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December 3, 1984

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MEMORANDUM FOR: Robert E. Browning, Director
Division of Waste Management

FROM: Paul T. Prestholt, Sr. OR-NNWSI PTP

Subject: NNWSI Site Report for Weeks of Nov. 19 and 26, 1984

I. On November 20, I received a call from Carl Johnson, State of Nevada, inviting me to accompany a tour of the NTS with State of Nevada and DOE personnel and Mr. David Tillson, a new consultant to Bob Loux's office. The group will look at the various areas of the NTS that have been proposed in the past, as HLW repository sites (Syncline Ridge, Wahmonie, Calico Hills, etc.). The tour is scheduled for December 12. I accepted.

II. I've been asked by Ralph Richards, DOE-WMPO, to get a legal opinion from the NRC concerning classified information about the seismic response of a few nuclear tests conducted at the NTS. The question is: Are the classified elements of these tests important to the determination of the seismic response of these tests to the repository site at Yucca Mountain; and will the review of these tests by a Q cleared, knowledgeable member of the NRC be sufficient to satisfy the hearing board in a future licensing action? In other words, can the classified nature of the data be protected in the future? I called Jim Wolf, ELD, and he referred me to 10 CFR 2.903, 904, and 905. These sections of the rule outline how national security matters are protected in a licensing hearing. I gave this information to Mr. Richards.

III. The NNWSI TPO-Project Manager meeting for November was held on the 27th and 28th. A number of subjects of interest to the staff were discussed.

Carl Johnson, State of Nevada, gave a presentation on the State's nuclear program goals, and specifically, on the State's independent research program. In general, the State of Nevada's program was well received, with some critical comment concerning the proposed field hydrology program. As I understand it, the DOE grant to the state is still being held up because of the State's

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insistence on conducting an independent drilling program.

The handout furinished by Mr. Johnson is enclosed.

Sandia National Laboratories gave a presentation on "Systems Engineering Management". The purpose of the presentation was to present a sensible way to implement these methods in the NNWSI Project in response to requirements that are being established by OCRWM. Enclosed is a handout describing the Sandia Systems Engineering philosophy, and some alternatives in generating a Systems Engineering Management Plan (SEMP). Also enclosed is an "Update, Yucca Mountain Mined Geologic Disposal System Description" prepared by Sandia.

Topical outlines for three NNWSI documents are enclosed. These are the following, with proposed date of issue:

1. Draft Performance Assessment Plan, 12-20-85
2. Surface-Based Test Plan, 12-20-85
3. Draft Exploratory Shaft Test Plan, 12-20-85

Also enclosed is a schedule for production and release of a number of important NNWSI documents.

The status of the NNWSI EA was discussed. The final camera-ready copy of the document was hand-delivered to Washington to arrive on Friday morning, November 29th. Dr. Vieth, the TPO's, the DOE and SAIC staff drank a champagne toast to the launching of the final EA.

Enclosed is some further information on the EA Public Interactions including the members of the briefing and hearing teams.

Enclosed is a draft NNWSI position paper on SCP Issues. This document is the result of discussions between BWIP and NNWSI as to how the SCP should be structured, and is a cut at a compromise between the two philosophies.

IV. On November 30, the monthly "State Informal Advisory Group" meeting was held in Las Vegas. A copy of the attendance roster is enclosed. Don Vieth presented a briefing on the SAIC-NNWSI support contract. SAIC's role in the NNWSI had been an item of interest and mild concern to the State of Nevada and members of local government. A copy of Dr. Vieth's viewgraphs is enclosed.

A recent meeting held by DOE at Oak Ridge National Laboratory on Computer Models of the Transportation Structure of the Waste Management Program was discussed. Two members of the group had attended and expressed disappointment. They didn't think the meeting did what it was supposed to. DOE gave an overview of the transportation system, and the states wanted a hands-on, nuts and bolts review of the computer software. Another workshop will be

held in February at Sandia. Roger Hilley of DOE-Hq. was complimented for stepping in and saving what might have been a real disaster of a meeting.

The local governments are very unhappy that there will be no questions and answers allowed at the EA hearings. They are concerned that there will be real anger displayed by citizens who travel to the hearings.

V. The "Legislative Seminar on High-Level Radioactive Waste Transportation" and "Legislative Working Group Meeting on High-Level Radioactive Waste Transportation" will be held in Las Vegas on December 4 and 5. I have been asked to attend by WMPC. A copy of the agenda is enclosed.

VI. A point that I feel should be stressed, came out of the TPO meeting. The NNWSI is anxious to hold technical meetings with the NRC. The participants consider that such meetings can be of inestimable value in preparing the SCP. They (the NNWSI participants) want to stress, however, that such meetings must be efficient, and must contribute to the SCP process. FY 1985 is Don Vieth's year of "Administrative Excellence" with many important documents to be written. However, all of this activity will be over-shadowed by the writing of the SCP, so the participants consider that all outside interactions must contribute to the production of this document.

