q, Revision 1: "A geologic entity whose physical, mechanical, chemical and hydrologic characteristics individually and collectively act to inhibit, minimize or preclude radionuclide transport."

Sandia National Laboratories Report SLTR 92-9004: "Any geologic system component that prevents or substantially delays the movement of water or radionuclides."

A first task of the workshop will be to reconcile and consolidate these proffered definitions of "natural barrier" in order to ensure that all of the workshop

participants share a common understanding of the term "natural barrier" as well as of the concept "important to waste isolation."

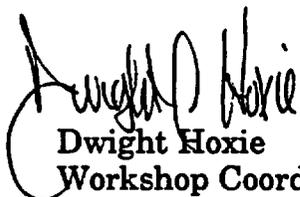
E. PERFORMANCE ALLOCATIONS

The allocation of performance to the natural barrier system at the Yucca Mountain site is described in overview in section 6.1.5, "Barriers Important to Waste Isolation," on pages 6-80 and 6-81 of the SCP (Enclosure 3) and presented quantitatively in the performance allocation tables, Tables 8.3.5.12 and 8.3.5.13, of the Yucca Mountain Site Characterization Program Baseline (SCPB). The workshop participants need to be cognizant of these allocations. It is recognized that one possible outcome of the workshop evaluations may be identifying a need to revisit and update these performance allocations based on the availability of new data and information.

F. BASIS INFORMATION

To the extent possible, the workshop evaluations, conclusions, and recommendations need to be supported by published quantitative data and analyses. Part of the workshop product will be a list of references cited as basis information on which the workshop evaluations rely. The basis information will be submitted to the AT for inclusion on the Assessment Team Controlled List (ATCL) in accordance with AP-6.17Q.

The workshop participants are requested to supply references to published documents and papers that can be cited to support the workshop evaluations, conclusions, and recommendations, in addition to or instead of any of the documents cited on the enclosed preliminary reference list.


Dwight Hoxie
Workshop Coordinator

DH:CS:mec:L93-767

Enclosures:

- 1. Draft workshop agenda and schedule**
- 2. AT guidelines for conducting workshop**
- 3. Section 6.1.5 from the SCP**
- 4. List of reference documents**

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Yucca Mountain Site Characterization Project
Assessment Team Manager Guidelines
for
Early Classification of Natural Barriers

Revision 0
January 8, 1993

Prepared by: M D Voegelé Date 1-8-93
M. D. Voegelé, Assessment Team Manager

Approved by: Maxwell Blanchard Date 1-11-93
M. B. Blanchard, Deputy Project Manager

Yucca Mountain Site Characterization Project
Assessment Team Manager Guidelines
for
Early Classification of Natural Barriers

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1.0 INTRODUCTION

The Assessment Team Classification of Items Management Plan (YMP/92-25) instructs the Assessment Team (AT) to compile the Q-List of Items of Interest to Safety (IITS), and Items Important to Waste Isolation (IITWI). In compliance with this directive and in accordance with Administrative Procedure (AP) 6.17Q, the AT is now focusing on identifying those natural barriers that are important to waste isolation. The AT's recommended approach for classification of the natural barriers includes both a near-term and a long-term goal. As a near-term goal, the AT will perform an early AT classification through use of experts, as required, and development of defensible technical rationale, using such supporting calculations as can be provided. The long-term goal would utilize analyses to be performed by Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) Performance Assessment staff and would provide a refined quantitative basis for classification. Both near-term and long-term goals include establishing the appropriate lateral extent for each of the natural barriers.

These guidelines describes the AT processes for conducting an early classification of the natural barriers at the Yucca Mountain Site Characterization Project (YMP) and developing recommendations for inclusion of candidate natural barriers on the Q-List.

This document is not Quality Affecting (QA), but the procedures, lists, and records produced by its implementation are considered to be QA. All resulting documents shall be prepared and processed in accordance with the provisions of AP-6.17Q, section 6.0.

Background

Under Revision 0 of AP-6.17Q, a set of natural barriers was identified, using the Site Characterization Program Baseline as basis information, and listed in Appendix A of the Q-List. No evaluations were performed, nor were criteria developed for justifying either the identification of a natural barrier, or its importance to waste isolation. Working now to Revision 1 of AP-6.17Q, the AT intends that the early classification, as described here, will provide the necessary basis information, including the reasons for the selected classification, to ensure that adequate and appropriate controls are imposed on site-characterization activities that may adversely impact a natural barrier's ability to isolate waste at the YMP.

Because the Quality Assurance Requirements Document (QARD), U.S. Department of Energy (DOE)/RW-0333P, Rev. 0, considers the natural barriers, to be IITWI and, thus, to be included in the Q-List, this early classification effort will provide a description of the basis for the placement on the Q-List of those natural barriers to be relied on to meet the post-closure performance objectives of the repository system. This is an important aspect of the product of this effort, because it will allow affected organizations to perform evaluations of the importance of their activities relative to these natural barriers.

Objective and Scope of Guidelines

The objective of these guidelines is to describe the process by which the AT will perform an early classification of the natural barriers at the YMP. The process for achieving the long term goal of developing a quantitative basis will be covered in a plan to be prepared by the Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O)

Assumptions

The key assumptions underlying this effort are as follows:

1. There presently exists sufficient site characterization and performance assessment data and information to perform a preliminary evaluation of the natural barriers.
2. Personnel within the YMP are sufficiently acquainted with this data and information and possess the expertise and qualifications to perform the required evaluation.

2.0 TECHNICAL APPROACH

Description

The early classification of natural barriers will be performed under AP-6.17Q as elaborated on in the following approach:

1. The AT will identify the performance objectives and functional requirements, to be satisfied by the natural barrier system.
2. The Assessment Team Manager (ATM) will develop the detailed selection criteria to be used to determine the selection of natural barriers to be considered for placement on the Q-List, in accordance with step 8 of section 5 of AP-6.17Q (Rev. 1).
3. The DOE will impanel a group of experts from within the YMP to participate in a Natural Barriers Evaluation Workshop, in order to complete steps 16 and 17 of Section 5 of AP-6.17Q (Rev. 1).
4. The Natural Barriers Evaluation Workshop experts and the AT will propose candidate basis information to be used in this evaluation.
5. The AT will establish a classification package identifying the basis information accepted for use in the evaluation, and the basis information will be added to the Assessment Team Controlled List.
6. The Assessment Team Support Staff (ATSS) will provide the experts with copies of all basis information selected.

7. The experts will convene in a workshop to evaluate the basis information and achieve the following objectives during a three (3) day workshop.
 - a. Explicate the concept of a natural barrier.
 - b. Identify the characteristics/properties that render a natural barrier important to waste isolation, e.g.,
 - * Prevent/discourage human intrusion
 - * Retard radionuclide migration
 - * Impede ground-water flow.
 - c. Identify the natural barriers at Yucca Mountain, including their vertical and lateral extent.
 - d. Evaluate and justify the importance of each natural barrier to waste isolation.
 - e. Identify those natural barriers that can be relied upon to meet post closure performance objectives.
 - f. Identify appropriate management controls to be placed on the remaining natural barriers.
 - g. Develop guidance for the long-term performance-based evaluations.
8. The AT support staff will prepare IITWI analysis/evaluation package, in accordance with step 18 of Section 5 of AP-6.17Q (Rev. 1), and provide it to the workshop experts for their concurrence. This will provide a QA record of the workshop.
9. The AT will review the basis information in accordance with ILP 1.2/OPM-Q and review the IITWI analysis/evaluation package per step 18, of Section 5, AP-6.17Q.
10. The AT will make a determination as to whether the natural barriers can be classified with the available information, or should be put on the Q-List by direct inclusion until further analysis is performed.
11. The AT will prepare and transmit a recommendation on the early classification of natural barriers to the Yucca Mountain Site Characterization Project Office (YMPO).
12. Following review and acceptance of the recommendation (or direction provided), the process of modifying the Q-List to reflect the recommendation/direction will be initiated.

3.0 ORGANIZATION, RESPONSIBILITIES, AND AUTHORITIES

Assessment Team and Support Staff

The AT Manager, AT Members and the ATSS shall have principal responsibility for conducting the activities identified here. Per YMP/92-25, the AT staff report to the YMPO Deputy Project Manager (DPM).

The ATSS will provide a facilitator and a recorder to assist with the workshop. The facilitator will ensure that the workshop format allows for expression of the views of each participant. A recorder will be present to document the workshop deliberations and discussions, including any conclusions and recommendations.

Participant Organizations

The YMP Participant Organizations will be requested to provide technical personnel to participate in the Natural Barriers Evaluation Workshop. The workshop members will work in accordance with this guideline, as directed by the AT. These technical personnel shall possess one or more of the following qualifications:

1. knowledge of the results of presently available performance assessment calculations and analyses,
2. awareness of the geohydrologic conditions and processes, and of the transport properties of the geologic media at the YMP,
3. awareness of the geochemical conditions, processes and properties at the YMP,
4. knowledge concerning the potential consequences of post-closure repository conditions, processes, and environments.

4.0 SCHEDULE (1993)

Schedule

Figure 1 presents the logic and schedule for the activities involved in the Early Classification of Natural Barriers (ECNB) effort.

Milestones

<u>Description</u>	<u>Date</u>	<u>Completion Criteria</u>
Approve ECNB Guidelines	1/8/93	DPM Acceptance
Identified Workshop	1/8/93	Letter from Technical Project Officers Members
Workshop	1/19-21/93	N/A
IITWI Package	1/27/93	AP-6.17Q Requirements
AT Recommendation	1/29/93	ILP/1.1

5.0 RESOURCES

Staff/Personnel

The following staff/personnel will participant in the performance of this effort.

Assessment Team Manager and Members

The AT Manager and Members, as established per the Assessment Team Classification of Items Management Plan, YMP/92-25, functions will be as required in YMP/92-25.

Assessment Team Support Staff

The ATSS, under the Technical and Management Support Services (T&MSS) scope of work, will provide both administrative support, management (including project engineering support) and technical expertise

Participant Organizations

Staff with expertise in geologic sciences and performance assessment will be provided by the following organizations:

Lawrence Livermore National Laboratory (LLNL)
 Los Alamos National Laboratory (LANL)
 United States Geological Survey (USGS)
 Sandia National Laboratory (SNL)
 Civilian Radioactive Waste Management System Management
 and Operating Contractor (CRWMS M&O)

