



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

Reply to:
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Las Vegas, NV 89101

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M E M O R A N D U M

DATE: November 30, 1992

FOR: Joseph Holonich, Director
Repository Licensing and Quality Assurance Project
Directorate (HLPD)
Division of High-Level Waste Management, M/S 4 H 3

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

SUBJECT: YUCCA MOUNTAIN PROJECT OLR REPORT FOR SEPTEMBER-OCTOBER
1992

INTRODUCTION

During my first two months on the job as On-Site Licensing Representative (OLR), I participated in numerous meetings held in Las Vegas and visited the Yucca Mountain site 10 times. This report summarizes those activities that I consider particularly relevant to NRC staff work.

A principal purpose of these OLR reports is to alert NRC staff, managers and contractors to information (including such things as new technical data, DOE's plans, schedules, and the status of activities) from DOE's site characterization, repository design and performance assessment and environmental programs that may be of potential use in fulfilling NRC's role during pre-licensing consultation. In addition to the 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 exploratory studies facility program, surface-based testing program, performance assessment program, data management system program and environmental studies program.

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SURFACE-BASED TESTING (SBT) PROGRAM

1) GHOST DANCE FAULT ZONE. I attended the TPO meeting on 9/11/92. It was here that Dr. Rick Spengler (USGS) first announced the results of a \$200K, 1-year mapping effort to describe the Ghost Dance Fault (GDF) in outcrop in detail (Enclosure 1 is his handout). The GDF is now considered, preliminarily, to be a zone of faulting no less than 700-feet wide. The USGS recommended that it be authorized to expand the detailed mapping of the GDF to the north, to cover its entire trace through the repository perimeter, and to the west and east, to ascertain the width of the zone and its relationship, if any, to the imbricate fault zone on the east and the Solitario Canyon Fault on the west. [I attended Dr. Spengler's field trip to the GDF on 9/17/92, his presentation on GDF to TRB on 9/15/92, and to ACNW on 10/23/92].

Dr. Spengler's preliminary conclusions about fault length, width and amount of offset appear limited by the vagaries of the stratigraphic markers, the uncertain significance of the presence of at least two types of breccias and the decision to not map fractures less than 6-feet long. Nevertheless, this study points out that surface geologic mapping of a fault in more detail than has been done heretofore can change the current perception (conceptual model) of that feature. This preliminary new model of the GDF may be tested in the ESF, when drifts penetrate the predicted underground location of the GDF (or GDF zone). I have Dr. Spengler's handout on file.

Other bedrock faults and fault zones are being mapped, such as at Exile Hill around the North Portal of the ESF, albeit at different scales for different purposes, by geologists from organizations other than Dr. Spengler's team (e.g., Bureau of Reclamation and Geomatrix geologists). Therefore, the future NRC and CNWRA staff reviewers of these maps will need to know the specific mapping criteria and their associated degree of resolution (such as fracture length cutoff; distinguishing features of various breccia types; reliability of key stratigraphic markers) when evaluating conclusions about faults and fault zones drawn by the various DOE groups.

2) SURFACE-BASED TESTING. Also, at the TPO meeting, Dr. Russ Dyer (DOE) enumerated the SBT activities schedule. I have his handout on file.

3) VOLCANISM. I attended the NWTRB Panel on Structural Geology and Geoenvironment's meeting on Volcanism 14-15 September 1992. This meeting was transcribed and was attended by eight NRC staff, four of whom reported directly to DHLWM upon their return. Therefore, I will not dwell on the technical information exchanged at the meeting (Enclosure 1, the agenda, indicates the scope of the presentations). Some new information about Lathrop Wells volcano was presented by DOE's principal investigator, Dr. Bruce Crowe

(LASL), in the form of 50-year-old photos of the volcano. Taken before quarrying destroyed some of the original slopes, the photos will be used as a primary source of slope angle measurements. Slope angles of cinder cones are evidence of eruption age, the less steep the older, due to erosion.

The discussions pointed out a continuing lack of convergence of views on the issues of ages of formation of volcanic rock and soils between volcanic rock units, structural controls of magma movement, probability and location of future volcanism and some related matters. The NRC position (presented by Dr. John Trapp) focused discussion temporarily on what kinds and level of detail of data DOE needs to obtain to address volcanism as a licensing issue (especially as input to consideration of waste isolation, repository design and demonstrations that performance objectives will be met). It appeared that some of NRC's published concerns will be addressed by DOE in the next year or so, for example, the need to integrate geophysical and drilling studies to detect the presence or absence of buried volcanic features. However, a data package (not a topical report) on volcanism is expected to be transmitted to NRC staff in early 1993. Handouts from the meeting are on file in this office.

I attended a field trip to Lathrop Wells volcano and Crater Flat volcanoes ancillary to the TRB meeting, 9/16/92. Dr. Crowe pointed to evidence of multiple episodes of volcanism exposed in several excavations. He also mentioned that a new water well on site had higher than expected temperature. Dr. Chris Fridrich (USGS) discussed alternative tectonic models of Crater Flat that he is considering as he maps the area. He appeared to preliminarily favor a half-rhombochasm model. Also, he mentioned that his hypothesis for the origin of the steep hydrologic gradient anomaly (which involves structural and stratigraphic control) will be published as an Open-file Report. I will pursue this OFR because it will be the first attempt to comprehensively explain that significant observation of the regional groundwater table. Dr. Gene Smith (UNLV) pointed out evidence for several episodes of volcanism at Red Cone. Handouts from the trip are on file in this office.

4) TRENCH MAPPING. On 9/17 and 9/18 I officiated a Site Visit (in accordance with the NRC/DOE Site-Specific Agreement; an OLR function) that emphasized trench wall mapping in Midway Valley. Dr. John Whitney (USGS) pointed out evidence for multiple movements on the Paintbrush Canyon Fault at Busted Butte. R. Spengler pointed out evidence for the existence of the GDF zone at Antler Ridge. Eight NRC staff observed Quaternary sedimentary units with

fractures indicated by Dr. Chris Menges (USGS) and John Westling (Geomatrix) in several trenches and pits in Midway Valley. The focus was on Trench T5, about 1200-foot-long, to be closed in November, and on nearby trenches and pits. J. Whitney introduced participants to research being conducted by himself and Dr. James Brune (UNR) on evidence of vibratory ground motion from toppled boulders and pedestal rocks in the vicinity of Yucca Mt. Ken Smith (UNR) summarized the Little Skull Mt. earthquake series that began on 29 June 1992. This Site Visit afforded the NRC and CNWRA staff an opportunity to observe first hand the bases (i.e., field observations) for forthcoming DOE conclusions about the presence/absence of Quaternary faults and the nature and rates of faulting in and around the location of proposed surface-handling facilities for the candidate repository.