NOV 27 1984

cc:
J. W. Bennett, DOE/HQ (RW-20), FORSTL
R. J. Blaney, DOE/HQ (RW-20), GTN
T. P. Longo, DOE/HQ (RW-22), GTN
C. R. Cooley, DOE/HQ (RW-24), GTN
M. W. Frei, DOE/HQ (RW-23), GTN
V. J. Cassella, DOE/HQ (RW-12), GTN
Ralph Stein, DOE/HQ (RW-23), FORSTL
E. S. Burton, DOE/HQ (RW-25), FORSTL
J. O. Neff, DOE/SRPO, Columbus, OH
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R. W. Lynch, SNL, 6300, Albuquerque, NM
W. W. Dudley, Jr., USGS, Denver, CO
L. D. Ramspott, LLNL, Livermore, CA
D. T. Oakley, LANL, Los Alamos, NM
J. B. Wright, W/WTSD, Mercury, NTS
M. E. Spaeth, SAIC, Las Vegas, NV
J. R. LaRiviere, SAIC, Las Vegas, NV
W. S. Twenhofel, SAIC, Lakewood, CO
J. H. Fiore, SAIC, Las Vegas, NV
R. R. Loux, NWPO, DOE/NV
C. H. Johnson, NWPO, DOE/NV
P. T. Prestholt, NRC/Las Vegas, NV

Encl. to memo
fm. Prestholt
12/3/84

Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114-4100

NOV 27 1984

W. J. Purcell, Director, Office of Geologic Repositories, DOE/HQ (RW-20), GTN

NNWSI WEEKLY HIGHLIGHTS FOR WEEK ENDING NOVEMBER 22, 1984

I. Issues Requiring Involvement of HQ or Other Projects

A. New Issues:

None to report.

B. Previously Reported Issues:

None to report.

II. Major Internal Concerns

None to report.

III. Significant Accomplishments (SA)/Information Items (II)

SA

None to report.

II

Chapters 2-5 of the EA are camera-ready. Dick Toft (Weston) is coming to Las Vegas next week to bring the Executive Summary and Chapters 1 and 7. He will assist in preparation of the NNWSI EA Table of Contents.

Discussions were held in Washington, D.C. regarding the E-MAD plans to transport spent fuel elements to Idaho and shutdown the E-MAD facility. HQ is evaluating the plans and has concerns regarding a proposal for caretaker status and funding needs beyond FY 1986. WMPO is studying the property management alternatives in the event it is determined to excess/abandon the E-MAD facility. WMPO will revise the plans according to HQ guidance when they are received from HQ.

WMPO has received a draft policy from HQ regarding State conduct of site specific field work at the proposed repository site. This guidance was reviewed with State representatives on November 20, 1984 in Las Vegas. A final assessment of the State's reaction cannot be made at this time.

IV. Upcoming Events

1. Coordination Group Meetings

- o Monday, December 3: Institutional/Socioeconomics Coordination Group Meeting, D.C.

2. HQ Meetings

- o Monday-Wednesday, December 3-4: EA Interaction Training Meeting, D.C.
- o Monday-Friday, December 3-7: Program SCP ATOC meeting.
- o Wednesday-Thursday, December 5-6: Office Automation Meeting, D.C.

3. Internal Project and DOE/NV Meetings

- o Monday-Friday, November 26-30: ESI Visit to LLNL (Records Center).
- o Tuesday, November 27: SAIC Monthly Status Review, Las Vegas.
- o Wednesday-November 28: Copper Research Meeting (CDA/INCRA), New York City, N.Y.
- o Wednesday-Thursday, November 28-29: PM-TPO Meeting, Las Vegas.
- o Wednesday, December 5: ESF Status Meeting, NTS.
- o Thursday-Friday, December 6-7: ESTP Committee Meeting, Las Vegas (tentative).
- o Monday, December 10: SCP Working Group (Issues) Meeting, Las Vegas (tentative).
- o Monday-Friday, December 10-14: ESI Visit to SNL (Records).
- o Monday-Wednesay, December 10-12: ESTP PIs meeting with DLV, Las Vegas (tentative).
- o Monday-Friday, December 17-21: ESI Visits to USGS, SNL, and LANL (Records).
- o Monday-Friday, January 7-11 and 14-18: ESI Visits to NTS Contractors.
- o Monday-Friday, January 14-18: ESI Visit to SAIC, Las Vegas.
- o Wednesday-Thursday, January 23-24: PM-TPO Meeting, Las Vegas.

4. State and Public Interaction

- Monday-Friday, November 26-30: Materials Research Society Annual Meeting, Boston.
- Tuesday, November 27: Community Monitoring Presentation, Silver Peak, NV.
- Thursday, December 6: National Conference of State Legislatures Tour of NTS.
- Friday, December 7: Nye County Commissioners/Advisory Board tour of NTS.
- Tuesday, January 8: EA Briefing to State Officials in Carson City.
- Tuesday, January 22: EA Public Briefing, Las Vegas.
- Wednesday, January 23: EA Public Briefing, Beatty.
- Thursday, January 24: EA Public Briefing, Reno.

5. NRC Interaction

- Thursday-Friday, December 13-14: NRC NNWSI QA Review Meeting, Las Vegas.

Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-352

NOV 27 1984

cc w/encls 1 & 2:
J. O. McElvey, DOE/HQ (RW-3), FORSTL
R. W. Gale, DOE/HQ (RW-44), FORSTL
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A. J. Roberts, RMBD, DOE/NV
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NOV 27 1984

E. S. Burton, Siting Division, Office of Geologic Repositories,
DOE/HQ (RW-25), FORSTL

NNWSI PLAN FOR IMPLEMENTATION OF ENVIRONMENTAL ASSESSMENT (EA) INTERACTION ACTIVITIES

This plan, which is based on the October 17, 1984, "Final Procedures for Environmental Assessment (EA) Interaction Activities" developed by the Office of Civilian Radioactive Waste Management; the November 9, 1984 DOE/HQ guidance regarding interactive public briefings; and the November 16, 1984 DOE/HQ verbal directions regarding Briefing agenda; addresses the overall format, personnel assignments and detailed milestones for the implementation of three specific activities within Nevada:

- state official pre-release notification
- public/state official briefings
- public hearings

Appendix A is a chronological list of milestone activities, personnel responsibility and due date; Appendix B is a listing of the various teams, personnel assignments and duration of team existence; and Appendix C is a PERT chart of milestone activities.