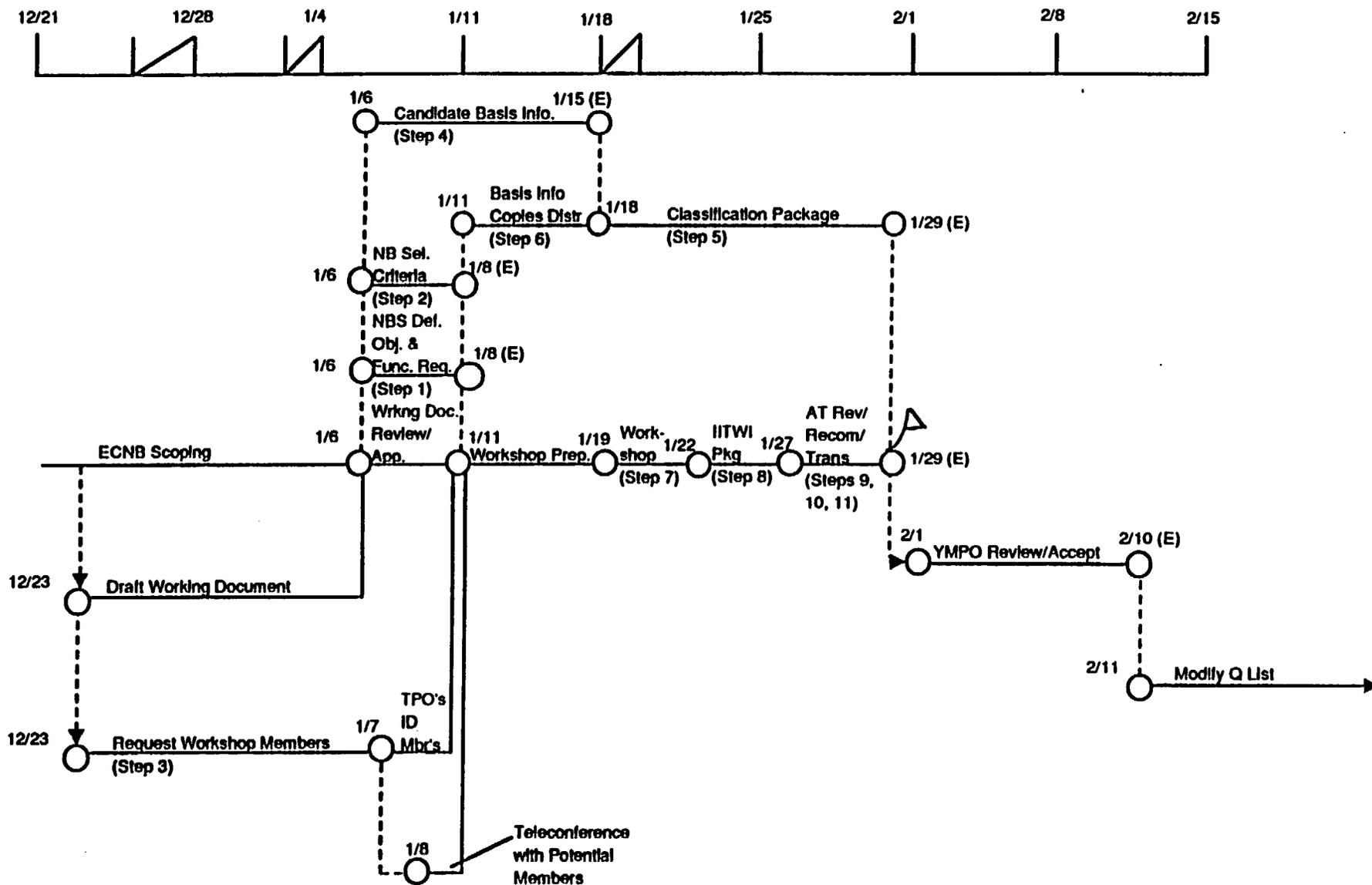


Figure 1: EARLY CLASSIFICATION OF NATURAL BARRIERS SCHEDULE

Technical Material/Information

The following material and information will be provided to the workshop members:

AP-6.17Q: Classification of Items Important to
Safety and Waste Isolation
These Guidelines: ATM Guidelines for Early Classification of
Natural Barriers
Selected Basis Information

6.0 DELIVERABLES

The results of the workshop will be documented by the ATSS in a letter report to the AT Manager, due 1/27/93.

The AT will prepare and transmit a recommendation on the early classification of natural barriers to the YMPO, due 1/29/93, for YMPO review/acceptance.

7.0 REQUIREMENTS

As this early classification of natural barriers effort is a quality affecting activity, following are the requirements and management controls.

Management Basis for Task Completion

Letter Michael D. Voegele to Carl P. Gertz, (AT-692-016) dated 12/15/92, Assessment Team Approach for Evaluation of Natural Barriers

Letter Carl P. Gertz to Technical Project Officers, (YMP:RVB:1731), dated 1/4/93, Request for Technical Assistance to Support YMPO AT evaluation of Natural Barriers Important to Waste Isolation.

AT Classification of Items Management Plan, YMP/92-25
QARD, DOE/RW-0333P, Rev. 1

Qualification Requirements for ECNB Workshop Participants

Qualification letter from organizations in technical areas of expertise.

Qualification Requirements for AT and ATSS

AP-6.17Q Classification of Items, Important to
Safety and Waste Isolation, Rev. 1
ILP-1.1 Assessment Team Conduct of Business
ILP-1.2 Assessment Team Controlled List
QAP-6.2 Document Review

Technical Directives:

Organizations involved in the performance of this effort will be working in accordance with the following Technical Directives.

LLNL:	LLNL-93-001
LANL:	LANL-93-001
USGS:	USGS-93-001
SNL:	SNL-93-002
CFWMS M&O:	TRW-93-003
T&MSS:	SAIC-93-002

8.0 MONITORING

The ATM will be responsible for determining the status of progress of the task on a weekly basis. Monitoring will include providing the status of progress in completion of the activities detailed in these guidelines.

Funding assigned to organizations in accordance with the Technical Directives will be monitored as part of current YMPO requirements and as detailed in participant organizations' Contract Management Control Systems (CMCS) procedures. Status reporting will occur on a monthly basis as required in YMPO procedures.

9.0 REPORTING

The AT Manager will provide the YMPO DPM and Assistant DPM with verbal reports on a weekly basis, targeted for Tuesday afternoons. This status will present the progress toward completion of the scope and schedule for the effort as detailed in the current revision of these guidelines.

Status of use of funding resources will be provided to the YMPO through the existing participant CMCS and YMPO Planning and Control System reporting cycles.

10.0 CHANGE CONTROL

This document represents the guidelines for the Early Classification of Natural Barriers effort. As such, when variances, new direction, or impacts from internal and external factors are identified during monitoring, the ATM is responsible for changing these guidelines. The ATM will assess the variance, present corrective action recommendations to the DPM and Assistant DPM (ADPM), and implement subsequent direction from the DPM/ADPM.

DECEMBER 1988

6.1.5 BARRIERS IMPORTANT TO WASTE ISOLATION

Barriers important to waste isolation are defined by the DOE (DOE, 1987c) as the barriers, structures, systems, and components that are relied on to achieve the postclosure performance objectives in 10 CFR 60, Subpart E. The engineered barriers that meet this definition are placed on the Q-list. The natural barriers that meet this definition are not placed on the Q-list, because they cannot be designed. Instead, their ability to isolate the waste is given special protection through an "activities list," which contains all the activities that might adversely affect the natural barriers and for which design criteria are not meaningful.

The identification of barriers important to waste isolation is accomplished through the performance-allocation process. Barriers at the Yucca Mountain site that satisfy the definition have, therefore, been identified by examining the performance allocations in Chapter 8 of this document. Each of the four postclosure performance objectives is represented by an issue in the issues hierarchy and a corresponding section in Chapter 8. In that section is a performance allocation, which selects the barriers that the DOE currently expects to rely on for demonstrating, in the license application, that the performance objective will be met. The engineered barriers named in the allocation are placed on the Q-list; the natural barriers receive protection through the activities list.

The first performance objective in 10 CFR 60.112 deals with the allowable releases of radioactivity from the repository to the accessible environment. Section 8.3.5.13, which treats this performance objective as Issue 1.1, describes the plans for demonstrating that this performance objective will be met. The performance allocation for Issue 1.1 relies largely on natural barriers: the saturated and unsaturated zones. The primary reliance is on the unsaturated zone; the principal unsaturated zone rock units in this allocation are the Calico Hills nonwelded zeolitic unit and the Calico Hills nonwelded vitric unit. The waste package, an engineered barrier, is relied on as a primary barrier only for releases of gaseous radionuclides. From these allocations, the waste package would be proposed for inclusion on the Q-list. The waste package, however, consists of two subelements: the waste container and the waste form inside the container. The waste form does not appear on the Q-list, because it will not be engineered as part of the repository design. The waste container is, therefore, proposed for inclusion on the Q-list of items important to isolation. The proposed activities list includes the activities that have a potential for adversely affecting the waste-isolation capabilities of the Calico Hills nonwelded zeolitic unit, the Calico Hills nonwelded vitric unit, the saturated zone, and the overburden.

The second performance objective in 10 CFR 60.113 deals with the time during which the waste package must provide substantially complete containment of the high-level waste. Section 8.3.5.9, which treats this performance objective as Issue 1.4, allocates performance to the emplacement environment of the waste package, which is the Topopah Spring welded unit in the immediate vicinity of the emplaced waste; to the waste container; and, to the waste form inside the container. This allocation suggests that the waste container should be placed on the Q-list of items important to waste isolation. For the reason given above, the waste form does not appear on the

Q-list. Activities that have the potential for adversely affecting the waste-isolation capabilities of the Topopah Spring welded unit are placed on the activities list.

The third performance objective in 10 CFR 60.113 deals with the allowed releases from the engineered-barrier system. Section 8.3.5.10, which treats this performance objective as Issue 1.5, allocates performance to the emplacement environment of the waste package, which is the Topopah Spring welded unit in the immediate vicinity of the emplaced waste, and to the waste form. This allocation suggests no additions to the Q list or the activities list beyond those suggested by the first two performance objectives.

The fourth performance objective in 10 CFR 60.113 deals with the required ground-water travel time at the repository site. Section 8.3.5.12, which treats this performance objective as Issue 1.6, allocates primary performance to the Calico Hills nonwelded zeolitic unit and the Calico Hills nonwelded vitric unit. It allocates secondary performance to the Topopah Spring welded unit and to the saturated zone. In addition, auxiliary reliance is allocated to the Prow Pass welded unit, the Prow Pass nonwelded unit, the Bullfrog welded unit, and the Bullfrog nonwelded unit. The allocation in Section 8.3.5.12, therefore, suggests the addition to the activities list of activities that may adversely impact the waste isolation capabilities of the Prow Pass welded unit, the Prow Pass nonwelded unit, the Bullfrog welded unit, and the Bullfrog nonwelded unit.

In summary, the proposed Q-list for items important to waste isolation, which was used for this design, contained the waste container. The proposed activities list will include activities that have the potential for significantly adversely affecting the waste-isolation capabilities of the Topopah Spring welded unit, the Calico Hills nonwelded zeolitic unit, the Calico Hills nonwelded vitric unit, the Prow Pass welded unit, the Prow Pass nonwelded unit, the Bullfrog welded unit, the Bullfrog nonwelded unit, and the saturated zone. The development of the proposed list is discussed in Section 8.6.

6.2 CURRENT REPOSITORY DESIGN DESCRIPTION

This section summarizes the current repository conceptual design. The design information reflects current design concepts being considered for the Yucca Mountain repository site. These concepts include both the vertical, which is the reference configuration, and the horizontal emplacement configurations. The design descriptions make reference to design documents and focus on design features that are influenced by site characteristics. Where uncertainties in site or other SCP-related design parameters are identified, plans for bounding design parameters or for performing preliminary sensitivity analyses are referenced.

**Tentative List of Basis Information Sources for
Early Classification of Natural Barriers**

Technical Summary of the Performance Assessment Computational Exercises for 1990 (PACE-90); Vol. 1: "Nominal Configuration" Hydrogeologic Parameters and Computational Results. SAND90-2726.

A Three-Dimensional Model of Reference Thermal/Mechanical and Hydrological Stratigraphy at Yucca Mountain, Southern Nevada. SAND84-1076.

Disturbance Criteria for Items Important to Waste Isolation: A Methodology and an Application to Unconsolidated Surficial Deposits. SLTR 92-004.

Preliminary Evaluation of the Subsurface Areas Available for a Potential Waste Repository at Yucca Mountain. SAND84-0175.