I attended a CNWRA/NRC Field Trip to Crater Flat and Nevada Test Site (NTS) on 9/19/92 with five NRC and four CNWRA staff. Dr. A. Ramelli (UNR) pointed out faults and pockets of basaltic ash exposed in Trench CF-1 and SCF-2(?) in Solitario Canyon. He was just beginning to map the trenches. At least two faults appeared to be very young; they seemed to transect the uppermost soil horizon. These trenches appear likely to yield data on the relationship of basaltic volcanism and faulting, and on the rate and recurrence interval of faulting of the SCF. Dr. Lawrence McKague (LLNL and CNWRA consultant) introduced us to the effects of underground nuclear explosions on Frenchman Flat terrain and to the volcanic stratigraphy and selected structural features of the NTS.

5) NATURAL RESOURCES. I attended the ACNW Working Group Meeting on Natural Resources with four NRC staff on 10/20/92 (Enclosure 2 is the agenda for the meeting; see the transcript for many interesting opinions on resources exploration and on specific examples of resource exploitation in Nevada). The various speakers were somewhat academic in their approaches, except for Michael Miklas (CNWRA). He was praised for his success in focusing the group on the needed input to a license application to address human intrusion and the potentially adverse conditions which pertain to the presence of resources. Little attention was paid to the potential implications of the Energy Bill, passed only a few days earlier, on the matter of human intrusion. Dr. M. Einaudi (Stanford Univ.) suggested that comprehensive computerized mineral evaluation models exist, but that DOE hasn't gotten past the 'cataloguing' phase of resource investigations yet. DOE's investigations appeared to him to be in their infancy.

On 10/21/92 the full ACNW met (Enclosure 3 contains the agenda). One item was a report of the Workshop of the previous day. Important points for ACNW consideration were raised by Carl Johnson (State of Nevada). He suggested that the Committee recommend to the Commission that the staff consider water resources and geothermal resources in its revised "options paper."

6) GEOPHYSICS INTEGRATION. At the full ACNW meeting on 10/21/92 Carl Gertz announced a DOE management response to several longstanding staff concerns expressed in the SCA and in subsequent NRC reviews of selected study plans on the subject of lack of integration of geophysics investigations. A Geophysics Integration Task Group is being formed to help ameliorate the concerns. This is Phase 2 of a revitalized three phase geophysics program. Phase 3 will be the actual integration of work. Phase 1 was completed when the Geophysics Working Paper was submitted. Mark Tynan (DOE-YMPO) is coordinating Phase 2.

7) SEISMOLOGY. At the ACNW full committee meeting, 10/21/92, Dr. James Brune (UNR) discussed preliminary results of the 29 June 92 Little Skull Mt. earthquake. The epicenter was about 11km below the Mt. which is about 20 km from Yucca Mt. The aftershock series has confirmed that a seismic gap exists at Yucca Mountain. The causative fault system is under investigation. This earthquake series has tested the capability of the earthquake monitoring program and has provided a stimulus for its continued development. Mr. Gertz has announced DOE's intentions to accelerate its seismic design investigations program.

On 10/23/92 I participated in the ACNW tour of X-tunnel in Little Skull Mt. on the Nevada Test Site. Dr. Michael Voegele (SAIC) guided participants through the tunnel and pointed out evidence for there not being any effects in the tunnel from vibratory ground motion from the 29 June 92 series of earthquakes which occurred below the tunnel. He showed photographs of spalls along the tunnel taken in the 1980s that, when compared to current observations, showed no new spalls. However, there were some cracks in the ceiling near the entry that could not be attributed to the earthquakes. I have on file a summary of a paper on his observations to be presented at the next International High-Level Waste Conference, and some photographs taken in the tunnel.

8) NORTH PORTAL FAULT MAPPING. I attended the ACNW tour on 10/23/92 which included observations of rocks exposed along the NRG-1 road above the North Portal location of the ESF. Drs. W. Hinze and P. Pomeroy expressed interest in the northwest-trending faults in the bedrock of Exile Hill mapped by the Bureau of Reclamation. They were interested in knowing about any fault

hazard assessments of these faults, considering their close proximity to the North Portal and their trend toward the North Portal Pad. DOE (Tim Sullivan) and M&O (Steve LeRoy) are aware of this interest. In a related matter, DOE intends to investigate northwest-trending fractures and faults in a trench (T7) to be opened in November below the NRG -1 roadcut; I will report on T7 investigations in my next report.

ATTEMPTS TO 'CLOSE' AN ISSUE

1) EXTREME EROSION. DOE has indicated that it will show that 'extreme erosion' is not a potentially adverse condition (PAC; see 10 CFR 60.122) and will seek to remove this issue from further consideration as a PAC. I asked for and was given permission to observe a draft of the Topical Report on Extreme Erosion (9/22/92) for the purpose of ascertaining or estimating the expertise needed by NRC to conduct a comprehensive review of the report. This I did and relayed to Dr. Keith McConnell and several Geology-Geophysics Section staff by conference call on 9/23. Dr. Thomas Bjerstedt (DOE) emphasized to me the point that the Topical Report will present formally, for the first time, qualified data. The staff will likely be asked to comment on the documentation of the qualification of data therein. DOE expects to make similar representations in subsequent topical reports.

PERFORMANCE ASSESSMENT PROGRAM

1) SOURCE TERM. I attended the full board meeting of the NWTRB on 10/14-15/92. The agenda emphasized "Source Term." Three DHLWM HQ staff attended the meeting; one, Dr. R. Codell made a presentation on selected aspects of the Division's IPA Phase 2 work. The meeting was transcribed, therefore I won't dwell on technical material discussed (Enclosure 4, the agenda, indicates the scope of the meeting). Dr. R. Van Konynenberg emphasized, among other things, that about 2/3rds of the fuel assemblies that will go into the first repository haven't been manufactured yet. Thus, he implied that the characterization of fuel (ne spent fuel) has yet to be done, and there might be time to influence (e.g., optimize) the characteristics of the future products. The NRC and CNWRA staff interested in the following topics might benefit from reading the transcript: a) C14 release, b) modeling spent fuel, c) oxidation of fuel, d) dissolution testing and colloid formation, e) EQ3EQ6, f) use of J-13 water for testing materials was discouraged by the TRB. Some handouts are on file in the OLR office.

DATA BASE MANAGEMENT SYSTEM PROGRAM

1) TECHNICAL DBASE MANAGEMENT. I attended a briefing of DOE's managers on 9/9/92 on "DOE's Technical Data Base Management." This was coordinated by Dr. Ardyth Simmons (DOE), newly appointed head of the Data Base Management Program.

The briefing materials handed out provide the current intent and scope of the DBase Mgmt Program. The handouts are on file in the OLR office.