Certain responsibilities will carry across the full spectrum of EA Interaction Activities. These responsibilities and the proposed personnel include:

- Overall Coordination - Allen Roberts, RMBD, DOE/NV
  Marge Olson, SAIC
- Management Review - Donald L. Vieth, WMPO, DOE/NV
  Maxwell Blanchard, WMPO, DOE/NV
- Logistics - Sue Volek, SAIC
- Media Interaction - Chris West, OPA, DOE/NV
- Legal Support - Dave Gassman, OGC, DOE/NV

Post hearing activities will be addressed in a later memo, following clarification by DOE/HQ on several key items, e.g., comment response document.

State Official Pre-Release Notification

- Format - This activity is to provide hand delivery of the Yucca Mountain Draft EA to select officials in the state, counties, and communities prior to the official public release. DOE/HQ has indicated that they will provide similar delivery to the State Congressional delegation - both lame duck and newly elected members.

Tentatively, it is anticipated that a State Notification Team will be in Carson City December 19 to deliver the following items to the governor's project office and state legislative committee representative.

- Yucca Mountain Draft EA
- Other eight sites EA
- Yucca Mountain Draft EA Briefing Book

By December 20, similar deliveries will be made to appropriate representatives of Clark, Lincoln and Nye counties and the communities of Boulder City, Henderson, Las Vegas and North Las Vegas. It can be expected that the State Notification Team should be prepared to discuss and/or respond to questions about:

- Procedural issues regarding the public comment process
- Schedule and agenda for Public and State Official Briefings
- Media Contact
- State interactions
- DOE/HQ recommendation methodology

Proposed members for the State Notification Team are:

Members: D. L. Vieth, WMPO, DOE/NV
Chris West, OPA, DOE/NV
Allen Roberts, RMBD, DOE/NV

A chronological list of state pre-release notification activities, due date, and responsible personnel follows.

Nov. 2	Designate proposed NNWSI State Notification Team	Olson
Nov. 7-9	PO's, HQ discuss BWIP Draft EA reference distribution plan	Roberts, Olson Volek
Nov. 15	Draft NNWSI State Notification plan completed	Olson
Nov. 16	Draft NNWSI State Notification plan reviewed with Loux (verbal)	Roberts
Nov. 16	Submit to HQ complete mailing list (pressure sensitive labels with designation of what to send)	Roberts
Nov. 19	Draft NNWSI State Notification plan cleared by WMPO	Vieth/Blanchard
Nov. 20	NNWSI State Notification plan submitted to HQ	Olson/Vieth
Nov. 21	Confirm necessary appointments for State notifications	Roberts
Nov. 26	Confirm travel arrangements for State Notification Team	Volek
Nov. 27	Submit DOE/NV press release and mailing list on release of Yucca Mountain EA to HQ	West

Nov. 29	Receive HQ clearance on NNWSI State Notification Plan	DOE/HQ
Dec. 6	Receive HQ clearance on DOE/NV press release on EA release	DOE/HQ
Dec. 12	Mail embargoed DOE/NV press release on EA release	West
Dec. 17	Receive 200 Yucca Mountain EAs; 50 sets of EA from other 8 sites	DOE/HQ
Dec. 18	Prepare package for State Notification Team	Olson
Dec. 19	State Pre-Release Notification	State Notif. Team
Dec. 20	State Release Notification	State Notif. Team
Dec. 20	Release of EA to public	DOE/HQ

Public/State Officials Briefings

It is anticipated that three Public Briefings will be held approximately one month after the release of the EA. The objective of the Briefings is to provide a common ground of understanding for both DOE/WMPO and the public regarding the EA. In this way it is hoped that the public comments and the DOE response in the final EA will be within a perspective understood by both parties. Specifically, the Briefings will be directed towards responding to inquiries from individuals who have reviewed the draft EA and to providing information and assistance to those individuals wishing to review the draft EA.

The format for the Public Briefings will be informal with brief presentations by DOE/WMPO and DOE/HQ followed by general discussion and question/answer. During the general Q/A session, topic experts will be available to discuss key issues. If the size of the audience precludes managable discussion, the group will be broken into smaller groups by topic area. Otherwise, the topic experts will be introduced and a general discussion period will ensue. One or two DOE/WMPO personnel will serve as moderators during the general discussion. They will be responsible for fielding the questions and directing them to the topic experts who will be located in the audience. The Public Briefings will last approximately 3-4 hours, although the Briefing Team should be prepared to stay until all questions are answered.

To provide maximum opportunity for interaction, both written and oral questions will be received. A typist will be available in the back of the room to type these questions in duplicate: one copy for the originator and one copy will be sent to the moderator. The copy to the originator is to assure that the question is not "lost" or ignored. The written questions will be alternated with oral questions from the audience.

The Public Briefings will be held only in the evening to encourage attendance by the public. Press releases and display advertisements will be used to notify the media and general public about the meetings.

In addition to the Public Briefings, one briefing will be held for State Officials in Carson City. This briefing has been requested by the State Nuclear Waste Project Office and the State will take the lead in developing the invitation list of officials. The WMPO presentation will be only one component in a full day meeting the state plans to conduct to discuss the EA and the comment process. Although the State Officials Briefing will be an open meeting, there will be no display advertisements.

The schedule for the briefings is as follows:

- January 8, 1985 - 9:00 a.m. - State Officials Briefing in Carson City
- January 22, 1985 - 7:00 p.m. - Public Briefing in Las Vegas
- January 23, 1985 - 7:00 p.m. - Public Briefing in Beatty
- January 24, 1985 - 7:00 p.m. - Public Briefing in Reno

Public Briefings will be conducted for the nine proposed sites. The Project Offices (POs) have concurred on the general format for the agenda and the Briefing Book. The specific contents of the Briefing Book, by subject, were documented at the October 26 meeting of the Institutional Socioeconomic Coordinating Group.