Estimation of Hydrologic Properties of an Unsaturated, Fractured Rock Mass. SAND84-2642

Estimation of the Limitations for Surficial Water Addition Above a Potential High Level Radioactive Waste Repository At Yucca Mountain, Nevada. SAND91-0790.

Numerical Studies of Rock-Gas Flow in Yucca Mountain. SAND91-7034.

Estimation of the Impact of Water Movement From Sewage and Settling Ponds Near a Potential High Level Radioactive Waste Repository At Yucca Mountain, Nevada. SAND91-7092.

Definitions of Reference Boundaries for the Proposed Geologic Repository at Yucca Mountain Nevada. SAND86-2157.

Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain. SAND87-7202.

The Effect of Percolation Rate On Water-Travel Time In Deep, Partially Saturated Zones. SAND85-0854.

TSPA 1991: An Initial Total-System Performance Assessment for Yucca Mountain. SAND91-2795.

Pre-Waste-Emplacement Ground-Water Travel Time Sensitivity and Uncertainty Analyses For Yucca Mountain, Nevada. SAND92-0461.

Conceptual Hydrologic Model of Flow in the Unsaturated Zone, Yucca Mountain, Nevada. USGS Water Resources Investigations Report 84-4345.

Preliminary Permeability and Water-Retention Data for Nonwelded and Bedded Tuff Samples, Yucca Mountain Area, Nye County, Nevada. USGS OFR 90-569.

An Example Postclosure Risk Assessment Using the Potential Yucca Mountain Site. PNL-8081.

Monitoring the Vadose Zone in Fractured Tuff, Yucca Mountain, Nevada. Proceedings of the NWWA Conference on Characterization and Monitoring of the Vadose (Unsaturated) Zone.

The four references below can be used to obtain currently baselined conceptual design information for both the potential waste package and potential repository. One should keep in mind that other designs are being developed as part of Advanced Conceptual Design, and changes are anticipated in both the repository and the waste package. For the Early Classification Workshop, these four documents can be referenced.

Controlled copies of all four documents will be available in Room 257 of the Bank of America Center Building (BAC).

Yucca Mountain Site Description (Basis for SCP Chapter 8). YMP/CM-0008.

Conceptual Design of a Repository (Basis for SCP Chapter 8). YMP/CM-0009.

Waste Package Design Basis (Basis for SCP Chapter 8). YMP/CM-0010.

Yucca Mountain Site Characterization Program Baseline. YMP/CM-0011.

NATURAL BARRIERS WORKSHOP PARTICIPANTS

NAME	ORG	PHONE #	FAX #
Bingham, Felton	SNL/6312	505 844 8816	505 844 1321
Cloke, Paul	T&MSS	702 794 7823	702 794 7008
Dudley, William	USGS/Denver	303 236 5048	303 236 5046
Duguid, James	M&O/Vienna	703 204 8851	703 204 8530
Flint, Alan	USGS/LV	702 295 5805	702 295 5989
Pendleton, Martha	M&O/WCFS	702 794 1828	702 794 1843
Revelli, Michael A	LLNL	510 532 1982	510 532 0540
Spengler, Rick	USGS/Denver	303 236 4920	303 236 5046
Vaniman, David	LANL	505 667 1863	505 665 328
VanLuik, Abe	M&O/Intera	702 794 7441	702 794 1843
Yunker, Jean	M&O/TRW	702 794 7650	702 794 1843

COORDINATORS

Hoxie, Dwight	USGS/LV	702 794 7286	702 794 7090
Schlinger, Charlie	T&MSS	702 794 7440	702 794 7008

FACILITATOR

McAdam, Ted	T&MSS	702 794 7268	702 794 7008
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TPO MEETING

Presented By

CARL GERTZ
PROJECT MANAGER

DECEMBER 11, 1992

Enclosure 4A

TOPICS

- **November 30 - Start of ESF site preparation**
 - ESAAB - November 16, 1992
- **'93 Yucca Mountain Budget Distribution**
 - OMB Budget Meeting (FY94) - November 12
- **NWTRB/ESF Meeting - November 4-5**
- **Convergence Task Force Update**
- **Recent Public Interactions**
- **OCRWM Fellowship Program**
- **Upcoming Events**

NOVEMBER 30, 1992
START OF ESF SITE PREPARATION

YUCCA MOUNTAIN PROJECT BUDGET DISTRIBUTION

**YMP
F/Y 1993 BUDGET SPLITS(\$K)**

DATE:
10-Dec

REECO LBL PNL USGS EGG DRI TMSS RSN LANL M&O LLNL SNL OTHER TOTAL

121	MGDS M&I	101			85			60	40	5048	175	165		5674	
122	WASTE PACKAGE									1560	6630	51		8241	
123	SITE	9277	506	300	18072	50		5631	1800	8934	1983	380	1292	1157	49382
124	REPOSITORY									2276		2077		4353	
125	REGULATORY	55	885	150	1055	2320		460	20	700	11260	1267	5153	361	23686
126	EXPLORATORY STUDIES FACILITY	31105						80	2521	1531	12905		202	134	48478
127	TEST FACILITIES	4099						2420	1440					1000	8959
129	PROJECT MANAGEMENT	1250			1450			2883	1340	1100	6706	1225	1204		17158
1210	FINANCIAL & TECH ASSISTANCE													17600	17600
1211	QA	1404			1900			839	1050	1200	1649	726	1184		9952
1212	INFORMATION MGMT	350			536			4750	150	748	3866	250	642		11292
1213	ENV, HEALTH & SAFETY	986			450	2950	800	7670	100		398			145	13499
1214	INSTITUTIONAL							3150			353				3503
1215	SUPPORT SERVICES	4621			250	176		6765	800	553	3105	483	518	546	17817
	YMP UNFUNDED LIABILITIES													3066	3066
PARTICIPANT TOTAL.		53248	1391	450	23798	5496	800	34648	9281	14806	51109	11136	12488	24009	242660

**NWTRB/ESF MEETING
NOVEMBER 4-5, 1992**



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Agenda

Panel on Structural Geology & Geoengineering Workshop on the Exploratory Studies Facility (ESF) Design and Construction Strategy

Plaza-Suite Hotel
4255 South Paradise
Las Vegas, NV 89109
(702) 369-4400

November 4 & 5, 1992

The Nuclear Waste Technical Review Board's (the Board) fourth and fifth reports to Congress and the Secretary of Energy discuss the need for access to the underground as a key part of the early assessment of the suitability of Yucca Mountain as a potential site for a deep geologic repository for the nation's spent nuclear fuel and defense high-level waste. The reports also recommended that strategies be developed to allow underground construction and testing to proceed with reduced budgets. In recent months, the Board has emphasized the need to minimize start-up costs of tunneling so that limited funds could be applied to starting tunneling with a single tunnel boring machine in late fiscal year (FY) 1993 or early FY 1994. The Department of Energy (DOE) has recently allocated the FY 1993 funds and developed plans to accomplish such a result. The purpose of this Board-sponsored workshop is to define and discuss the technical merits, costs, and schedules of strategies for underground construction and testing in the ESF.

This workshop is organized around four sessions that are intended to bring together construction, testing, and management perspectives. In an effort to seek broad and open participation, a major portion of each session is devoted to round-table discussions following minimum introductory presentations.

Wednesday, November 4, 1992

8:00 A.M. **Welcome**
 Clarence R. Allen
 Nuclear Waste Technical Review Board (NWTRB)

Opening Remarks
John E. Cantlon
Chairman, NWTRB

Overview and Intent of the Workshop
Edward J. Cording, NWTRB

Telephone: 703-235-4473 Fax: 703-235-4495

Wednesday, November 4, 1992 - continued

Session 1 begins with an introductory presentation that will briefly review the baseline configuration, construction sequence, cost, and schedule for the ESF. This will be followed by a short presentation of the proposed FY 1993 plans for proceeding with the development of the ESF. The round-table discussion follows, with active participation by all attendees encouraged.

Baseline Configuration

William Simecka, Department of Energy (DOE)

- ESF preliminary design
- Phased approach to implementing the baseline configuration
- Baseline cost and schedule

FY 1993 Approach for Developing the ESF

**Carl Gertz, Yucca Mountain Site Characterization
Project Office (YMPO)**

- FY 1993 Yucca Mountain Project \$244.7M budget
- Early access to the underground

Round-table Discussion

Given reduced budgets, what strategies can be defined to allow the construction of the baseline configuration, and surface and underground site-characterization programs to proceed toward the goal of early determination of site suitability and efficient ESF development?

Approaches to constructing the baseline configuration (layouts, methods, phasing, costs, and schedules) for:

- Portals, surface facilities, site preparation
- Ramps and access drifts to main test level
- Access to Calico Hills and other levels
- Excavation of side drifts and tunnel enlargements
- Constraints on construction of the ESF/proposed repository site: organics, concrete, shotcrete, grouts, water, potential for subsidence
- Nuclear weapons testing facility construction standards applied to the ESF
- Utilities (power lines, vent line, fire/water line, cable trays, etc.)
- Safety codes

Alternatives strategies for developing the ESF:

- Maximizing use of tunnel boring machines
- Size and turn radius of access tunnels
- Geometry and location of alcoves
- Excavating alcoves and turnouts

Wednesday, November 4, 1992 - continued

- Ventilation requirements
- Excavation slopes, mucking, and transportation
- Construction of separate access to the Calico Hills formation

KEY PARTICIPANTS:

Carl Gertz, YMPO

Thomas Statton, Woodward/Clyde, Management & Operations (M&O)

Thomas Blejwas, Sandia National Laboratories

Neil Dahmen, The Robbins Company

Lok Home, Boretec, Inc.

James Friant, Colorado School of Mines

Joseph Sperry, NWTRB consultant

Hugh Cronin, NWTRB consultant

S.H. Bartholomew, NWTRB consultant

11:45 A.M. LUNCH

12:45 P.M. Overview of Session 2 - Exploration and Testing

A key part of the ESF development strategy is the definition of what early exploration and testing are needed, and how the ESF can best be used to accomplish key elements of the site-suitability and site-characterization programs. The session will start with a presentation on integrated testing evaluation, followed by a presentation on the need for an alternative testing facility and its functions. Round-table discussion by all workshop participants will then explore the proposed tests to be conducted in the ESF and their relevance to the issue of early assessment of site suitability.

Integrated Testing Evaluation

Russ Dyer, DOE

- Early testing priorities

Why an Alternative Testing Facility?

William Simecka, DOE

- Thermal testing
- Excavation testing

Round-table Discussion

Testing to be conducted in the ramps, alcoves, main test level, and in Calico Hills formation

- What are we testing for?
 - Regulatory compliance?
 - Scientific confidence through exploration?
 - Scientific confidence through testing?

Wednesday, November 4, 1992 - continued

- What should be the early, high priority objectives for observation or testing in the ESF?
- What are the testing priorities and requirements for:
 - observations across faults?
 - observations across lithologic boundaries?
 - observations in ramps and drifts?
 - testing in alcoves?
 - underground drilling and testing?
 - main test level activities?
- Can the tunnel boring machine be advanced through the ESF without delays for testing?
- How can a balance between surface-based and underground testing be maintained?
 - Where does required testing in deep, dry drillholes fit in?
 - Can the ESF be used for tests that were formerly part of the surface-based program?
- What should be the timing of access to the Calico Hills?
- Should there be direct access to Calico Hills outside the geologic repository operational area?
- Should early access to Pah Canyon be considered?
- What are the constraints on construction of the ESF/proposed repository site in terms of organics, concrete, shotcrete, grouts, water, and potential for subsidence?