Some highlights of the briefing follow. The SEPDB is defunct as of 9/1/92. GENISIS System is a system-wide GIS data base that can hold spatial and tabular data (principal is James Beckett). APQ 5.2 is the basis for the new Technical Data Base (TDB) Handbook. MGDS Data Base is undergoing parameter normalization (principal is Dr. Scott Sinnock). This led to development of a Parameter Dictionary; this is not a controlled document (principal is Gail Heitland). The Data Catalog is designed to fulfill the DOE/NRC agreement for DOE to produce a quarterly data catalog. The RIB is a totally in-house DOE document. It is a source of consistency of project data. Data in the RIB are selected for their representativeness (principal is Joe Shelling).

2) LINKING DBASES. I attended a briefing of DOE's managers on 9/10/92 on "Linking DOE's Administrative and Technical Data Bases."

Some highlights of the briefing follow. The Data Encyclopoedia will be important for NRC staff to have as a reference when reviewing DOE documents (principal is Michael Savoie). The PTIM Data Management Flow Model, Rev.5 (principal is Robert Bentley), focused DOE on the need to not let administrative linkage requirements drive the technical data base development. The briefing package is on file in the OLR office.

3) EG&G's REMOTE SENSING LABS (RSL) AND GEOGRAPHIC INFORMATION SYSTEM (GIS) SYSTEM. On 10/22/92 I visited EG&G's RSL at Nellis Air Force Base and GIS facilities in Bank of America Building, as part of the tour for ACNW arranged by DOE (see Enclosure 5 for agenda). Thanks to Elaine Ezra (DOE) I am assured that I can obtain a copy of virtually any map, chart, remote sense image (such as aerial photos, LANDSAT) on stock such as mylar, photopositives, photonegatives, ozalid. I will be able to peruse DOE's files for EG&G products of use to the staff. James Beckett (EG&G) demonstrated the GIS basis for GENISES Dbase. GIS has facilitated production of the new Site Atlas.

4) INFOSTREAMS. The entire DOE organization is unifying its computerized management information system. It is called INFOSTREAM. It has similarities to AUTOS. I have a briefing package on file.

INTERNATIONAL PROGRAMS

1) BENEFITS. I attended the TPO meeting on 9/11/92. Robert Levich (DOE) discussed the value of DOE's International Programs to the YMP. He gave several examples of work done in other countries that are transferrable to the U.S. HLW program. (However, I didn't record them; there were no handouts).

2) LESSONS LEARNED. Dr. Jane Long (LBL) discussed some lessons learned from the STRIPA program (Sweden). The tunnel boring machines (TBMs) changed the characteristics of the bulk rock and water in the near-field. The main effect is degassing and consequent perturbation of two-phase flow. The implication is that DOE should consider how similar perturbations might affect its ESF. Also, Dr. Long concluded that most errors in predicting flow can be attributed to use of the wrong conceptual model. NRC staff should note that the TOUGH2 code is used by DOE to deal with fracture flow + two-phase flow cases. Further, she cautioned that by varying the "relative permeability" values input to codes almost any answer desired can be had. Another caution: cannot get steady state due to dynamic interaction of gas in pores as pressure increases. An inverse of TOUGH is now available - ITOUGH.

STUDY PLANS

1) Carl Gertz expressed a concern about NRC study plan approvals in his presentation to ACNW full committee on 10/21/92 on YMPs FY93 plans and priorities. He elaborated on this in November meetings. I will reflect his concerns in my next report.

STATE AND AFFECTED LOCAL GOVERNMENTS

1) On 10/21/92 the ACNW full committee (Enclosure 3, agenda) heard from the following representatives of affected parties: a) STATE SENATOR THOMAS HICKEY- he asked that NRC move its HLWM offices to Nevada and hold as many meetings, like the ACNW meeting, in NV as it can; b) CARL JOHNSON (STATE OF NEVADA)- indicated that the State considers that DOE has nothing to gain from going underground, i.e., from developing an ESF; he asked that the

suitability of the site be reconsidered in light of the emerging facts that the Solitario Canyon Fault next to the repository is active and the Ghost Dance Fault (GDF) within the repository perimeter is at least 700-feet wide; he quoted from Robert Bernero's paper (ASCE Meeting, August 92) on the proposed staff position which cautions DOE on locating structures, systems and components important to safety in or near a Type 1 fault or fault zone; Mr. Johnson suggested that DOE would lose a lot of waste emplacement space if it tries to avoid the GDF which may be a Type 1 fault zone; he demanded (for DOE's ears) that the State be involved in ESF design and near-field effects studies; c) C. MEYERS (MOAPA BAND OF PAIUTES)- seeks recognition of the Moapa Band of Paiutes; d) P. NIEDZIELSKI-EICHNER (NYE COUNTY)- discussed its plans to use \$2.2M in FY93; includes hiring a full-time On-site Representative and technical contractors; is concerned that investment costs and lack of contingencies will drive the Federal Government (read DOE and NRC) to find Yucca Mt. suitable; was concerned initially with "designing around site deficiencies," is now concerned with "legislating around site deficiencies;" the technical consultant (Marty Mifflin and Assoc.) will produce a report that identifies key site performance issues; e) D. BECHTEL (CLARK COUNTY)- is devoting efforts mainly to transportation and socio-economic effects; is concerned that the LSS investment will be lost.

GENERAL

1) LPDR. I visited the LPDR at the UNLV Reference Library on 9/25/92 to gain familiarity with the holdings and its modus operandi. The librarian had determined that all holdings had been converted to microfiche. He was in the process of gathering all hard copy for discard. All holdings will be accessed by computer terminal.

2) PRIORITIES FOR FY93. At the NWTRB full board meeting on 10/14-15/92 Carl Gertz (DOE) announced that in FY93 the YMPO will emphasize ESF (WBS 1.2.6) and Site Investigations (WBS 1.2.3). Also, Dr. John Bartlett (DOE) wants to focus on closing seismic design issues. There will be only one LM300 in operation for awhile, and it will be on one shift, five days per week. He also stated that the project is considering reducing the surface drilling program given that it was predicated on the concept that the ESF would only drift 6000-feet, but currently calls for two levels of ramps drifting 14 miles. He is implying, of course, that less surface-based drilling may be needed. The staff will likely need to consider this matter when it arises.

At the ACNW meeting on 10/21/92 Mr. Gertz again specified preliminarily how he expected the funds for WBS 1.2.6 and 1.2.3 to be allocated in FY93. I have enclosed selected lists from his handout for your and staff edification. (Enclosure 6: preliminary allocation of FY93 funds; 1.2.6 and 1.2.3 planned accomplishments; preliminary ESF construction schedule; geophysics integration initiative).

3) DOE'S FY92 ACCOMPLISHMENTS. Carl Gertz enumerated the YMPO FY92 accomplishments and other project information at the ACNW meeting on 10/21/92. I have enclosed selected information from his handout (Enclosure 7: list of work underway; other major accomplishments, activities reflecting limited funding, projected annual budget to 2001) that can serve as a checklist for the staff and as a stimulus for staff to followup on items of particular interest. The complete handout is on file in the OLR office.