The agenda for the Nevada Public Briefings will be:

o	General Welcome and Introduction	5 mins-WMPO
	- Purpose and Format	
	- Agenda	
	- Briefing Team members	
o	Background	15 mins-present-HQ
	- NWPA	15 mins-Q&As
	- Purpose of EA	
	- NWPA EA vs. NEPA EA	
o	EA - Document Organization	15 mins-present-WMPO & HQ
	- Data, definitions, table of contents	15 mins-Q&As
	- Summary chapters 1-7	
	- Reference availability	
o	Coffee Break	15 mins
o	General Discussion/Q&A	

Experts will be available on the following subjects:

- Site Selection Process, Decision Methodology (HQ)
- Geology (performance by host rock) (SAIC)
- Hydrology (USGS)
- Transportation (SAIC)
- Socioeconomics (SAIC)

- Repository Design (SNL)
- EA Public Comment Process (WMPO)
- Radiological Health Physics (SAIC and DOE/NV)

The Briefing Team should contain personnel from DOE/WMPO who will be responsible for the presentations described above. In addition, there should be representatives from the Office of Public Affairs, State Liaison, Office of General Counsel and technical support staff. It is anticipated that these individuals would provide support to the DOE/WMPO personnel during the Q&A portions of the Briefings. The representative from the Office of Public Affairs would be the media contact point for all of the Briefings. Finally, DOE/HQ will designate a representative who will be responsible for the HQ presentations noted above. Because DOE/HQ has indicated the possibility that weather, etc. might prevent HQ attendance, a member of the WMPO team must be assigned responsibility as the HQ alternate.

The Briefing Team will attend a Training Session for all Briefing Teams December 4-5 in Washington, D.C. DOE/HQ is managing this session. The Yucca Mountain Briefing Team, minus the HQ representative, will participate in a dry run preparation session in Las Vegas on January 4, 1985.

Proposed Briefing Team members and their responsibilities are listed below.

- o Donald L. Vieth, WMPO, DOE/NV
  - Presentation on: General Welcome/Introduction
  - Topic Expert on: EA public comment process
  - Moderator during general discussion

- o Maxwell Blanchard, WMPO,DOE/NV
  - Presentation on: EA - Document organization
  - Moderator during general discussion

- o Michael Voegele, SAIC
  - Topic Expert on: Earth Science (e.g., geology, rock mechanics, tectonics)

- o Jean Younker, SAIC
  - Alternate and technical support

- o Michael Foley, SAIC
  - Topic Expert on: Environmental Science (e.g., environment, transportation, socioeconomics)

- o Mary Lou Brown, SAIC
  - Alternate and socioeconomics support

- o Bill Dudley, USGS
  - Topic Expert on: Hydrology

- o Tom Hunter, SNL
  - Topic Expert on: Repository Design
- o Cindy Alexander, SAIC
  - Topic Expert on: Socioeconomics
- o Richard Belanger, SAIC
  - Topic Expert on: Radiological Health Physics
- o Chris West, OPA, DOE/NV
  - Media Contact
- o Allen Roberts, RMBD, DOE/NV
  - State Liaison
- o Dave Gassman, OGC, DOE/NV
  - Legal aspects of NWPA and 10 CFR 960
- o Sue Volek, SAIC
  - logistics
- o Marge Olson, SAIC
  - coordination

A chronological list of Public/State Officials Briefings activities, due date and responsible personnel follows.

Nov. 2	Designate proposed NNWSI Briefing Team	Olson
Nov. 5	Reserve facilities for Briefings	Volek
Nov. 6	Final draft NNWSI material for Briefing Book	Volek/Olson
Nov. 7-9	Receive final draft material for Briefing Book from other POs and HQ; discuss content and production	Roberts, Olson Volek
Nov. 16	Receive draft material from HQ on Briefing Team Training Session	HQ
Nov. 16	Hotel reservations made for Briefing Team Training Session	Olson
Nov. 16	Solicit mailing list for State Officials Briefing from Bob Loux	Roberts
Nov. 19	Final NNWSI material for Briefing Book cleared by WMPO	Vieth/Blanchard
Nov. 26	Submit final NNWSI material for Briefing Book to HQ	Olson/Vieth
Nov. 26	Submit HQ comments on HQ draft material for Briefing Team Training Session	Olson (comments from West, Roberts, Blanchard, Vieth)

Dec. 3	Confirm travel arrangements for Briefing Team to all Briefings	Volek
Dec. 3	Receive HQ clearance on Yucca Mountain Briefing Book	HQ
Dec. 4-5	HQ training session in Washington, D.C. for Briefing Team	Briefing Team
Dec. 7	Finalize mailing list and letter of invitation for State Official Briefing	Roberts, Olson
Dec. 10	Submit DOE/NV press release display advertisements (2), and mailing lists on Public Briefings to HQ	West
Dec. 10	Mail letters of invitation for State Officials Briefing	Olson
Dec. 10	Begin production of Briefing Book	Olson
Dec. 17	Receive HQ clearance on DOE/NV press release and display advertisements on Public Briefings	HQ
Dec. 17	Receive printed copies of Briefing Book	Olson
Dec. 17	Check with invitees who have not RSVPed to State Officials Briefing	Roberts
Jan. 2	DOE/NV press release on Public Briefings issued	West
Jan. 4	NNWSI dry run for Briefing Team	Briefing Team
Jan. 7	Confirm support (name tags, coffee, overheads) material for Public Briefings	Volek
Jan. 8	9:00 - State Officials Briefing in Carson City	Briefing Team
Jan. 12-13	General display advertisement on all Public Briefings	West
Jan. 14	Handout packages for Public Briefings assembled	Olson/Volek
Jan. 21	Display Advertisement for Las Vegas Public Briefings	West
Jan. 22	7:00 p.m. - Public Briefing in Las Vegas	Briefing Team
Jan. 22	Display Advertisement for Beatty Public Briefing	West
Jan. 23	7:00 p.m. - Public Briefing in Beatty	Briefing Team
Jan. 23	Display Advertisement for Reno Public Briefing	West
Jan. 24	7:00 p.m. - Public Briefing in Reno	Briefing Team