KEY PARTICIPANTS:

William Simecka, DOE

Russell Dyer, DOE

Uel Clanton, DOE

Lawrence Hayes, U.S. Geological Survey

Thomas Staston, Woodward/Clyde (M&O)

Scott Sinnock, TRW (M&O)

Ned Elkins, Los Alamos National Laboratory

Dale Wilder, Lawrence Livermore National Laboratory

Thomas Blejwas, Sandia National Laboratories

6:00 P.M.

RECESS

Thursday, November 5, 1992

8:00 A.M. Overview of Session 3 - Management and Acquisition Strategies

This session is directed toward a review of the process of design, construction, construction management, contract type, and possible alternative means of obtaining an early delivery of construction at minimum cost. The session opens with a short presentation explaining the current process being used at Yucca Mountain in terms of roles, responsibilities, and authority.

**The Yucca Mountain ESF Design and Construction Program -
Management and Implementation
William Simecka, DOE**

Round-table Discussion

Alternative management and acquisition strategies

- Roles, responsibilities, and authority
- Equipment and material acquisition, mark-ups
- Fixed price contracts, cost reimbursable contracts, target cost/schedule incentive fees, award fees
- Disputes review board

KEY PARTICIPANTS:

Carl Gertz, YMPO

William Simecka, DOE

James Allen, Morrison-Knudsen, M&O

Robert Pritchett, Reynolds Electrical and Engineering Co.

Dale Frasier, Reynolds Electrical and Engineering Co.

Joseph Sperry, NWTRB consultant

Hugh Cronin, NWTRB consultant

Robert M. Matyas, NWTRB consultant

S. H. Bartholomew, NWTRB consultant

11:45 A.M. LUNCH

12:45 P.M. Overview of Session 4 - The Design and Construction of ESF Alternative Scenarios and Strategies

The purpose of this session is to seek definition or direction on promising strategies for development of the ESF. Integration of construction, testing, and management strategies is emphasized in this wrap-up discussion. All workshop attendees are encouraged to take part.

Thursday, November 5, 1992 - continued

Round-table Discussion

- Are there promising alternative strategies to developing the ESF?
- What are the implications of the testing requirements vs. constructibility, cost, and schedule?
- Can the excavation process be implemented without delay for testing?
- What is the impact of repository design evolution on the ESF design in terms of planning for changes in location and size of potential repository excavations?
- Is there a precedence for the government buying a tunnel boring machine, then asking a contractor to build a tunnel using an award fee type contract?
- What are the incentives for the contractor to perform?
- Are there alternative strategies for acquisition of underground construction?
- What are the constraints on construction of the ESF/proposed repository site in terms of organics, concrete, shotcrete, grouts, water, and potential for subsidence?

KEY PARTICIPANTS:
All workshop attendees

6:00 P.M. ADJOURNMENT

Convergence Task Force

CONVERGENCE TASK FORCE FOCUSED ON ACHIEVING

- **Clarification of Repository Program Goals**
 - **Site Suitability Evaluation**
 - **NEPA process**
 - **Licensing**
- **Clarification of functional responsibilities between implementing and oversight offices**
- **Recognition of need for program guidelines to ensure appropriate external party involvement**
- **Operational efficiency**

REPOSITORY PROGRAM CONVERGENCE GOALS

Successful and timely implementation of:

- **The site evaluation process resulting in compliance with 10 CFR 960 and earliest possible determination of site suitability**
- **The NEPA process in compliance with NEPA and 10 CFR 1021**
- **The licensing process in compliance with 10 CFR 60 and 10 CFR 2 and,**
- **If the site is found suitable,**
- **Completion of the site recommendation and approval process and submittal of the EIS and LA to the NRC**

OGD DELEGATED RESPONSIBILITY FOR:

- **Development of detailed strategies and implementation plans to achieve Repository Program Goals**
- **Development of top-level Convergence Strategy to tie together implementation plans for Repository Program Goals**

OVERALL APPROACH EMPHASIZES

- **Public Health and Safety**
- **Scientific and Engineering Integrity**
- **Approved QA Program**
- **Public Trust and Confidence**
- **Program Integration**

Within the above context

**Timely achievement of goals
at lowest possible cost**

OVERALL APPROACH

Conduct a site investigation, design, and performance assessment program that is technically sound, procedurally correct, and cost-effective and that is iteratively evaluated and focused on what is needed for convergence, taking into account the interrelationships among the site evaluation, NEPA, and licensing processes

ELEMENTS OF APPROACH

- **Conservatism in demonstrating compliance**
- **Broadening of scientific and public acceptance**
- **Establishment of single point regulatory responsibility**
- **Iterative evaluation and focusing of site investigation, design, and PA program**
- **Timely initiation of NEPA process**
- **Ongoing identification and monitoring of regulatory needs**
- **Early identification and resolution of issues**
- **Focused process of technical interactions**
- **Early planning for licensing proceeding and potential litigation**

EMPHASIZE COMPREHENSIVE NRC ROLE

- **NRC statutory responsibility cuts across entire regulatory process**
- **Site evaluation:**
 - **NRC concurred on 10 CFR 960 and must concur on any changes**
 - **NRC comments on sufficiency of site data must be included in SRR**
- **NEPA compliance:**
 - **NRC must adopt DOE's EIS, to the extent practicable, or issue its own EIS**
- **Licensing:**
 - **NRC reviews the LA prior to authorizing construction of repository**
 - **LSS Administrator must certify that all relevant information has been included in LSS prior to licensing**

OGD MANAGEMENT APPROACH

- **Implement management principles of DOE Order 4700.1**
- **Delegate responsibility for:**
 - **Site Evaluation Process Implementation**
 - **NEPA Compliance Process Implementation**
 - **Licensing Process Implementation**
- **The three positions report directly to the OGD Associate Director/Yucca Mountain Project Manager**
- **The three positions are independent of technical line organizations (site investigation, design, performance assessment)**

OGD MANAGEMENT APPROACH

(CONTINUED)

To implement this responsibility, the OGD Associate Director will:

- **Develop detailed implementation plans for each process**
- **Define specific responsibilities of the three positions, including interfaces within OCRWM and with external groups**
- **Define budget and staffing authority for the three positions**
- **Create the three positions and select appropriate individuals**
- **Formally delegate authority to the three individuals**

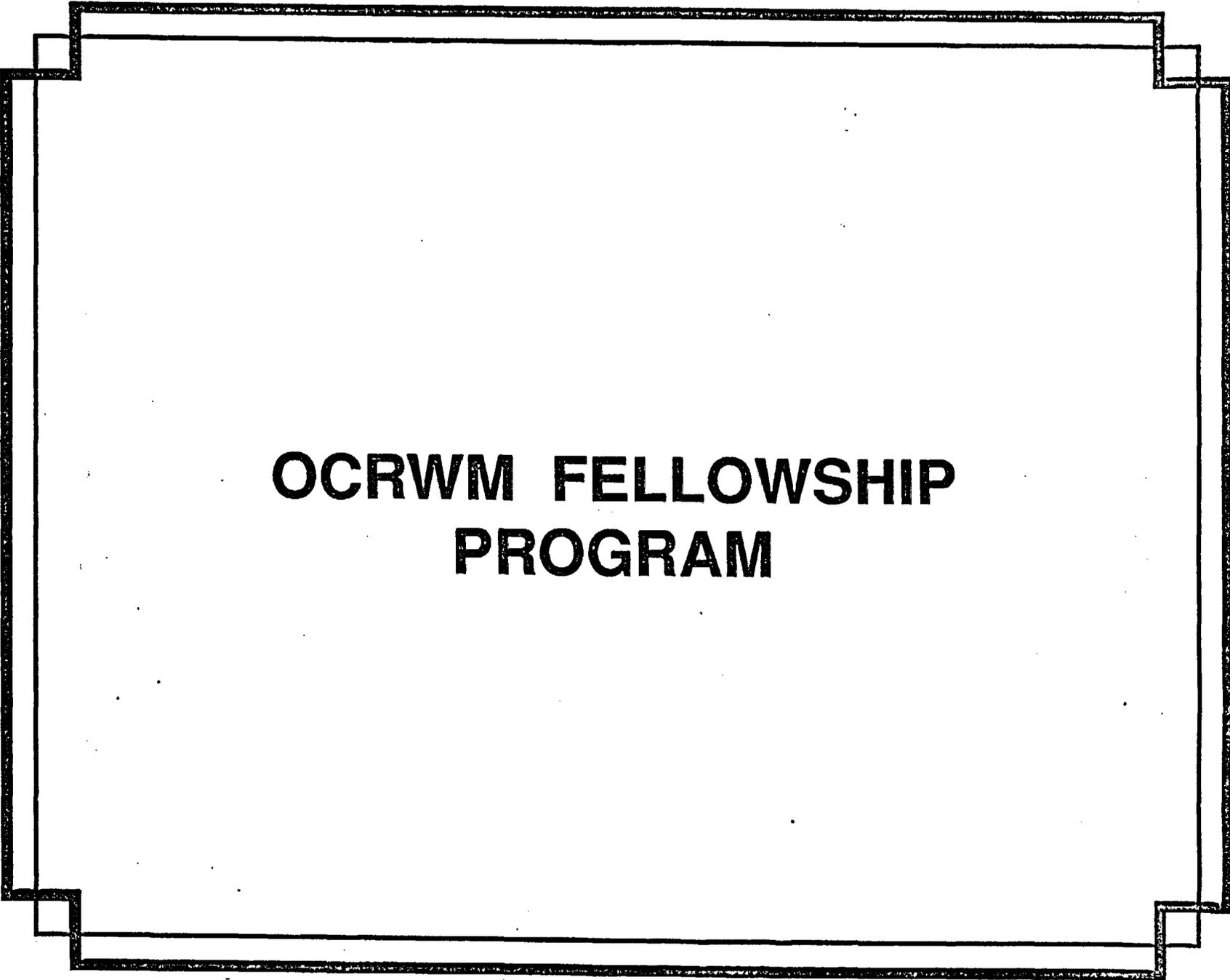
RECENT PUBLIC INTERACTIONS

UPCOMING EVENTS

- **Nuclear Waste Technical Review Board Meeting** **January 5-6, 1993**
- **American Nuclear Society** **January 14, 1993**
- **Waste Management '93** **February 28 -
March 4, 1993**
- **High-Level Waste Conference** **April 26-30, 1993**

RECENT PUBLIC INTERACTIONS

- **Public Update Meetings held**
 - Las Vegas (300 people)
 - Amargosa Valley (50 people)
 - Reno (50 people)
- **Undersecretary, Hugo Pomrehn visit #2**



OCRWM FELLOWSHIP PROGRAM

December 1, 1992

To: Carl Gertz

From: Carol Hanlon

Subject: Graduating OCRWM Fellows

Dear Carl,

Thank you for taking time last Monday to discuss with me the OCRWM Fellowship Program and considering possible strategies for placing our graduating fellows in program positions, especially at the Yucca Mountain Project Office or YMP participants. At that time, we discussed the fact that we currently anticipate that seven fellows will complete their graduate degrees by August 31, 1993. We also discussed the fact that non-availability of FTE's seems to be impacting the hiring of one of this year's fellows, Mark Banks. Mark completed his Master's degree in Nuclear Engineering at the University of Arizona this year, and performed his practicum at Sandia National Laboratories. We are concerned that, as yet, Mark has not been placed in a permanent position. We have extended his practicum through December, 1992, with the understanding that if positions become available at Sandia, he will be among candidates considered for permanent hire.