4) NRC STAFF VISITORS. The following NRC staff visited the site and/or attended meetings in Las Vegas in September: K. McConnell, C. Abrams, H. Lefevre, L. Deering, R. Vollmer, J. Trapp, P. Prestholt; in October: V. Colten-Bradley, Te Ahn, R. Codell, K. McConnell, H. Lefevre, A. Eiss, P. Prestholt.

Enclosures: As stated

cc w/o encls:

C. Abrams, 4 H 3, W. Patrick, J. Roberts, C. P. Gertz,
R. E. Loux, C. Pflum, J. Martin, G. Cook, D. M. Kunihiro,
D. Weigel, J. Linehan, 4 H 3, B. J. Youngblood, M/S 4 H 3,
R. Bernero, 6 A 4, H. Thompson, 17 G 21; H. Denton, 17 F 2,
S. Gagner, 2 G 5, E. O'Donnell, NLS 260



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

Agenda

**Panel on Structural Geology & Geoengineering
Meeting on Volcanism**

**Alexis Park Hotel
375 East Harmon
Las Vegas, NV 89109
(702) 796-3300**

September 14-16, 1992

Monday, September 14, 1992

1:00 P.M.

Welcome

Clarence R. Allen, Nuclear Waste Technical
Review Board (NWTRB)

1:10 P.M.

Introductions

Department of Energy (DOE), state of Nevada,
Nuclear Regulatory Commission (NRC)

UPDATE ON GEOLOGIC AND GEOPHYSICAL STUDIES

1:30 P.M.

Overview of Task Status

Bruce Crowe, Los Alamos National Laboratory
(LANL)

2:00 P.M.

Review of Age-Dating Activity

Don DePaolo, University of California at Berkeley

2:45 P.M.

Paleomagnetism Studies

John Geissman, University of New Mexico (UNM)

3:05 P.M.

Cosmogenic Helium Studies

Jane Poths, LANL

3:20 P.M.

BREAK

3:35 P.M.

Soils and Geomorphic Studies: Part I

Leslie McFadden, UNM

-over-

4:05 P.M. **Soils and Geomorphic Studies: Part II**
Steve Wells, University of California at Riverside

4:35 P.M. **Petrology Studies - Basal Cycles**
Frank Perry, UNM.

5:20 P.M. **ADJOURN**

Tuesday, September 15, 1992

8:30 A.M. **Opening Remarks**
Clarence R. Allen, NWTRB

UPDATE ON GEOLOGIC AND GEOPHYSICAL STUDIES (cont.)

8:40 A.M. **Physical Processes of Magmatism and Effects
on Repository**
Greg Valentine, LANL

9:30 A.M. **Progress in Field Studies of Recent Volcanism**
Eugene Smith, University of Nevada-Las Vegas (UNLV)

10:00 A.M. **Structural Control of Pliocene Volcanism in the
Reveille Range of Central Nevada**
Mark W. Martin, UNLV

10:30 A.M. **BREAK**

10:45 A.M. **New High-Precision $^{40}\text{Ar}/^{39}\text{Ar}$ Step-Heating Results
from Basalts near Yucca Mountain**
Brent Turrin, U.S. Geological Survey (USGS)

11:15 A.M. **New Paleomagnetic and Geologic Constraints:
Evaluation of Polycyclic Volcanism in Basalts
near Yucca Mountain**
Duane Champion, USGS

11:45 A.M. **Comments on Volcanic Issues at Yucca Mountain**
Kip Hodges, Massachusetts Institute of Technology

12:15 -1:30 P.M. **LUNCH**



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1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Tentative Agenda

Panel on Structural Geology & Geoengineering

Field Trip

Las Vegas, Nevada

September 16, 1992

Wednesday, September 16, 1992

- 7:00 A.M.** **Depart Valley Bank Center**
101 Convention Center Drive
Las Vegas, Nevada
- 9:00 A.M.** **Arrive at Lathrop Wells Cone**
Several stops around the cone to understand geologic
relationships of units, and to view evidence
in trenches of buried lava and polycyclic volcanism
- 11:45 A.M.** **Depart Lathrop Wells for Steve's Pass**
- 12:05 P.M.** **LUNCH AT STEVE'S PASS**
Discussion of tectonic framework for volcanic events
in Crater Flat
- 1:00 P.M.** **Depart Steve's Pass for Northern Crater Flat**
- 1:20 P.M.** **Arrive at Black Cone**
Discuss 1.2 million-year-old basalts - state of Nevada
May also stop at Red Cone
- 3:15 P.M.** **Depart Black or Red Cone for View of Northern Yucca**
Mountain and Discussion of 3.7 Million-Year-Old
Basalts
- 4:45 P.M.** **Depart Crater Flat for Las Vegas**
- 7:00 P.M.** **Arrive at Valley Bank Center**



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20542

Final Agenda

ADVISORY COMMITTEE ON NUCLEAR WASTE
WORKING GROUP MEETING
OCTOBER 20, 1992

POTENTIAL FOR PRESENCE OF NATURAL RESOURCES
AT A HIGH-LEVEL WASTE REPOSITORY

Tuesday, October 20, 1992

- 8:30 - 8:45 a. m. Welcome & Introduction
William Hinze, Advisory Committee on
Nuclear Waste (ACNW)
- 8:45 - 9:30 a. m. Overview of Geology & Potential for
Natural Resources
Jonathan Price, Director, Nevada Bureau
of Mines & Geology
- 9:30 - 10:00 a. m. Regulatory Considerations & Nuclear
Regulatory Commission (NRC)
Perspective
Harold Lefevre, Nuclear Regulatory
Commission
- 10:00 - 10:15 a.m. Nevada Agency for Nuclear Projects
Activities and Perspective on Natural
Resources
Carl Johnson, Nevada Agency for Nuclear
Projects
- 10:15 - 10:30 a.m. ***** BREAK *****
- 10:30 - 11:00 a.m. Petroleum Exploration in Railroad
Valley, Nye County, Nevada: Lessons
Learned
Don French, Petroleum Geologist
- 11:00 - 11:30 a.m. Data and Methods to Assess Petroleum
Resources in the Southern Basin and
Range
Ted Jannings, Argonne National
Laboratory Liaison Office
- 11:30 - 12:00 NOON Metallic Mineral Resources & Potential
for Mineral Exploration at Yucca Mt.
Andrew Wallace, Cordex Minerals

12:00 - 1:15 p.m. *** LUNCH *****

1:15 - 1:45 p.m. Geologic-geochemical Evaluation
Methodologies for Metallic Mineral
Exploration
Marco T. Blaud, Stanford University

1:45 - 2:15 p.m. Geophysical Methods for Evaluating
Mineral Resources
John D. Corbett, geophysicist

2:15 - 2:45 p.m. Mining Scenarios Affecting Waste
Isolation
Russell Kaney, U.S. Bureau of Mines

2:45 - 3:15 p.m. Regulatory Approach to Address
Natural Resource Requirements
Mike Micklas, Center for Nuclear
Waste Regulatory Analysis
(CNWRA)

3:15 - 3:30 p.m. ***** BREAK *****

3:30 - 4:00 p.m. DOE Investigations on Mineral
Resources
Joel Bergquist, U.S. Geological
Survey (USGS)

4:00 - 4:30 p.m. DOE Investigations on Petroleum
Resources
John Gray, USGS
+ Petroleum Resources
OPEN DISCUSSION

4:30 - 5:00 p.m.