Public Hearings

In response to a request from the state, public hearings on the draft EA for the proposed Yucca Mountain site will be held approximately 60 days after release of the EA. In response to HQ guidance, plans have been made for a second day of hearings at each hearing site in the event that DOE is unable to accommodate all requests to present testimony on the first day.

The schedule for the hearings is as follows:

Feb. 25, 1985	10:00 a.m.-2:00 p.m.; 6:00 p.m.-10:00 p.m. - Amargosa
Feb. 26, 1985	10:00 a.m.-2:00 p.m.; 6:00 p.m.-10:00 p.m. - Las Vegas
Feb. 27, 1985	2nd day hearings - if needed - in Las Vegas; time to be determined

Feb. 28, 1985	10:00 a.m.-2:00 p.m.; 6:00 p.m.-10:00 p.m. - Reno
Mar. 1, 1985	2nd day hearings - if needed - in Reno; time to be determined
Mar. 4, 1985	2nd day hearings - if needed - in Amargosa; time to be determined

Four persons will be involved in the conduct of the hearings:

- A senior DOE/HQ official will be the presiding officer and will open the hearings with an introductory statement about the repository program and the purpose of the EAs.

- A hearing panel comprised of a moderator and two panelists will receive the testimony. The moderator will be non-DOE with experience in conducting public hearings. The moderator will be responsible for describing the hearing format, including schedule and time limits, and for all administration regarding the conduct of the hearings.

  The two panelists shall include one DOE/WMPO staff person familiar with the contents of the Yucca Mountain draft EA and one independent person recognized as a state and/or community leader.

  The function of the hearing panel will be to identify areas of testimony where clarification may be necessary and to answer procedural questions.

In addition, DOE/WMPO shall designate a Hearing Team comprised of individuals who are (1) familiar with the Yucca Mountain draft EA and (2) responsible for responding to public comment in production of the final EA. These individuals shall plan to attend the EA hearings.

Although there will be no designated public hand-out package at the hearings, a table should be set up in the rear of the room to make the following documents available.

- o Yucca Mountain EA (limited quantity)
- o Executive summaries of all nine EAs (prepared by HQ) - If available
- o Site selection process brochure (prepared by HQ)
- o Yucca Mountain Draft EA Briefing Book
- o WMPO Fact Sheets
  - Why Yucca Mountain?
  - What is Tuff?

This table should be staffed by a representative of the DOE/NV Office of Public Affairs and will serve as a the media contact point.

The hearings will be held at readily accessible sites, e.g., hotel meeting rooms, university buildings, community centers, etc. The hearings will be announced to the public through press releases and display advertisements.

DOE/HQ will conduct a training session for the Hearing Panel. In addition, DOE/WMPO shall conduct at least two separate sessions to help prepare the panel, including the moderator.

The following are proposed to serve in various support roles:

- o Moderator - an individual with academic background and experience from serving at the Yucca Mountain scoping hearings
- o Panel - (1) Max Blanchard to represent DOE/WMPO, (2) A county commissioner from Nye County (alternate: Clark County)
- o DOE/WMPO Hearing Team
  - D. L. Vieth, WMPO, DOE/NV
  - Allen Roberts, RMBD, DOE/NV - state liaison
  - Chris West, OPA, DOE/NV - media contact
  - M. I. Foley, SAIC - environmental sciences support
  - M. D. Voegele, SAIC - earth sciences support
  - J. L. Younker, SAIC - earth sciences support
  - M. L. Brown, SAIC - environmental sciences support
  - T. O. Hunter, SNL - repository design support
  - W. W. Dudley, USGS - hydrology support
  - Richard Belanger, SAIC - radiological health physics support
  - S. M. Volek, SAIC - logistics support
  - M. H. Olson, SAIC - coordination support

Specific milestones, responsible individual and due dates for the public hearings include the following:

Nov. 2	Designate proposed NNWSI Hearing Team & Hearing Panel	Olson
Nov. 7-9	POs, HQ discuss panel role; limitations on interactions with public; OGC position	Roberts, Volek, Olson
Nov. 27	Reserve facilities for hearings	Volek
Nov. 27	Submit panel/moderator nomination package to WMPO	Roberts/Olson
Dec. 6	WMPO clears panel/moderator nomination package	Vieth/Blanchard
Dec. 7	Submit panel/moderator nomination package to HQ	Olson/Vieth
Dec. 10	Designate DOE (SAIC) contact person to schedule/receive requests to comment at hearings	Volek
Dec. 13	Receive HQ clearance on panel/moderator nomination package	HQ
Dec. 17	Send letters of invitation to panel/moderator	Olson/Roberts
Dec. 18	Submit plans to WMPO for court recording, transcript and distribution services	Volek
Jan. 4	Confirm panel/moderator response to letters of invitation	Roberts
Jan. 7	Send letter to panel/moderator confirming acceptance; giving schedule of activities	Roberts/Olson