As you suggested, I am providing you with one-page resumes on our graduating fellows for your information and review. In addition, I am including a resume and background package on Mark Banks, who has indicated that he would be very interested in positions available with the Yucca Mountain Project Office in Las Vegas. I hope that this information will be sufficient for you to use in opening discussions with Yucca Mountain TPOs regarding the placement of these graduating fellows. I would welcome the opportunity to attend a TPO meeting where the subject of increasing the effectiveness of the OCRWM fellowship program and placing graduate fellows in program positions, and would be happy to provide a brief introduction on the subject, or provide you with other information that would be helpful to you.

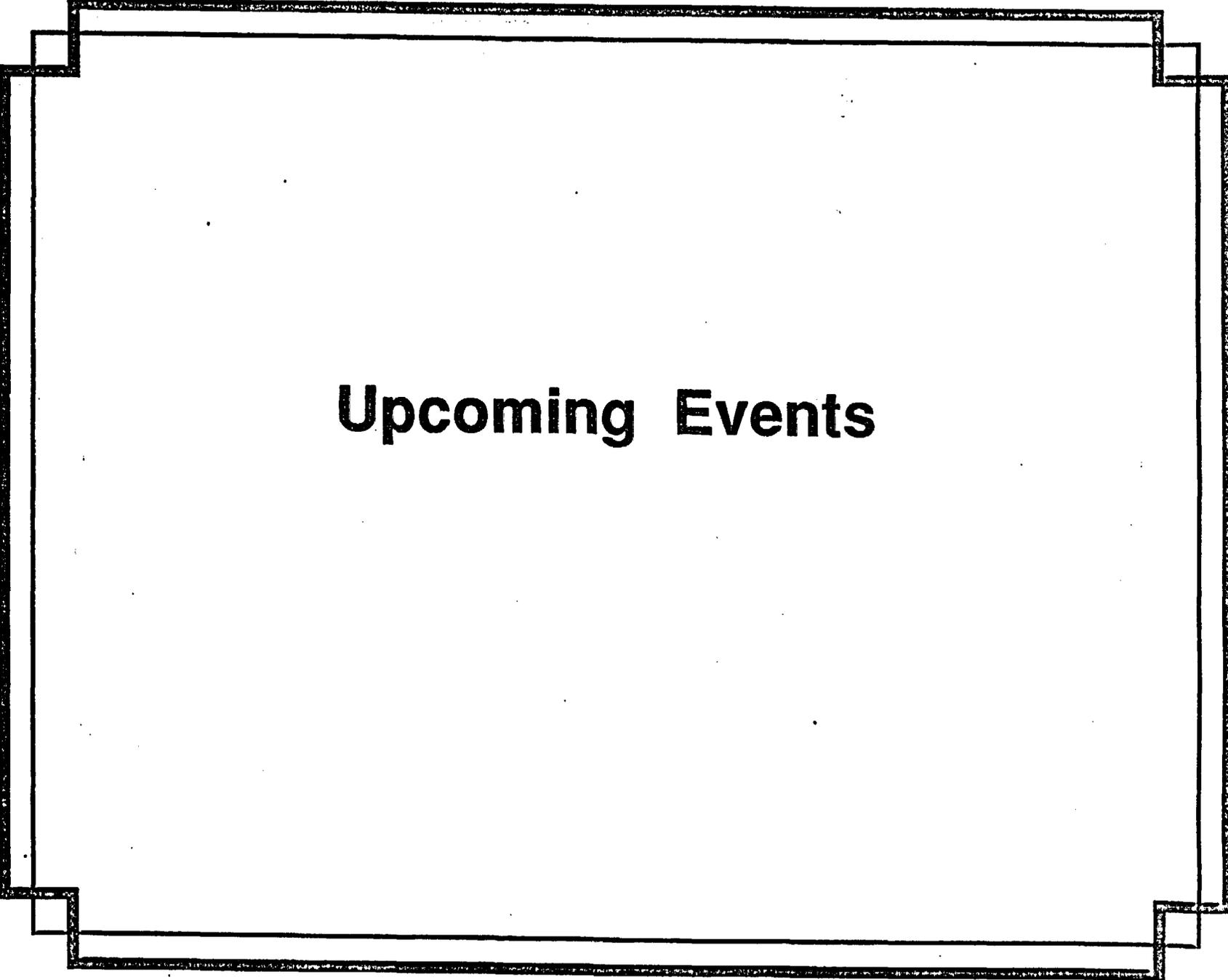
We are currently very interested in increasing the effectiveness and efficiency of this fellowship program, as applications for new fellowships will be evaluated in February, along with practicum assignments. In addition, we are striving to ensure that all of our graduating fellows will be hired in program positions. Therefore, I sincerely appreciate the assistance and consideration you have given to this subject, and will welcome your assistance.

Should you have questions or wish to have additional information, please don't hesitate to contact me on 202-586-2284.

Sincerest regards,

Carol

Carl, Many thanks for your assistance!



Upcoming Events

UPCOMING EVENTS

- **Nuclear Waste Technical Review Board Meeting** **January 5-6, 1993**
- **American Nuclear Society** **January 14, 1993**
- **Waste Management '93** **February 28 -
March 4, 1993**
- **High-Level Waste Conference** **April 26-30, 1993**

TPO MEETING

Presented By

CARL GERTZ
PROJECT MANAGER

JANUARY 20, 1993

Enclosure 4B

TOPICS

- **Acting Director appointed/confirmation hearing held for new secretary**
- **Watkins responses to Senator Johnston**
- **NRC meeting 12/17/92**
- **NWTRB meeting 1/5-6/93**
- **SEAB draft report released 1/8/93**
- **Inspector General briefing 1/12/93**
- **93 & 94 Yucca Mountain budget outlook**
- **Convergence Task Force update**
- **Recent public interactions**
- **Upcoming events**
- **Public tour schedule**
- **Other items of interest**

- **Lake Barrett appointed OCRWM Acting Director on January 11, 1993**
- **Hazel O'Leary confirmation hearing held January 19, 1993**



Department of Energy
Washington, DC 20585

BIOGRAPHY

LAKE H. BARRETT

Lake H. Barrett is the Director of the Rocky Flats Program Office, Defense Programs, U.S. Department of Energy (DOE). In this position, he is responsible for activities leading to the resumption of operations at the Rocky Flats facility.

Previously, Mr. Barrett served in a variety of senior management positions in DOE's Office of Civilian Radioactive Waste Management (OCRWM). His various responsibilities within the high level radioactive waste program included Quality Assurance, Facilities Siting and Development, External Relations and Policy, Transportation, and Systems Engineering areas between 1985 and 1990.

Mr. Barrett has held various engineering, supervisory and managerial positions within General Dynamics/Electric Boat Division, Bechtel Power Corporation, and the Nuclear Regulatory Commission, before joining DOE in 1985. Between 1980 and 1984, he was Site Director for the Nuclear Regulatory Commission, stationed at the Three Mile Island reactor site, and was responsible for regulatory programs during the cleanup of the damaged Unit 2 reactor.

Mr. Barrett received his B.S. degree in mechanical engineering in 1967 and his M.S. degree in mechanical/nuclear engineering in 1971, both from the University of Connecticut. He is a registered professional engineer, member of the American Nuclear Society, and has served on various standard and industry committees. Among Mr. Barrett's honors are Meritorious Service and Performance Bonus Awards, a DOE Special Act Award, and the Congressional Award for Exemplary Service Finalist.

Mr. Barrett is married to the former Lynn Buckley. They have two children and currently reside in Derwood, Maryland.

**STATEMENT OF
HAZEL O'LEARY
EXECUTIVE VICE PRESIDENT
CORPORATE AFFAIRS
NORTHERN STATES POWER COMPANY
BEFORE THE
COMMITTEE ON ENERGY & NATURAL RESOURCES
UNITED STATES SENATE
MARCH 31, 1992**

I-335846

Mr. Chairman and Members of the Committee: I am grateful to appear before you today on behalf of the Northern States Power Company to discuss the civilian radioactive waste management program and specifically to: (1) strongly support the reinstatement of the interim storage program; (2) note the Department of Energy's progress in developing the Monitored Retrievable Storage (MRS) and permanent repository projects; and (3) request your support for increased funding for the projects.

I have served as a Senior Executive with NSP for three years and have twenty years of broad experience within the energy industry, beginning with my tenure at the Cost of Living Council to the Federal Energy Administration under President Ford and in the U.S. Department of Energy under President Carter. I was responsible for the regulation of the petroleum, natural gas and electric utility industries and the Federal Government's conservation and environment programs. I have had the pleasure of appearing before this Committee in years past and I am privileged to have the opportunity to appear before you again. Before proceeding further with my testimony, I want to thank you and other Members of this Committee for your hard work in passing S. 2166. NSP supports this legislation and also supports S.1138. We believe that its passage has imposed pressure on Nevada to issue the permits necessary to begin site characterization.

NSP is an investor owned utility headquartered in Minneapolis, Minnesota which serves about 1.3 million electric customers in Minnesota, Wisconsin, North Dakota, South Dakota and Michigan's Upper Peninsula. NSP relies on the low cost environmentally sound production of nuclear power to meet 35% of the electric energy needs of its customers. According to the Utility Data Institute, production costs for our Monticello and Prairie Island plants rank 8th and 9th in the nation when compared to other nuclear plants in the nation.

Our plants have consistently been rated by independent agencies as among the top performing nuclear plants in the nation. But our customers will only continue to benefit from this low-cost option if the federal government lives up to its responsibility to develop a permanent repository for the storage of spent nuclear fuel from the nation's nuclear power plants. We fully understand the importance of this issue since our Prairie Island plant, which generates 1040 megawatts of electricity, representing 20 percent of our generating capacity, will run out of on-site storage by the end of 1994. We are awaiting a ruling from the Minnesota Public Utility Commission on our request to store spent fuel in above ground steel sealed containers on site. The Commission will rule on our request this summer.

Some believe licensing reform alone is needed to encourage investment in new nuclear facilities. I believe they are wrong. If the waste issue is not resolved, there will be no new investment in nuclear power under present circumstances. It is not reasonable to assume that responsible business people will risk billions of

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Hazel O'Leary
Northern States Power Company

dollars to invest in new nuclear plants when there is no place to store spent fuel. I have not come here today to point fingers or to assign blame for the lack of progress in developing interim or permanent storage facilities for the nation's spent nuclear fuel. There is enough blame for all of us to share. For example, I recall the failed attempt to establish the first Office of Nuclear Power within the Federal Energy Administration under the Ford Administration. Nuclear power issues have been permeated by frustration for many years.

We all know what the problem is. The federal government is behind schedule in its statutory obligation under the Nuclear Waste Policy Act (NWPA) to develop necessary facilities to store the nation's spent waste. All parties are deeply frustrated. In spite of this frustration, we must not act hastily. Progress has been made during the last year. We believe that if the recommendations we make in this testimony are followed, further progress will be made. Mr. Chairman, we would urge you to require the DOE to report on progress that is being made in key areas, (Yucca Mountain, development of an MRS), and that the Congress hold the DOE to strict standards of performance, then the Committee could assess the progress being made and determine the future direction of the program. At some point, it might be necessary to change direction. We believe that now is not the time to change direction. This would depend on a finding that the program is not achieving its statutory objectives.

Together we must assure that a permanent facility or an MRS is developed. If not, the nuclear power industry, which generates 20 percent of the electricity in the nation, is at risk. Additionally, more than seventy de facto nuclear waste storage facilities would be created at reactor sites. To ensure that well-managed nuclear plants continue to operate, the federal government should have the responsibility to take title to waste in order to keep a plant open. In the original Nuclear Waste Policy Act the Secretary of Energy had the authority to take title to waste. This authority has expired, and should be reinstated.