5:00 p.m. ADJOURN



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20545

October 7, 1992

SCHEDULE AND OUTLINE FOR DISCUSSION
47TH ACNW MEETING
OCTOBER 21, 1992
LAS VEGAS, NEVADA

Wednesday, October 21, 1992, St. Tropez Hotel, 455 East Harmon
Avenue, Las Vegas, NV, Monte Carlo Room

- 1) 8:30-8:45 a.m. Opening Remarks by ACNW Chairman (Open)
 - 1.1) Opening Remarks (DWM/RKM)
 - 1.2) Items of Current Interest (DWM/RKM)

- 2) 8:45-10:00 a.m. Discussion of Activities at the Proposed High-Level Waste Repository at Yucca Mountain (Open)
(WJH/LGD/GNG)
 - 2.1) Carl Gertz et al., DOE, to discuss Site Characterization Activities Underway
 - 2.2) Results of Site Characterization to date
 - 2.3) Strategy for future activities
 - 2.4) Additional Discussion

- 10:00-10:15 a.m. BREAK

- 3) 10:15-11:15 a.m. Discussion by DOE of Seismic Investigations at the Proposed Yucca Mountain Site (Open)
(DWP/LGD/GNG)
 - 3.1) Information available on the June 29, 1992 Little Skull Earthquake - Jim Brune, University of Nevada, Reno
 - ? - 3.2) Discussion of the Accelerated Seismic Initiative - Carl
 - ? - 3.3) Discussion of Geophysics Integration Initiative
 - 3.4) Additional Discussion

- 4) 11:15-11:45 a.m. Working Group Chairman's Report on the October 20, 1992 ACNW Working Group on the Potential for Presence of Natural Resources at a High-Level Waste Repository (Open) (WJH/HJL)

- 11:45-12:45 p.m. LUNCH

- 5) 12:45-2:45 p.m. Review Comments on the Proposed High-Level Waste Repository (Open) (DWM/HJL)
Discussion with:
 - 5.1) State (C. Johnson, S. Frishman, et al. NV)
 - 5.2) Local (Nye and Clark Counties) - tentative
 - 5.3) Indian Tribes - tentative
 - 5.4) Others

- 2:45-3:00 p.m. BREAK

47th ACM Meeting
October 21, 1992

6) 3:00-4:30 P.M.

System Analysts Approach to Reviewing the
Overall High-Level Waste Program (Open)
(MJS/HLL)

- 6.1) Current Status
- 6.2) Progress on Draft Report/Road Map
- 6.3) Future Actions

ACM

7) 4:30-5:30 P.M.

Committee Activities/Future Agenda (Open)
(DMN/ROD)

Discuss anticipated and proposed committee activities, future meeting agenda, administrative and organizational matters, as appropriate

ACM

- 7.1) See November agenda
- 7.2) Review working group schedule
- 7.3) Other future topics
- 7.4) Meeting Dates for 1993

5:30 P.M.

Adjourn



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

Agenda

Full Board Meeting

October 14-15, 1992

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

Wednesday, October 14, 1992

- 8:30 A.M.** **Welcome and Opening Remarks**
John E. Cantlon, Chairman
Nuclear Waste Technical Review Board (NWTRB)
- 8:35 A.M.** **Morning Session Introduction**
Ellis D. Verink, Jr., NWTRB
- 8:40 A.M.** **Opening Remarks**
Carl Gertz
Department of Energy (DOE)
- 8:45 A.M.** **Source Term Concept and Definition**
David Stahl
Management and Operating Contractor (M&O)
- 9:15 A.M.** **¹⁴C Releases**
Richard A. Van Konynenburg
Lawrence Livermore National Laboratory (LLNL)
- 10:00 A.M.** **Overview on Spent Fuel**
Ray B. Stout, LLNL
- 10:45 A.M.** **BREAK (15 minutes)**
- 11:00 A.M.** **Oxidation Testing of Spent Fuel**
Robert Einziger
Pacific Northwest Laboratory (PNL)

Wednesday, October 14, 1992 (continued)

- 11:30 A.M.** **Dissolution Testing of Spent Fuel**
Walter J. Gray, PNL
- 12:00 P.M.** **Dissolution Testing of UO₂**
Steven A. Steward, LLNL
- 12:30 P.M.** **LUNCH (1 hour, 15 minutes)**
- 1:45 P.M.** **Afternoon Session Introduction**
Donald Langmuir, NWTRB
- 1:50 P.M.** **Glass Testing and Colloid Evaluations**
John K. Bates
Argonne National Laboratory
- 2:20 P.M.** **Glass Modeling**
William L. Bourcier, LLNL
- 2:50 P.M.** **Thermodynamic Database for the Source Term**
Cynthia Palmer, LLNL
- 3:20 P.M.** **BREAK (10 minutes)**
- 3:30 P.M.** **Geochemical Code EQ3/6**
Thomas J. Wolery, LLNL
- 4:20 P.M.** **Plans for Future Work**
Diane Harrison, DOE
- 4:50 P.M.** **RECESS UNTIL THURSDAY, October 15**



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Thursday, October 15, 1992

- 8:00 A.M. Morning Session Introduction
Patrick A. Domenico, NWTRB
- 8:05 A.M. Combining Processes: An Engineered Barrier System Source Term
William J. O'Connell, LLNL
- 8:40 A.M. Source Term in the Sandia National Laboratories (SNL)
Total System Performance Assessment
Michael L. Wilson and Ralston W. Barnard, SNL
- 9:15 A.M. Source Term in the PNL Total System Performance Assessment
David W. Engel, PNL
- 9:55 A.M. Source Term in the Electric Power Research Institute (EPRI)
Performance Assessment
Robert A. Shaw, EPRI
- 10:35 A.M. Model for Radionuclide Release in the Nuclear Regulatory
Commission (NRC) Iterative Performance Assessment, Phase 2
Richard B. Codell and Tae M. Ahn, NRC
- 11:15 A.M. BREAK (15 minutes)
- Source Term Overviews by NWTRB Consultants
- 11:30 A.M. Michael J. Apted, Intera Information Technologies, Inc.
- 11:45 A.M. Nava C. Garisto, Beak Consultants, Ltd.