Jan. 8	Contract court recording, transcript, distribution services	Volek
Jan. 9	Submit to HQ: Public Hearings - individuals who will be invited to comment - draft letter of invitation - draft press releases (2) - draft display advertisements (2)	Olson/West
Jan. 14	Confirm travel arrangements for Hearing Team	Volek
Jan. 16	Receive HQ clearance of Jan. 9 submission	HQ
Jan. 17	First WMPO preparation session for panel/moderator	Olson/Roberts
Jan. 18	Mail letters of invitation to comment	Olson
Jan. 18	Issue DOE/NV press release #1	West
Jan. 21	Receive requests to comment (continues to end of hearings)	Volek
Jan. 31	HQ training session for hearings	HQ
Feb. 4	Confirm all necessary support equipment at hearing locations	Volek
Feb. 7	Second WMPO preparation session for panel/moderator	Olson/Richards
Feb. 8	Display advertisement #1	West
Feb. 11	Contact invited individuals who have not responded	Olson
Feb. 15	Issue DOE/NV press release #2	West
Feb. 20	Prepare public information package for each hearing location	West/Olson
Feb. 22	Make list of scheduled commenters (daily updates through hearings)	Volek
Feb. 22	Display ad in Amargosa	West
Feb. 25	10-2; 6-10 - Public Hearing in Amargosa	Hearing Team
Feb. 25	Display ad in Las Vegas	West
Feb. 26	10-2; 6-10 - Public Hearing in Las Vegas	Hearing Team
Feb. 27	Contingency continuation day in Las Vegas	
Feb. 27	Display ad in Reno	West
Feb. 28	10-2; 6-10 - Public Hearing in Reno	Hearing Team
Mar. 1	Contingency continuation day in Reno	
Mar. 4	Contingency continuation day in Amargosa	

Donald L. Vieth

Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-366

Enclosures:
1. Appendix A - Chronological List of Milestone Activities
2. Appendix B - Team Membership
3. Appendix C - PERT Chart

Appendix A: Chronological List of Milestone Activities

Nov. 2	Designate proposed NNWSI Hearing Team & Hearing Panel	Olson
Nov. 2	Designate proposed NNWSI State Notification Team	Olson
Nov. 2	Designate proposed NNWSI Briefing Team	Olson
Nov. 5	Reserve facilities for Briefings	Volek
Nov. 6	Final draft NNWSI material for Briefing Book	Volek/Olson
Nov. 7-9	Receive final draft material for Briefing Book from other POs and HQ; discuss content and production	Roberts, Olson Volek
Nov. 7-9	POs, HQ discuss panel role; limitations on interactions with public; OGC position	Roberts, Volek, Olson
Nov. 7-9	PO's, HQ discuss BWIP Draft EA reference distribution plan	Roberts, Olson, Volek
Nov. 15	Draft NNWSI State Notification plan completed	Olson
Nov. 16	Draft NNWSI State Notification plan reviewed with Loux (verbal)	Roberts
Nov. 16	Submit to HQ complete mailing list (pressure sensitive labels with designation of what to send)	Roberts
Nov. 16	Receive draft material from HQ on Briefing Team Training Session	HQ
Nov. 16	Hotel reservations made for Briefing Team Training Session	Olson
Nov. 16	Solicit mailing list for State Officials Briefing from Bob Loux	Roberts
Nov. 19	Final NNWSI material for Briefing Book cleared by WMPO	Vieth/Blanchard
Nov. 19	Draft NNWSI State Notification plan cleared by WMPO	Vieth/Blanchard
Nov. 20	NNWSI State Notification plan submitted to HQ	Olson/Vieth
Nov. 21	Confirm necessary appointments for State notifications	Roberts
Nov. 26	Submit final NNWSI material for Briefing Book to HQ	Olson/Vieth
Nov. 26	Confirm travel arrangements for State Notification Team	Volek
Nov. 26	Submit HQ comments on HQ draft material for Briefing Team Training Session	Olson (comments from West, Roberts, Blanchard, Vieth)
Nov. 27	Reserve facilities for hearings	Volek
Nov. 27	Submit panel/moderator nomination package to WMPO	Roberts/Olson
Nov. 27	Submit DOE/NV press release and mailing list on release of Yucca Mountain EA to HQ	West
Nov. 29	Receive HQ clearance on NNWSI State Notification Plan	DOE/HQ
Dec. 3	Receive HQ clearance on Yucca Mountain Briefing Book	HQ
Dec. 3	Confirm travel arrangements for Briefing Team to all Briefings	Volek

Dec. 4-5	HQ training session in Washington, D.C. for Briefing Team	Briefing Team
Dec. 6	WMPO clears panel/moderator nomination package	Vieth/Blanchard
Dec. 6	Receive HQ clearance on DOE/NV press release on EA release	DOE/HQ
Dec. 7	Submit panel/moderator nomination package to HQ	Olson/Vieth
Dec. 7	Finalize mailing list and letter of invitation for State Official Briefing	Roberts, Olson
Dec. 10	Submit DOE/NV press release display advertisements (2), and mailing lists on Public Briefings to HQ	West
Dec. 10	Mail letters of invitation for State Officials Briefing	Olson
Dec. 10	Begin production of Briefing Book	Olson
Dec. 10	Designate DOE (SAIC) contact person to schedule/receive requests to comment at hearings	Volek
Dec. 12	Mail embargoed DOE/NV press release on EA release	West
Dec. 13	Receive HQ clearance on panel/moderator nomination package	HQ
Dec. 17	Receive HQ clearance on DOE/NV press release and display advertisements on Public Briefings	HQ
Dec. 17	Receive printed copies of Briefing Book	Olson
Dec. 17	Check with invitees who have not RSVPed to State Officials Briefing	Roberts
Dec. 17	Receive 200 Yucca Mountain EAs; 50 sets of EA from other 8 sites	DOE/HQ
Dec. 17	Send letters of invitation to panel/moderator	Olson/Roberts
Dec. 18	Submit plans to WMPO for court recording, transcript and distribution services	Volek
Dec. 18	Prepare package for State Notification Team	Olson
Dec. 19	State Pre-Release Notification	State Notif. Team
Dec. 20	State Release Notification	State Notif. Team
Dec. 20	Release of EA to public	DOE/HQ
Jan. 2	DOE/NV press release on Public Briefings issued	West
Jan. 4	Confirm panel/moderator response to letters of invitation	Roberts
Jan. 4	NNWSI dry run for Briefing Team	Briefing Team
Jan. 7	Send letter to panel/moderator confirming acceptance; giving schedule of activities	Roberts/Olson
Jan. 7	Confirm support (name tags, coffee, overheads) material for Public Briefings	Volek
Jan. 8	9:00 - State Officials Briefing in Carson City	Briefing Team
Jan. 8	Contract court recording, transcript, distribution services	Volek
Jan. 9	Submit to HQ: Public Hearings - individuals who will be invited to comment - draft letter of invitation - draft press releases (2) - draft display advertisements (2)	Olson/West