No matter where any of us stand on the issue of nuclear power, we can all agree that appropriate federal storage of nuclear waste is urgently needed. Resolution of the nuclear waste issue is the first priority of our customers. Research conducted by Cambridge Reports tells us that high level nuclear waste is the peoples number one issue. It must be resolved so we can realistically plan for the resource needs of our customers.

Recent research in Minnesota shows the public believes that waste storage at reactor sites will become permanent and there is little faith that the federal government will develop an MRS or a

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Hazel O'Leary
Northern States Power Company

permanent repository. This concern has been voiced in the public hearing process in Minnesota. NSP's leading principle in planning for above ground storage at Prairie Island is that the facility is temporary. We've signed a public covenant to accept no waste from any site other than Prairie Island. We are here today on behalf of the people of Minnesota. They want us to take the necessary action to ensure that waste storage at our Prairie Island plant will not be permanent. A program is needed that will keep the promise made to Minnesotans, in particular, and Americans, in general, that waste stored at reactor sites will never become permanent. That program is the development of a permanent repository or MRS, and reinstatement of federal authority to let title to waste in order to ensure that well operated plants are continue to operate.

THE NEED FOR FEDERAL INTERIM WASTE STORAGE

In view of our commitment to the people of Minnesota we support reinstatement of the authority of the DOE to take title to waste to deal with emergency situations. Sections 135 and 136 (Subtitle B) of the original version of the Nuclear Waste Policy Act foresaw such a crisis and included authority to require the Secretary of Energy to enter into contracts with utilities. However, this provision expired in 1990.

There is overwhelming support and compelling logic for reinstating the federal interim storage program. For example, the report of the Monitored Retrievable Storage Review Commission issued in 1989, endorsed interim storage. The Commission recommended construction of a Federal Emergency Storage (FES) facility with a capacity limit of 2,000 metric tons. The Commission also recommended construction of a user-funded interim storage facility with a capacity limit of 5,000 metric tons. The report states "...The FES could be used to store spent fuel from otherwise satisfactorily operating nuclear power plants that would have to be shut down because of insufficient on site storage. The report also states, "that the Commission believes that it would not be in the national interest to force utilities to shut down operation of otherwise satisfactorily operating nuclear power plants because of lack of storage capacity for spent fuel." Additionally, in a recent report, the General Accounting Office (GAO) recommended that the authority of interim storage be reinstated. Thus, the original Nuclear Waste Policy Act, MRS commission, and GAO all foresaw the situation which exists at Prairie Island. NSP seeks to preserve the original intent of Congress.

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Hazel O'Leary
Northern States Power Company

Mr. Chairman, we respectfully set before you the need to reinstate the interim storage provisions of the Nuclear Waste Policy Act so that its original goals and policy will be met.

REQUEST FOR THE FY' 1993 DOE OFFICE OF CIVILIAN RADIOACTIVE WASTE

We are very disappointed that the Office of Civilian Radioactive Waste Management has failed to make significant progress on the nuclear waste management program. In October of last year, the Board of Directors of NSP met at and toured the facilities at Yucca Mountain, Nevada. We came away with the realization that this important project is years behind schedule. Adequate funding must be provided so the Department of Energy can aggressively move forward on the waste storage program. We share your concerns about how program monies are being managed by the DOE. Therefore, appropriate program milestones monitored by the Committee can assure the civilian radioactive waste management program is effectively administered. We pledge our cooperation to work with you and other affected parties, including the Administration in developing such milestones.

The Department of Energy has requested approximately \$391,976,000 for the waste storage program effort in FY' 93. This represents an amount 42 percent greater than the funding which the Congress approved for the program this fiscal year. Not only does NSP support the funding level requested by the Energy Department for FY '93, but we also request the Committee to add \$70 million over and above the request of the Energy Department to assure that the experimental studies facility is developed as expeditiously as possible. This higher level of funding would also provide for the continuation of new surface based testing activities and the development of basic underground exploration capacity.

Mr. Chairman, any cut in funding spells delay. The Nation expects no more delay. In no event must the Committee allow funds for this program to be reduced as they were in FY '92. Such a cut in funding would irreversibly harm the development of the waste storage program. With each delay it becomes more difficult for utilities to justify contributions of ratepayer monies to the Nuclear Waste Fund. In our own situation, a regulatory problem may exist with the state because our customers will have paid three different times to store waste: once when the plant was constructed, a second time to finance the permanent repository and a third time to develop additional storage while waiting for the permanent repository.

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Hazel O'Leary
Northern States Power Company

THE FEDERAL DOE BUDGET PROCESS

Mr. Chairman, I am incensed by the status of the Nuclear Waste Trust Fund. Specifically, we are convinced that a distinction must be made, within the federal budget, between the Fund, which is financed by dedicated revenues in the form of a fee levied by contract on reactors and paid by our consumers, and other programs which the Congress funds with general revenues and by using federal borrowing authority. Currently, monies in the Fund are used to balance the federal budget and reduce the federal deficit. Congress did not intend such a result when it created the Fund.

Therefore, we join with the National Association of Regulatory Utility Commissioners (NARUC) in urging you to take the Fund "off-budget", in the same manner as the Social Security Trust Fund, to preserve the intent of the Congress. We ask your support of our effort to amend the Nuclear Waste Policy Act to accomplish this important result. In the meantime, I respectfully request this Committee to require the Department of Energy to submit a report to the Congress under the authority of Section 114(e) of the Nuclear Waste Policy Act. The report should address the extent to which the permanent repository schedule has been delayed because of the "on-budget" status of the Fund. The report should also specify how placing the Fund "off-budget" would affect the statutory schedule for the permanent repository program. Taking the funding "off-budget" would allow the program to be funded adequately. Taking the program "off-budget" would also remove it from the competitive appropriations process.

CONCLUSION

We have observed that progress has been made during the past year by the Department of Energy in the MRS and the permanent waste disposal project. However, progress is not being made fast enough. Major accomplishments are possible in this next year if the MRS and Yucca Mountain projects are sufficiently funded, properly budgeted and efficiently managed. Citizens expect no less from the Federal government. Thank you for the opportunity to appear before you today to share our concerns on this vital issue.

SUMMARY OF DECEMBER 17 LETTER ON INTERIM SPENT FUEL STORAGE FROM WATKINS TO JOHNSTON

- **Efforts focused on standardized container system**
- **Nuclear Waste Negotiator not been able to identify a viable candidate site**
- **Congress should give DOE deadline to select candidate federal sites by 1994**
- **DOE to explore "Utility Equity Issues"**
- **DOE recommends taking program off budget**



The Secretary of Energy

Washington, DC 20585

December 17, 1992

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510-6150

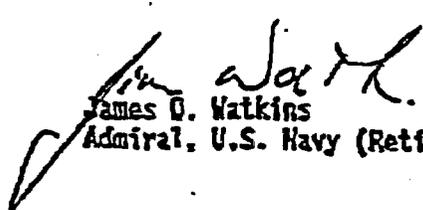
Dear Mr. Chairman:

Thank you for your letter of December 10, 1992, requesting information on the Department's plans to assure that receipt of spent nuclear fuel (SNF) from reactors can begin in 1998. You also requested information on progress toward disposal, which I will address in a separate letter.

Enclosed for your information is a summary of my new strategy to provide SNF interim storage in 1998. It will broaden and complement existing siting efforts and use a more effective SNF management system. We will complete planning and begin implementation of the described actions by December 31, 1992. In implementing the strategy we will establish productive working relationships with affected and interested constituencies.

I believe this new strategy for the Department and the Congress will produce the results needed to begin SNF receipt in 1998 and will maintain the Nation's options for sustained use of nuclear power as established in the Energy Policy Act of 1992. I urge your continued leadership for congressional action to achieve our mutual goals.

Sincerely,


James O. Watkins
Admiral, U.S. Navy (Retired)

Enclosure

cc:
The Honorable Malcolm Wallop
Ranking Minority Member

A NEW STRATEGY FOR MANAGEMENT
OF COMMERCIAL SPENT NUCLEAR FUEL

Background

The National Energy Strategy and the Energy Policy Act of 1992 envision continued use of nuclear power, along with other supply sources, to meet the country's needs for more electricity to support a growing economy and to replace aging existing capacity, and to remain within existing and emerging environmental laws such as the Clean Air Act. Progress on, and a timely solution to, the management and disposal of spent commercial nuclear fuel is essential to avoid premature and unwarranted shutdowns of operating nuclear plants, to permit renewals of existing plant licenses to provide life extensions from 40 to 60 years, and to enable new orders of advanced-design nuclear plants.

The Department of Energy has been working to a plan that would enable start of spent fuel removal from nuclear plant sites and receipt at a Monitored Retrievable Storage (MRS) facility by January 1998, and start of spent fuel disposal at a repository by 2010. In May 1992, in a letter to Northern States Power, the Department stated that it would assess progress in implementing that plan and report the results of its assessment to the Congress in January 1993. The Department further stated that should it become clear that its planned actions and progress towards interim milestones would not ensure that it could accept spent nuclear fuel by 1998, it would take whatever actions were necessary and in accordance with the law to meet its obligations under the Nuclear Waste Policy Act (NWPA). Further, it would seek additional legislative authority if appropriate.

The results of that assessment and the new actions planned are described below.

MRS Facility and Siting

The Office of the Nuclear Waste Negotiator, established under the NWPA as amended in 1987, has spent more than two years seeking a voluntary host and site for an MRS facility. That office has not been able to identify a viable candidate site that can be recommended to Congress by June 1993 and that will permit spent fuel receipt by January 1998 as planned. Thus, alternative actions are required.

The Department has examined potential alternative actions and has concluded the following:

- (1) It now appears that a multiple purpose and standardized container system for spent fuel receipt, storage, transport, and disposal can be developed to reduce costs, minimize required handling of spent fuel assemblies, and provide more efficient storage at both an interim storage site and nuclear plant sites. Such a system would simplify the design of a storage facility, but would require expeditious development and certification to be effective.

- (2) to meet the needs and expectations of the nuclear industry, the Department should plan for use of Federal Government sites for interim storage.

Accordingly, storage capacity for spent nuclear fuel at any Federal Government site or sites should be made available for use by January 1998. The Department has prepared a generic schedule showing the actions necessary to utilize a Government site or sites by that time.

The Department should be authorized and required by the Congress to select candidate Federal sites by December 31, 1993. A detailed, specific schedule for site selection and readiness to receive spent fuel by January 1998 should also be required to be submitted to the Congress by December 31, 1993.

Standardized Container System

The Department will immediately refocus spent fuel container design activities on development of a standardized system with capability for receipt, dry storage, transport, and disposal of spent fuel. Such a standardized system has been endorsed by a recent resolution of the Edison Electric Institute UWASTE Committee.

As of December 15, 1992, an expedited schedule for developing, manufacturing, testing and certifying such a container system and its elements was completed by the Department. The certification schedule was reviewed informally with the Nuclear Regulatory Commission on December 17, 1992.

Current work on MRS facility siting will be terminated and design work will be redirected toward the modular canister concept. By December 31, 1992, the simplification of the MRS facility that may be possible through use of a standardized system will be defined.

Budget Adjustments

The Department is recommending to the Office of Management and Budget that the Nuclear Waste Fund be taken off-budget, in a revolving fund, for FY 1994 and makes a similar recommendation to the Congress. The off-budget concept would permit the Department to apply whatever resources are necessary to meet program needs and schedules, subject to Congressional appropriation.