Thursday, October 15, 1992 (continued)

- 12:00 P.M.** **Open Discussion**
- 12:45 P.M.** **Concluding Remarks on Source Term Sessions**
D. Warner North, NWTRB
- 1:00 P.M.** **LUNCH (1 hour, 15 minutes)**
- 2:15 P.M.** **Overview of Ghost Dance Fault Mapping**
Richard W. Spengler
U.S. Geological Survey
- 2:45 P.M.** **Introductory Remarks**
John Bartlett, DOE
- 2:55 P.M.** **YMPO Fiscal Year 1993 Budget**
Carl Gertz, YMPO
- 3:55 P.M.** **Closing Remarks and Adjournment**
John E. Cantlon, Chairman, NWTRB

ITINERARY

REMOTE SENSING LABORATORY AND GEOGRAPHIC INFORMATION SYSTEM TOUR

October 22, 1992

for

Advisory Committee on Nuclear Waste

- 7:30 AM Leave St. Tropez Hotel for Remote Sensing Laboratory (RSL)
- 8:10 AM Arrive at RSL; Badging
- 8:20 AM Briefing on RSL facility and mission
- 8:45 AM Break
- 9:00 AM TOUR
Flight Support
- 9:20 AM Nuclear Radiation
- 9:45 AM Photo Support
- 10:05 AM Multispectral Remote Sensing (including GIS)
- 10:30 AM Depart RSL for Bank of America Center (BAC, formerly Valley Bank Center)
- 11:15 AM Arrive BAC; tour of EG&G Geographic Information System, YMP Support Office
- 12:00 Lunch (on your own)
- 1:30 PM Tunnel training, DOE Large Conference Room (Room #202, DOE offices)

ITINERARY
YUCCA MOUNTAIN SITE TOUR

October 23, 1992

for

Advisory Committee on Nuclear Waste

7:00 AM Arrive at Lathrop Wells Gate (Gate 510) for Badging
7:30 AM Depart for X-Tunnel
7:50 AM Arrive at X-Tunnel; briefing and tour tunnel
9:00 AM Depart for Yucca Mountain Crest
9:50 AM Briefing on Yucca Mountain Crest
10:30 AM Depart for LM-300 drill rig
11:00 AM Briefing on rig operations
11:30 AM Lunch at LM-300 trailer
12:00 PM Depart for Ghost Dance Fault
12:10 PM Briefing and Discussion at Ghost Dance Fault
USW H4 wash
1:10 PM Depart for Trenches 14C and 14D
1:30 PM Briefing and Discussion at Trenches 14C and 14D
Bow Ridge Fault
2:30 PM Depart for Trench 5, Exile Hill
2:45 PM Briefing and Discussion at Trench 5
3:45 PM Depart for Sample Management Facility (SMF)
4:00 PM Tour of SMF
4:30 PM Tour of Hydrologic Research Facility (HRF)
5:00 PM Leave HRF for Lathrop Wells Gate; badge collection

STRATEGY FOR FUTURE WORK

PRELIMINARY ALLOCATION OF FY93 FUNDING

Preliminary

<u>WBS</u>	<u>M\$</u>
1.2.1 Systems Engineering	5.9
1.2.2 Waste Package	8.3
→ 1.2.3 Site Investigations	50.0
1.2.4 Repository	4.5
1.2.5 Regulatory	23.0
→ 1.2.6 Exploratory Studies Facility	49.0
1.2.7 Test Facilities	10.2
1.2.9 Project Management	17.4
1.2.10 Financial Assistance	17.6
1.2.11 Quality Assistance	10.0
1.2.12 Information Management	11.0
1.2.13 Environment, Safety and Health	12.4
1.2.14 Institutional	3.5
1.2.15 Support Services	16.2
YMP Support to OGD Analysis and Verification Division	1.5
NTS Allocation	<u>4.2</u>
Total	244.7