Jan. 12-13	General display advertisement on all Public Briefings	West
Jan. 14	Handout packages for Public Briefings assembled	Olson/West
Jan. 14	Confirm travel arrangements for Hearing Team	Volek
Jan. 16	Receive HQ clearance of Jan. 9 submission	HQ
Jan. 17	First WMPO preparation session for panel/ moderator	Olson/Roberts
Jan. 18	Mail letters of invitation to comment	Olson
Jan. 18	Issue DOE/NV press release #1 (on hearings)	West
Jan. 21	Receive requests to comment (continues to end of hearings)	Volek
Jan. 21	Display advertisement for Las Vegas Public Briefings	West
Jan. 22	7:00 p.m. - Public Briefing in Las Vegas	Briefing Team
Jan. 22	Display advertisement for Beatty Public Briefing	West
Jan. 23	7:00 p.m. - Public Briefing in Beatty	Briefing Team
Jan. 23	Display advertisement for Reno Public Briefing	West
Jan. 24	7:00 p.m. - Public Briefing in Reno	Briefing Team
Jan. 31	HQ training session for hearings	HQ
Feb. 4	Confirm all necessary support equipment at hearing locations	Volek
Feb. 7	Second WMPO preparation session for panel/ moderator	Olson/Richards
Feb. 8	Display advertisement #1 (on hearings)	West
Feb. 11	Contact invited individuals who have not responded	Olson
Feb. 15	Issue DOE/NV press release #2 (on hearings)	West
Feb. 20	Prepare public information package for each hearing location	West/Olson
Feb. 22	Make list of scheduled commenters (daily updates through hearings)	Volek
Feb. 22	Display ad in Amargosa	West
Feb. 25	10-2; 6-10 - Public Hearing in Amargosa	Hearing Team
Feb. 25	Display ad in Las Vegas	West
Feb. 26	10-2; 6-10 - Public Hearing in Las Vegas	Hearing Team
Feb. 27	Contingency continuation day in Las Vegas	
Feb. 27	Display ad in Reno	West
Feb. 28	10-2; 6-10 - Public Hearing in Reno	Hearing Team
Mar. 1	Contingency continuation day in Reno	
Mar. 4	Contingency continuation day in Amargosa	

Appendix B: Team Membership

EA Interaction Activities Management Team

Objective: Overall management of all EA interaction activities, including but not limited to, pre-release notification, state officials briefing, public briefings, public hearings.

Time Frame: November 5, 1984, to close of public comment period

Members:

Donald L. Vieth, WMPO, DOE/NV - management review
Max Blanchard, WMPO, DOE/NV - management review
Allen Roberts, RMBD, DOE/NV - DOE coordination
Marge Olson, SAIC - contractor coordination
Chris West, OPA, DOE/NV - media contact
Dave Gassman, OGC, DOE/NV - legal counsel
Sue Volek, SAIC - logistics

State Notification Team

Objective: Personal delivery and/or transmittal of the draft EA, in a timely manner, to the appropriate state, county and community officials and local Congressional offices.

Time Frame: November 5, 1984 - December 21, 1984

Members:

Donald L. Vieth, WMPO, DOE/NV - WMPO representative
Allen Roberts, RMBD, DOE/NV - State liaison
Chris West, OPA, DOE/NV - Media contact

Briefing Team

Objective: Presentations to, discussions with, response to questions, and attendance at the requested briefing for state officials and the three public briefings in order to support DOE interaction with the public and enhance the quality of comments at the public hearings.

Time Frame: November 5, 1984 - January 25, 1985

Members:

- Donald L. Vieth, WMPO, DOE/NV
  - Presentation on: General Welcome/Introduction
  - Topic Expert on: EA public comment process
  - Moderator during general discussion

- Maxwell Blanchard, WMPO,DOE/NV
  - Presentation on: EA - Document organization
  - Moderator during general discussion

- Michael Voegele, SAIC
  - Topic Expert on: Earth Science (e.g., geology, rock mechanics, tectonics)

- Jean Younker, SAIC
  - Alternate and technical support

- Michael Foley, SAIC
  - Topic Expert on: Environmental Science (e.g., environment, transportation, socioeconomics)

- Mary Lou Brown, SAIC
  - Alternate and socioeconomics support

- Bill Dudley, USGS
  - Topic Expert on: Hydrology

- Tom Hunter, SNL
  - Topic Expert on: Repository Design

- Cindy Alexander, SAIC
  - Topic Expert on: Socioeconomics

- Richard Belanger, SAIC
  - Topic Expert on: Radiological Health Physics

- Chris West, OPA, DOE/NV
  - Media Contact

- Allen Roberts, RMBD, DOE/NV
  - State Liaison

- Dave Gassman, OGC, DOE/NV
  - Legal aspects of NWPA and 10 CFR 960

- Sue Volek, SAIC
  - logistics

- Marge Olson, SAIC
  - coordination

Public Hearing Panel

Objective: Following the opening of the hearing by the presiding DOE/HQ official, the panel shall state the administrative format of the hearing, note where clarification in testimony may be helpful, answer procedural questions and certify the hearing record.