Potential Compensation for Delay Costs

Some electric utility companies and state regulatory commissions have expressed a concern for compensation by the Federal government for on-site spent fuel storage costs due to potential delays in Department start of receipt of spent fuel in January 1998.

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As a contingency action, the Department will promptly explore possible concepts of compensation and resolution of utility equity issues based upon payment or credit from the Nuclear Waste Fund and on no increase in the millage fee. If such an approach is found to be justified and practicable, the Department will notify the Congress of whatever new legislation may be required in order to provide such compensation.

WATKINS NEW PROGRAM STRATEGY FOR DISPOSAL OF SPENT FUEL AND DEFENSE HIGH-LEVEL WASTE IN LETTER TO JOHNSTON, JANUARY 12, 1993

- **DOE investigating an alternative disposal program strategy**
 - **NRC would make periodically formal findings**
 - **DOE focus on issues to resolve disposal safety**
 - **Provide conceptual revised strategy for public review by April 1, 1993**
- **DOE recommend that Nuclear Waste Fund be taken off-budget**



The Secretary of Energy
Washington, DC 20585

January 12, 1993

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510-6150

Dear Mr. Chairman:

Your letter of December 10, 1992 requested information on the Department's plans and progress for disposal of spent nuclear fuel (SNF). You also requested information on plans to assure that receipt of SNF from reactors can begin in 1998, which I provided to you in my response of December 17, 1992.

The enclosure to this letter describes for your information my recent initiatives to minimize disposal program costs and to build confidence as the program proceeds that substantive progress is being made and safe disposal can be accomplished. We are also investigating alternative strategies for interactions between the Department and the Nuclear Regulatory Commission (NRC). The potential exists that a petition for proposed rulemaking to the NRC may be a result of this investigation. As permitted by National Academy of Sciences (NAS), Environmental Protection Agency (EPA) and NRC procedures, we will participate in the proceedings of the NAS. These investigations will help assure that the EPA standards are soundly based and appropriately structured for implementation. We have also instituted management practices which will assure that program progress is as cost effective as possible.

I believe these new initiatives for the disposal program will meet the Nation's needs for safe, timely, and cost-effective disposal and will maintain our

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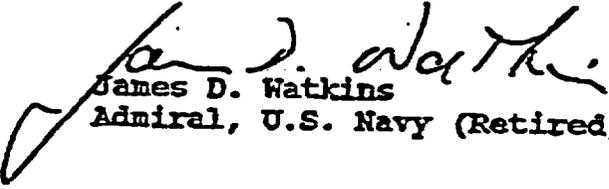
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options for sustained use of nuclear power as established in the Energy Policy Act of 1992. I urge your continued leadership for congressional action to achieve our mutual goals.

Sincerely,


James D. Watkins
Admiral, U.S. Navy (Retired)

Enclosure

cc:
The Honorable Malcolm Wallop
Ranking Minority Member

A NEW PROGRAM STRATEGY FOR DISPOSAL OF SPENT NUCLEAR FUEL AND DEFENSE HIGH-LEVEL WASTE

BACKGROUND

Pursuant to the Nuclear Waste Policy Act, as amended, the Department has been characterizing the Yucca Mountain site in Nevada to determine if it is a suitable location for disposal of spent nuclear fuel (SNF) and high-level waste (HLW). If the site were found suitable for disposal, DOE would have submitted a license application for construction of a waste repository at the site to the Nuclear Regulatory Commission (NRC) in 2001 and to begin disposal in 2010.

Under these plans and procedures, the process from start of preliminary site investigations to start of disposal would span more than 30 years, and more than \$9 billion would be spent on site investigations, licensing, and construction before disposal begins. The only official findings concerning disposal safety occur at the end of the NRC licensing process, and these findings would be based on performance assessment models and predictions without any experimental evidence of disposal safety.

These procedures do not provide an opportunity to make disposal data available for licensing reviews or to build confidence in disposal program costs, schedules, and progress. The Department is taking the actions described below to put the disposal program on a sound track for demonstration of cost effective progress.

DISPOSAL PROGRAM STRATEGY

The Department is investigating an alternative disposal program strategy for progress through step by step DOE and NRC interactions. In contrast with the above-mentioned plans, under which the NRC makes no findings until the end of licensing proceedings, the NRC would periodically make formal findings concerning the progress toward environmentally sound and safe disposal as DOE advances the testing and data analysis program. The findings would guide the DOE program and would be based on the NRC disposal safety standards. The strategy could involve disposal test emplacement of limited quantities of waste in order to obtain experimental data as a basis for findings, and would provide for abandonment of the Yucca Mountain site and retrieval of that test waste at any time if there are findings that safe disposal at the site is not possible. This approach would avoid the possibility of expending some \$9 billion before any findings are made.

The strategy would be designed to focus DOE's program activities on those that are essential to resolve disposal safety issues. It would also be designed to assure technical linkage to the new SNF interim storage and transport programs that I described in my December 17, 1992 letter to you.

A rulemaking by the NRC ultimately is required to implement a revised disposal program strategy.. The Department believes that an effective new strategy can be adopted within the flexibility offered by the NRC's existing statutory authority.

The Department expects to complete its investigations and provide a conceptual revised strategy for public review by April 1, 1993, and it is anticipated that a petition for proposed rulemaking will be submitted to the NRC if required. An improved strategy implemented through an NRC rulemaking is expected to produce a cost-effective program which provides information on progress and status to the public as the program proceeds.

DEVELOPMENT OF EPA DISPOSAL STANDARDS

As required by Section 801 of the Energy Policy Act of 1992, the National Academy of Sciences (NAS) will perform studies and make recommendations for the Environmental Protection Agency (EPA) safety standards for SNF and HLW disposal. The EPA will then develop standards and the NRC will revise its regulations to incorporate the EPA standards. As permitted by NAS, EPA, and NRC procedures, DOE will participate in these proceedings to help assure that the standards are soundly based and appropriately structured for implementation. The Department expects to perform technical analyses, prepare topical reports, and comment on proposed regulations. The Department's work will be reviewed by the Nuclear Waste Technical Review Board.

ASSURANCE OF COST CONTROL AND MANAGEMENT EFFECTIVENESS

The Department has begun implementation of a cost-controlling iterative process, which will operate under formal change procedures with the NRC, to revise and focus planned site characterization work on the basis of data already obtained. The first revision of plans established in the Yucca Mountain Site Characterization Plan will be completed in May 1993. It will be based on interpretation of site data obtained to date and the repository system safety performance assessment completed in July 1992.

The Department has also instituted practices such as self assessment and assessments by independent external parties to help assure management effectiveness. In addition, the Department is implementing actions to improve work efficiency and cost effectiveness such as optimization of drilling schedules and stringency in adherence to procurement schedules. These practices and actions will assure that program progress is as cost effective as possible.

Recent progress has been demonstrated with the successful resolution of litigation and the issuance by the State of Nevada of necessary environmental permits which have led to new surface-based testing and site preparation for underground exploration now under way at Yucca Mountain.

BUDGET ASSURANCE

To provide resources required to meet program needs and schedules, the Department recommended to the Office of Management and Budget that the Nuclear Waste Fund be taken off-budget, in a revolving fund subject to Congressional appropriation.

EVALUATE ADEQUACY OF NUCLEAR WASTE MANAGEMENT PROGRAMS

In accord with requirements of Section 803 of the Energy Policy Act of 1992, the Department is evaluating the adequacy of existing nuclear waste management plans and programs considering additional waste that might be generated by new nuclear power plants or renewal of existing plant licenses. We are also considering the potential impact of changes in the Nation's defense posture and of new waste management technologies. The draft report of this evaluation will be available for public review in May 1993.

POMREHN, BARTLETT AND GERTZ UPDATE NRC ON DECEMBER 17, 1992

- **Pomrehn announced DOE looking in-house for temporary nuclear waste storage**
 - **Conceded hard to find state, county or Indian Tribe willing to host MRS by January 1998**
 - **Bartlett said to meet deadline, a host had to be identified by October 1992**
- **Gertz gave update on field work at Yucca Mountain**

POMREHN, BARTLETT AND GERTZ UPDATE NWTRB ON JANUARY 5 & 6, 1993

- **Pomrehn said new initiatives are designed to assure that spent fuel receipt can begin in 1998, by pursuing alternative paths**
- **Bartlett discussed programs and activities related to interim storage**
- **Gertz discussed Mission 2001 scope and results**



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Tentative Agenda
Full Board Meeting

January 5-6, 1993

Key Bridge Marriott
1401 Lee Highway
Arlington, VA 22209
(703) 524-6400

Tuesday, January 5, 1993

- 9:00 A.M. Welcome and Opening Remarks
 John E. Cantlon, Chairman
 Nuclear Waste Technical Review Board (NWTRB)
- 9:10 A.M. Recent Department of Energy (DOE) Initiatives on Radioactive
 Waste Management
 Hugo Pomrehn, Under Secretary of Energy
- Morning session will be chaired by Dennis L. Price, NWTRB.
- 9:20 A.M. Overview of Interim Storage: Perspective from the Nuclear
 Regulatory Commission
 Robert M. Bernero
- 10:10 A.M. Department of Energy (DOE) Programs and Activities Related to
 Interim Storage
 John W. Bartlett
 Office of Civilian Radioactive Waste Management (OCRWM)
 Ronald A. Milner, OCRWM
- 11:00 A.M. BREAK (15 minutes)

Tuesday, January 5, 1993 - CONTINUED

11:15 A.M. Update from the Office of the Nuclear Waste Negotiator
Charles B. Lampesis

12:00 P.M. Discussion

12:20 P.M. LUNCH

Afternoon session will be chaired by Garry D. Brewer, NWTRB.

Perspectives on Interim Storage

1:45 P.M. American Electric Power Company
E. Linn Draper

2:25 P.M. Natural Resources Defense Council
Daniel W. Reicher

3:05 P.M. National Association of Public Utility Commissioners
Lynn Shishida-Topel, Illinois Commerce Commission

3:45 P.M. BREAK (15 minutes)

4:00 P.M. Edison Electric Institute Initiatives on Interim Storage
F. Kenneth Moore, Virginia Power
Robert W. Rasmussen, Duke Power
Marvin L. Smith, Virginia Power

5:00 P.M. Discussion and Comments

5:20 P.M. RECESS UNTIL WEDNESDAY, January 6

**SECRETARY OF ENERGY ADVISORY BOARD
ON PUBLIC TRUST AND CONFIDENCE
SUBMITTED 45-PAGE DRAFT REPORT TO
SECRETARY WATKINS ON JANUARY 8, 1993**

- **Recommend more Yucca Mountain staff live in Nevada**
- **Recommend citizen review boards be established**
- **Acknowledged image of DOE had gradually improved over last four years but " The legacy of distrust created by the department's history and culture will continue for a long time to color public reaction . . . "**

**U.S. Department of Energy
The Office of Inspector General
Meeting Agenda, January 12, 1993**

9:00 - 11:30	Project Overview State of the Project Update of Current Field Activities	Carl Gertz
11:30 - 1:00	Lunch	
1:00 - 1:30	Annotated Outline Issue Resolution	Susan Jones
1:30 - 2:00	Planning and Control System	Vince Iorri Dave Abel
2:00 - 2:30	Management and Integration of the Project	Max Blanchard
2:30 - 2:45	Break	
2:45 - 3:15	Institutional/Outreach Programs	A.C. Robison
3:15 - 3:45	Environmental Program	Wendy Dixon
3:45 - 4:15	Mission 2001	Dale Foust