HIGHEST
PRIORITY

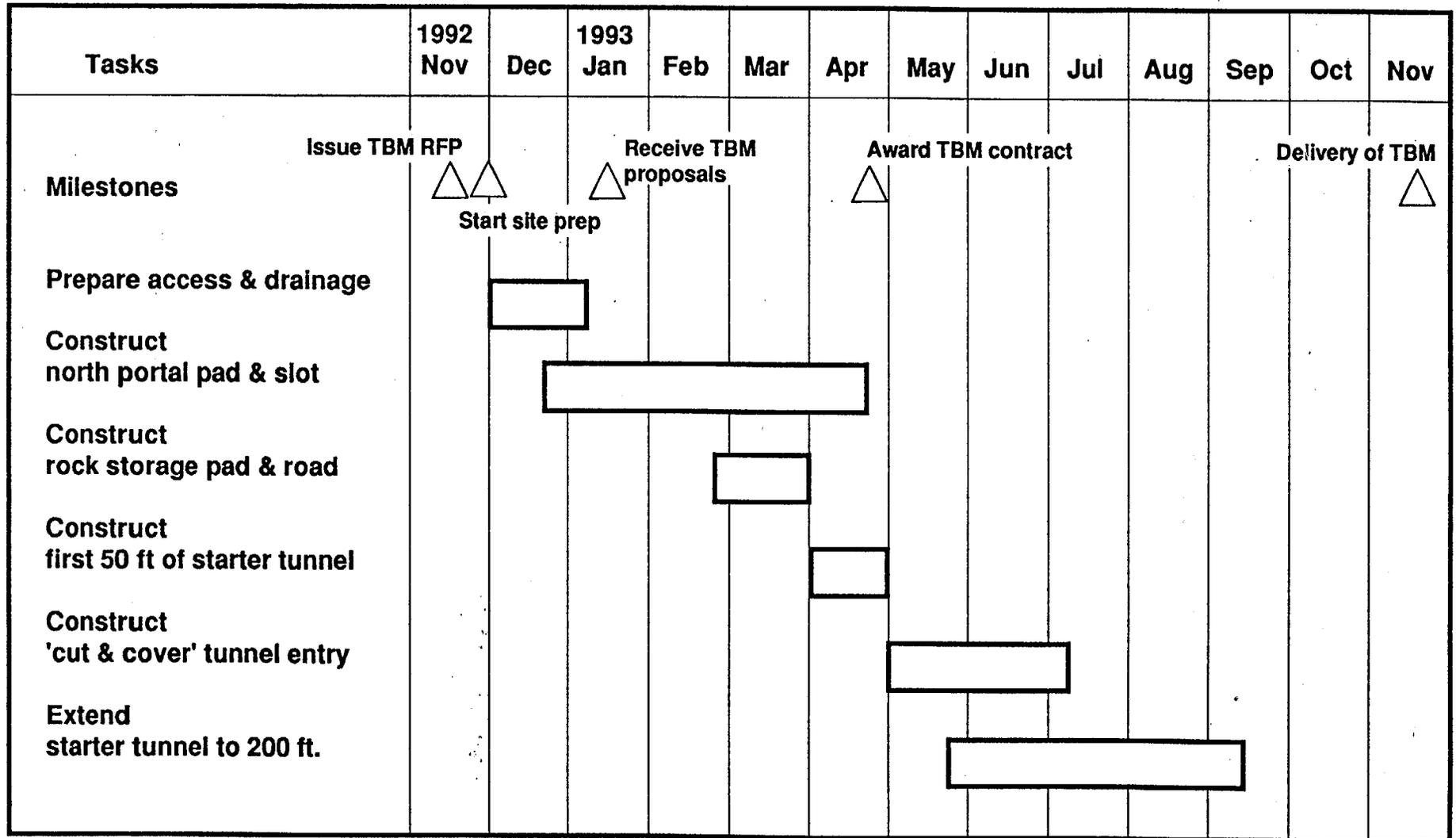
FY93 PLANNED ACCOMPLISHMENTS

Preliminary

1.2.6 Exploratory Studies Facility (\$49M)

- Start ESF site preparation and construct first 200' of north portal and ramp
- Continue ESF Title II Design
- Prepare facilities for ESF testing
- Award subcontract for underground construction
- Issue RFP, receive proposals, and award contract for first large TBM and support equipment
- Upgrade power supply for ESF construction

PRELIMINARY ESF CONSTRUCTION SUMMARY SCHEDULE



FY93 PLANNED ACCOMPLISHMENTS

Preliminary

1.2.3 Site Investigations (\$50M)

- Complete UZ-16 borehole, install instrumentation and begin testing
- Complete boreholes NRG-2 through NRG-6 and SRG-5; provide ESF ramp design data
- Complete drilling/continue data collection to support study of shallow UZ infiltration (neutron boreholes)
- Complete/revise prerequisite study plans and job packages for ESF tests in starter tunnel
- Complete trenching program in Midway Valley; complete most of trenching program for Quaternary faults in the site area
- Continue collection of data (hydrologic, meteorologic, geochemical, seismic) that would otherwise be lost
- Carry out C-well pump test
- Start UZ-14 borehole drilling

GEOPHYSICS INTEGRATION INITIATIVE

- **PURPOSE**

- A Geophysics Integration task force is planned for the integration and coordination of Geophysics activities within the Site Characterization program.

- **MEMBERSHIP**

- Technical staff from DOE, DOE contractors, and participants

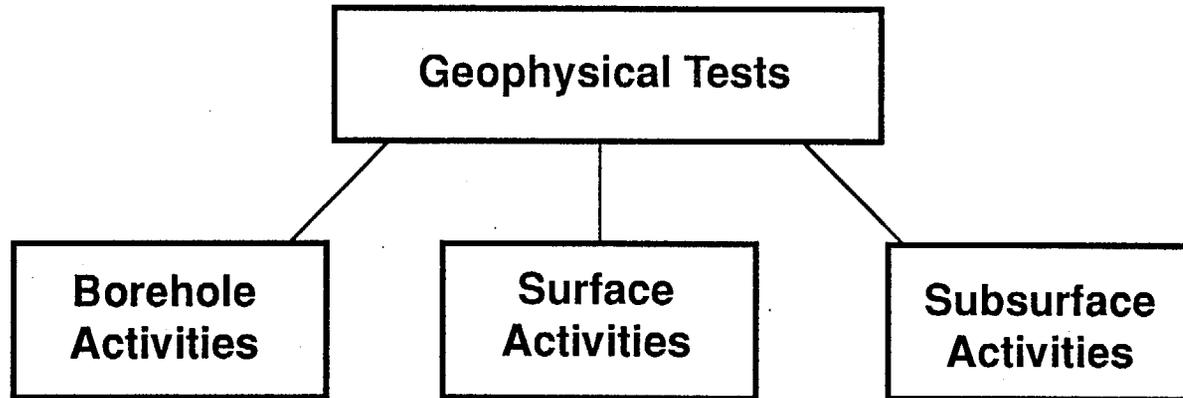
- **ESTIMATED SCHEDULE**

- Currently planned to start for mid FY-93 and continue through site characterization program

- **OBJECTIVE**

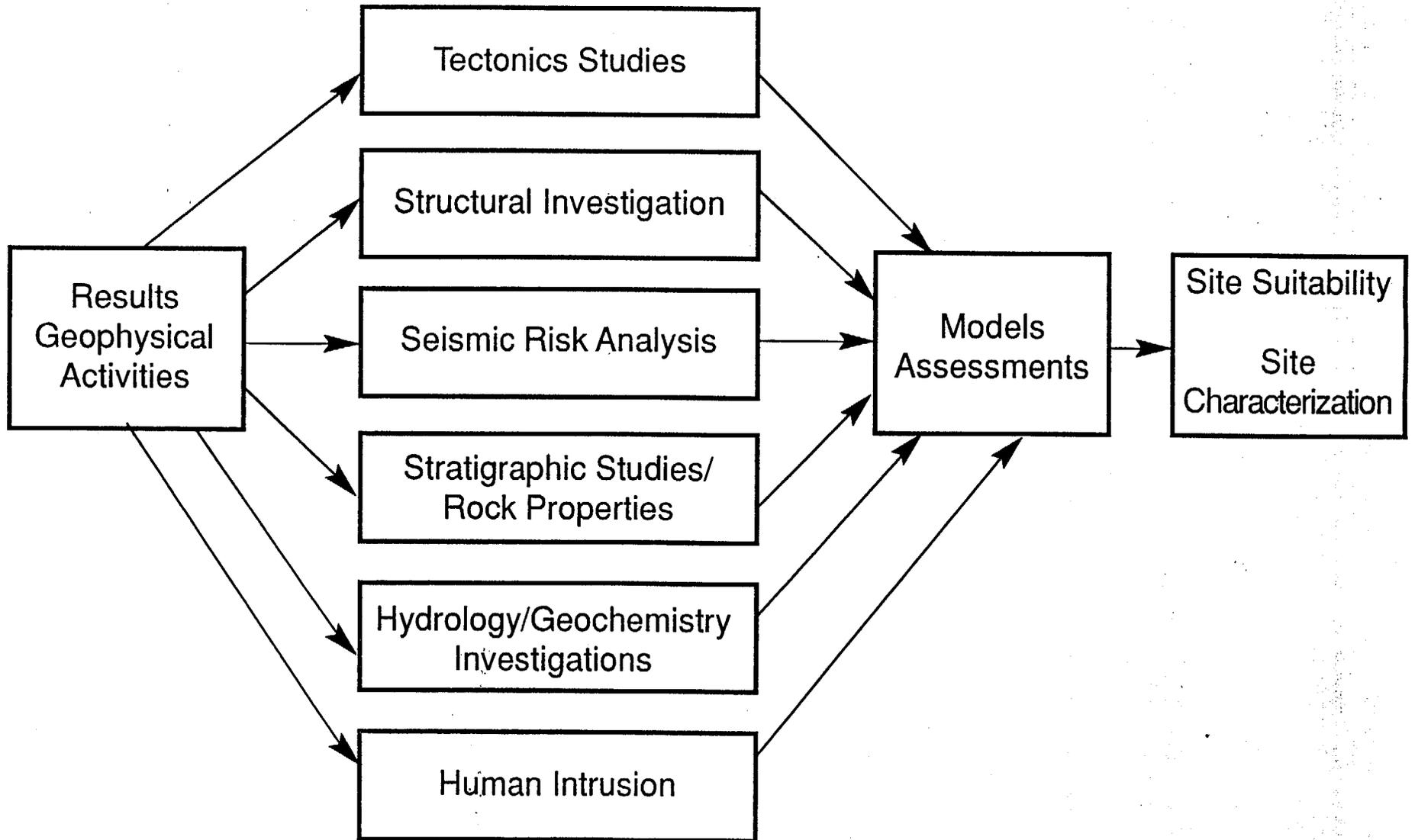
- Identify all geophysical tests in study plans
- Identify information feeds for geophysical activities (non-geophysical tests)
- Prioritize geophysical testing program
- Provide timely supporting information from results of geophysical testing for other studies