1993/1994 YUCCA MOUNTAIN BUDGET OUTLOOK

ALLOCATION OF FY93 NEW BA

Preliminary

WBS	M\$
1.2.1 Systems Engineering	5.8
1.2.2 Waste Package	8.3
1.2.3 Site Investigations	49.4
1.2.4 Repository	4.4
1.2.5 Regulatory	24.2
1.2.6 Exploratory Studies Facility	48.8
1.2.7 Test Facilities	9.0
1.2.8 Reserved	0.0
1.2.9 Project Management	17.5
1.2.10 Financial Assistance	17.6
1.2.11 Quality Assistance	9.9
1.2.12 Information Management	10.9
1.2.13 Environment, Safety and Health	13.5
1.2.14 Institutional	3.5
1.2.15 Support Services	18.5
Total	241.3

ALLOCATION OF FY93 NEW BA AND CARRYOVER

Preliminary

WBS	M\$
1.2.1 Systems Engineering	5.8
1.2.2 Waste Package	8.9
1.2.3 Site Investigations	52.4
1.2.4 Repository	4.6
1.2.5 Regulatory	26.7
1.2.6 Exploratory Studies Facility	49.0
1.2.7 Test Facilities	9.5
1.2.8 Reserved	0.0
1.2.9 Project Management	18.6
1.2.10 Financial Assistance	17.6
1.2.11 Quality Assistance	10.1
1.2.12 Information Management	11.7
1.2.13 Environment, Safety and Health	14.2
1.2.14 Institutional	3.8
1.2.15 Support Services	18.7
Total	251.6

CONVERGENCE TASK FORCE UPDATE

Draft implementation plans being readied
for HQ Executive Committee

- | | <u>HQ Briefing</u> |
|---|------------------------------|
| • Site suitability | December 1992
(completed) |
| • National Environmental
Policy Act compliance | February 1993 |
| • Licensing | March 1993 |

UPCOMING EVENTS

- State of Project, Los Alamos February 3, 1993
- State of Project, SANDIA February 4, 1993
- DOE Regional Science Bowl, UNLV February 26-28, 1993
- Waste Management '93 February 28 - March 4, 1993
- High-Level Waste Conference April 26-30, 1993
- Public Update Meetings May 1993

29-30-31

RECENT PUBLIC INTERACTIONS

- **Industry Day briefing on ESF** **December 1, 1992**
- **YMP exhibit displayed at
American Geophysical Union
Conference, San Francisco** **December 7-11, 1992**
- **NRC Commissioner Curtiss tour** **December 14, 1992**
- **Various Nevada legislative
briefings** **December - January**
- **Andrew Kadek tour** - CEO *Yankee Atomic* **January 9, 1993**
 "ACORE"
- **Public Tour** **January 16, 1993**

TOUR YUCCA MOUNTAIN

LAS VEGAS DEPARTURE

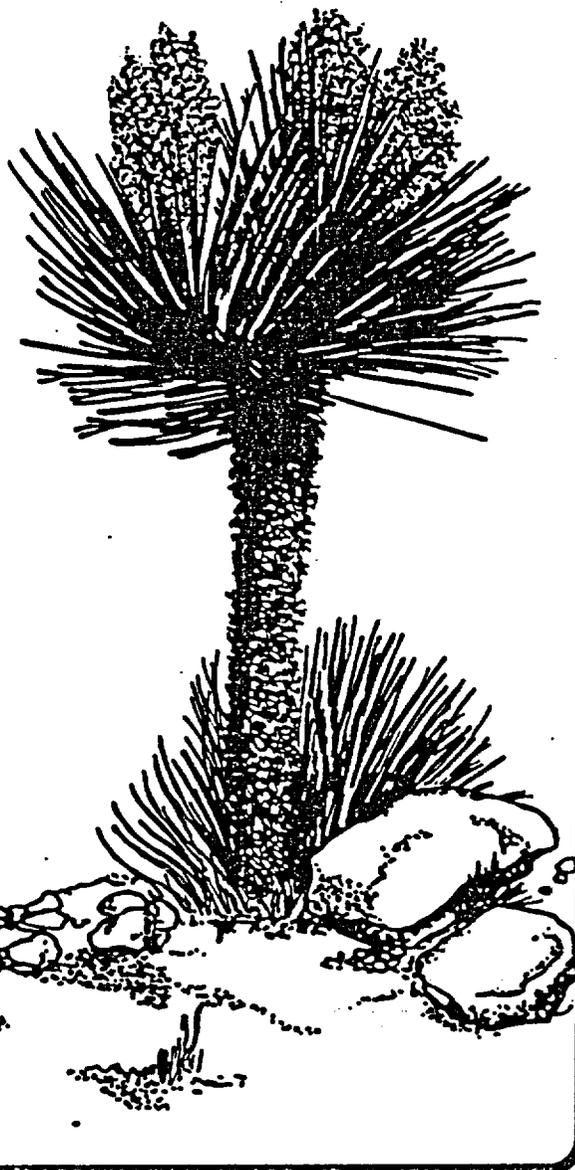
**Saturday, February 20; Saturday, March 27;
Saturday, April 24; and Wednesday, May 19, 1993
7:30 a.m. - 4:30 p.m.**

The U.S. Department of Energy's Yucca Mountain Project invites you to tour the Yucca Mountain area and talk to scientists and staff members about ongoing studies.

Reservations should be made at least 14 days in advance by calling 794-7104 during business hours. Tours will be filled on a first-come, first-serve basis.

Yucca Mountain is about 100 miles northwest of Las Vegas. To visit the site, information such as full names, addresses, social security numbers, dates and places of birth, and telephone numbers must be provided when making a reservation. The tour is open to any U.S. citizen over the age of 14.

The Yucca Mountain staff is looking forward to your visit.



Energy Secretary Watkins gives himself a 'B-minus'

By Thomas W. Lippman
The Washington Post

WASHINGTON — Outgoing Energy Secretary James Watkins is in the odd position of giving himself a decent grade even though many of the high-priority missions that faced him nearly four years ago were never carried out.

At the beginning of his tenure, the most urgent task facing the former chief of naval operations was to get the United States back in the business of manufacturing nuclear weapons, the mission that consumes about two-thirds of the Energy Department's budget.

To restart operations in the 12-state network of arms factories, crippled by safety problems and environmental violations, Watkins needed to resume plutonium milling at the Rocky Flats, Colo., plant; open a plutonium waste repository in New Mexico; build a plutonium separator in Idaho; and develop a reliable method of producing tritium, a radioactive gas used in warheads.

None of those things happened, and the United States today is not capable of producing nuclear weapons. But the end of the Cold War and the sweeping arms reduction agreements between Washington and Moscow took Watkins and his department off



JAMES WATKINS
Stepping down

the hook.

As he spent his last days in office and evaluated the problems Secretary-designate Hazel R. O'Leary will face, Watkins, 65, talked more about the department's responsibility for cleaning up the environmental mess around the weapons plants, its role as a repository of technology and its future as a promoter of scientific education than about its mission of mass destruction.

"World events have changed

things tremendously, and actually helped me in a situation that would have been really something," he said in an interview this month. Had the need for new warheads not abated, he said, President Bush would have had to use emergency powers to override safety regulations and environmental laws to allow production to resume at facilities that would have been "safe enough, but not at a desirable level."

But the end of the Cold War dissipated the "produce or else" mandate that had driven the nuclear weapons complex for 40 years, allowing the Energy Department to close some facilities, mothball others and begin a long-term evaluation of weapons production needs. With the nuclear arsenal shrinking rapidly, the Energy Department has several years of breathing room while its evaluation continues.

In his final report to Congress, Watkins describes a department still trying to climb out from an abyss of mismanagement and incompetence. He does not claim to have solved the myriad problems that beset the department when he took office, but he says O'Leary "will inherit a department that has become one of the finest in all of government."

That assessment is not shared by his most persistent critics, the

environmental and anti-nuclear groups who have long complained that the production-first, secrecy-oriented "culture" Watkins pledged to eradicate still prevails and that the department's environmental cleanup program is inadequate.

"He was not able to fundamentally reform the Department of Energy," they said in a report entitled "Rhetoric vs. Reality."

Despite high-minded declarations from the department's headquarters, their report said, the department is still characterized by secrecy, mismanagement, failure to control its contractors and wasteful spending.

Four years into the 30-year, \$100 billion-plus program to clean up dangerous wastes and restore the environment around the weapons plants, "tangible results are minimal," the report said.

"We're better than the 'F' given to us by the special-interest groups," Watkins said in the interview last week. He opted for "B-minus."

In many ways this is a glass-half-full or glass-half-empty argument.

As depicted by Watkins, the Energy Department was in such trouble that an intensive four-year effort by dedicated people, backed by huge amounts of mon-

ey, has not been able to overcome all the problems. As depicted by its critics, the department is better than before but still resistant to change and inadequate to its task.

Watkins maintains that the department's performance is better than its reputation. He said the department lacks credibility with the public because the news media pay too much attention to criticism from environmental activists with anti-nuclear agendas and not enough to the Energy Department's achievements.

"Nobody gives us any credit," he said, referring to the department's educational mission. Watkins has taken seriously the Bush administration's goal of making American students first in the world in science and mathematics achievement by 2000, and has developed several educational initiatives: a nationwide "Science Bowl" competition, cooperative programs with universities and programs for high school students at the national laboratories.

His report to Congress also called for a new licensing plan for

Yucca Mountain, which is being studied as a possible home for a repository for the nation's high-level nuclear waste.

The new strategy would focus the department on solving potential safety problems at the site, and allow Yucca Mountain, 100 miles northwest of Las Vegas, to be discarded earlier if it is found to be unsafe for waste storage, saving billions of dollars, Watkins said in his report.

Opponents called the new strategy a shortcut to place a repository in the state.

ROLE OF U.S. NRC AND OLRs IN HLW DISPOSAL PROGRAM

Justus and Gilray

Thank you for this opportunity to meet with you to discuss what NRC's role is and what we OLRs are here to do.

NRC MISSION: Protect public radiological health and safety, the environment and the common defense security.

INTRODUCTORY REMARKS:

1. NRC is mandated to assure that a repository will function as it is designed to function.
2. NRC staff makes recommendations on such assurance by reviewing DOE's LA. NRC has 3-4 years to present its recommendations.
3. To respond to an license application the license application must be complete and of high quality. Therefore, OLRs (representatives of NRC staff) assure that the characteristics of YM and evidence of disruptive processes and events are thoroughly investigated and fully considered in DOE's assessments by performance and design. And that DOE's work is documented and defensible (QA).
4. NRC is required to uphold standards of health, safety and performance regardless of where a site is located and independently of whichever entity owns it or directed it to be studied.
5. NRC does not select sites for any nuclear facility. NRC is in Nevada because Congress directed DOE to study the YM site.
6. Site characterization is a process that when completed does not automatically confer suitability or licensability upon the site.

DOE/NRC PROCEDURAL AGREEMENT^{1A} IS TO ASSURE:

- NRC receives adequate information, timely, to enable staff review/evaluation of DOE activities to facilitate early ID of potential licensing issues for timely resolution.
- DOE gets prompt access to NRC for explanations of intent of NRC comments on DOE's activities.

ROLE OF OLRs PER PROCEDURAL AGREEMENT^{1A}:

- During site characterization OLRs serve as a point of prompt information exchange.
 - COMMUNICATION OF EXCHANGE OF INFORMATION SUCH AS STATUS OF NRC ACTIONS/DOE ACTIONS
ex: Trench closure; Study Plan reviews; Tech Position