GEOPHYSICS INTEGRATION INITIATIVE



- **Attempt to schedule early geophysical testing**
- **May aid in prioritization of non-geophysical surface and subsurface testing programs**
- **May result in shift in emphasis for test locations, objectives**

GEPHYSICS INTEGRATION INITIATIVE



GEOPHYSICS INTEGRATION INITIATIVE

Phase I

Geophysics White Paper (1990, Oliver, et al.)

- **Priority of testing established**
- **Feasibility testing outlined**
- **Field testing in progress FY93**

Phase II

Geophysics Integration Task Force (in progress)

- **Will examine individual test scope**
- **Test integration within various site programs (structure, tectonics, human intrusion etc.)**
- **Test priority analysis**
- **Test adequacy evaluation and recommended scope changes**
- **Test sequencing analyses**
- **Test scheduling recommendations; monitor & schedule deliverables**
- **Evaluation continues through all site characterization**

Phase III

Integration of results for completed geophysical tests (in progress)

FY93 PLANNED ACCOMPLISHMENTS

Preliminary

1.2.5 Regulatory (\$23M)

Regulatory and Licensing

- **Support monthly interactions with NRC/NWTRB/ACNW**
- **Prepare and issue documents**
 - **ESSE comment responses**
 - **40 CFR 191 reviews and white paper**
 - **Two semi-annual progress reports**
 - **One revision of the MGDS annotated outline**
 - **Topical reports on erosion and seismic hazard methods**
 - **Accelerated seismic initiative**

FY92 ACCOMPLISHMENTS

WORK IS UNDERWAY AT SEVERAL LOCATIONS

Summary

- **UZ-16 drill pad construction completed**
- **Drilling at borehole UZ-16 approximately 800 feet down**
- **17 neutron access boreholes completed for natural infiltration studies. An additional 7 boreholes are planned**
- **28 soil test pits and 4 trenches were excavated in Midway Valley study area**
- **41 additional test pits excavated as part of Soil and Rock Properties investigations related to north area surface and subsurface access facilities**

WORK IS UNDERWAY

(CONTINUED)

Summary (Continued)

- **6 trenches were excavated and 4 pavements cleared for Quaternary fault studies**
- **NRG-1 (north ramp geologic hole) access road and pad completed; drilling completed**
- **Drilling of JF-3 environmental monitoring well completed and monitoring equipment installed; fulfills commitment to National Park Service**
- **Volcanism studies - 45 excavations completed**

OTHER FY92 MAJOR ACCOMPLISHMENTS

Regulatory/Licensing

- **Oversight group interactions include**
 - **16 with Nuclear Regulatory Commission (NRC)**
 - **15 with Nuclear Waste Technical Review Board (NWTRB)**
 - **15 with Advisory Committee on Nuclear Waste (ACNW)**
- **Prepared annotated outline for License Application and transmitted to NRC for review**

OTHER FY92 MAJOR ACCOMPLISHMENTS

(CONTINUED)

Performance Assessment

- Issued first Total System Performance Assessment
 - Modeled undisturbed conditions, volcanism, human intrusion and climate change
 - Results reflect current uncertainty in conceptual models and data sparsity
 - A range of infiltration rates modeled; some higher than those expected to exist in repository
- Published Performance Assessment Computational Exercise (PACE 90) report
- Developed, enhanced and documented a number of performance assessment codes

OTHER FY92 MAJOR ACCOMPLISHMENTS

(CONTINUED)

Issued Early Site Suitability Evaluation (ESSE) Report and Peer Review Report

- **Evaluated the Yucca Mountain Site using DOE's siting guidelines (10CFR960)**
- **Same guidelines used in the 1986 EA to identify candidate sites for characterization**
- **For the disqualifying conditions of the guidelines the report concluded**
 - **13 of 17 disqualifying conditions are not present and additional data is unlikely to change conclusion**
 - **4 of 17 disqualifying conditions are not likely to be present, but additional data is needed**

OTHER FY92 MAJOR ACCOMPLISHMENTS

(CONTINUED)

Issued Early Site Suitability Evaluation (ESSE) Report and Peer Review Report

- **For the qualifying conditions the report concluded**
 - **13 of 32 qualifying conditions are present and additional data is unlikely to change this conclusion**
 - **19 of 32 qualifying conditions are likely to be present but further information is needed**
- **ESSE report supports continuing site characterization studies to determine if Yucca Mountain is a safe site for a geologic repository**

FY 1992 YMP ACTIVITIES REFLECT LIMITED FUNDING

- **Complete initial, early site suitability evaluation draft report; continue ongoing suitability evaluation**
- **Initiate and continue new surface-disturbing (drilling) site characterization activities including:**
 - **Park Service monitoring borehole**
 - **Unsaturated zone boreholes**
 - **Geologic investigation boreholes**
 - **Field trenching**
 - **Test pits**
- **Continue ongoing surface-based site characterization activities**

Accomplished

FY 1992 YMP ACTIVITIES REFLECT LIMITED FUNDING

(CONTINUED)

- **Begin limited ESF Title II design in October 1991 (update repository design as appropriate)**
- **Quality Assurance program and planning**
- **Maintain a sound environmental program and provide support to field activities, as necessary**
- **Conduct performance assessment to support Project priorities/activities**
- **Continue to fully implement a YMP-wide cost/schedule planning and control system (PACS)**

Accomplished

FY 1992 YMP ACTIVITIES REFLECT LIMITED FUNDING

(CONTINUED)

- **Conduct a minimal waste package/EBS/near-field environment/waste form characterization program**
- **Maintain Project roads, buildings, records centers, etc.**
- **Conduct institutional/outreach programs**
- **Transition M&O (TRW) into Project activities**

Accomplished