Time Frame: November 5, 1984 - March 5, 1985

Members:

Moderator: To Be Determined
Panelists: Maxwell Blanchard, WMPO, DOE/NV
Commissioner, Nye County (or Clark County)

DOE Public Hearing Team

Objective: As individuals familiar with the draft EA and responsible for production of the final EA, attendance at all public hearings to observe tenor of hearings and tonal inflections of testimony which may not be evident in written transcript in order to enhance quality of final EA.

Time Frame: November 5, 1984 - March 5, 1985

Members:

Donald L. Vieth, WMPO, DOE/NV
M. D. Voegele, SAIC
M. I. Foley, SAIC
J. L. Younker, SAIC
M. L. Brown, SAIC
T. O. Hunter, SNL
W. W. Dudley, USGS
Richard Belanger, SAIC
Allen Roberts, RMBD, DOE/NV
Chris West, OPA, DOE/NV
S. M. Volek, SAIC
M. H. Olson, SAIC

LEGISLATIVE SEMINAR ON HIGH-LEVEL RADIOACTIVE WASTE TRANSPORTATION
and
LEGISLATIVE WORKING GROUP MEETING ON HIGH-LEVEL RADIOACTIVE WASTE TRANSPORTATION

December 3-6, 1984
Desert Inn
Las Vegas, Nevada

6:00 p.m.-8:00 p.m. REGISTRATION

6:00 p.m.-8:00 p.m. OPENING RECEPTION (No-Host)

Proposed Agenda

December 4, 1984

8:00 a.m.-9:00 a.m. REGISTRATION

9:00 a.m.-9:15 a.m. WELCOME
The Honorable Thomas J. Hickey
Nevada State Senator

9:15 a.m.-9:35 a.m. THE NATIONAL HIGH-LEVEL RADIOACTIVE WASTE PROGRAM
Roger Gale, Director
Office of Policy Integration and Outreach
Office of Civilian Radioactive Waste Management (OCRWM)
U.S. Department of Energy (DOE)

9:35 a.m.-9:55 a.m. U.S. DEPARTMENT OF ENERGY
STORAGE AND TRANSPORTATION PROGRAM
Roger Hilley, Associate Director
Office of Storage and Transportation Systems
OCRWM

9:55 a.m.-10:15 a.m. OVERVIEW
Review of High-Level Radioactive Waste (HLW) Transportation Issues
Doug Larson, Executive Director
Western Interstate Energy Board (invited)

10:15 a.m.-11:15 a.m. PANEL PRESENTATION
Perspectives of State and Local Governments, Industry, and Environmental Community on HLW Transportation
Leonard Sloskey
Colorado Governor's Science Advisor

Robert W. Bishop, Esq.
Chairman, Electric Utility Companies' Nuclear Transportation Group

Dr. Fred Millar
Nuclear and Hazardous Materials Transportation Project
Environmental Policy Institute

December 4, 1984 (continued)

10:15 a.m.-11:15 a.m. (continued)	PANEL PRESENTATION Dennis A. Bechtel Advance Planning Division Clark County, Nevada
11:15 a.m.-12:15 p.m.	FEDERAL AGENCY RESPONSIBILITIES FOR REGULATION AND EMERGENCY RESPONSE Richard C. Hannon Materials Transportation Bureau U.S. Department of Transportation John Cook Project Manager for Transportation U.S. Nuclear Regulatory Commission Keith Klein Office of Storage and Transportation Systems Office of Civilian Radioactive Waste Management U.S. Department of Transportation Roy Garrison Chief of Transportation Defense Programs U.S. Department of Transportation
12:15 p.m.-2:00 p.m.	LUNCH ON YOUR OWN
2:00 p.m.-2:50 p.m.	LIABILITY OF SPENT FUEL SHIPMENTS Susan K. Kuznick Office of General Counsel U.S. Department of Energy Jerome Saltzman Office of State Programs U.S. Nuclear Regulatory Commission
2:50 p.m.-3:10 p.m.	HLW TRANSPORTATION SAFETY RESEARCH AND CASK DESIGN AND TESTING Dr. Robert M. Jefferson (invited) Transportation Technology Center Sandia National Laboratories
3:10 p.m.-3:30 p.m.	BREAK
3:30 p.m.-5:00 p.m.	GENERAL DISCUSSION ON ISSUES OF CONCERN TO STATES Routing, Prenotification, Enforcement and Inspection, Liability, Emergency Response, Safeguards, and Defense Shipments
5:00 p.m.-5:15 p.m.	WRAP-UP AND ADJOURN
6:00 p.m.-7:30 p.m.	No-Host Reception

LEGISLATIVE HIGH-LEVEL RADIOACTIVE WASTE
WORKING GROUP MEETING

December 5-6, 1984
Desert Inn
Las Vegas, Nevada

Proposed Agenda

December 5, 1984

9:30 a.m.-9:45 a.m.	WELCOME AND INTRODUCTION Moderator: The Honorable Thomas J. Hickey Nevada State Senator
9:45 a.m.-11:00 a.m.	DOE BRIEFING Suggested Topics: Mission Plan Environmental Assessments Siting Guidelines Monitored Retrievable Storage Interim Storage Defense Wastes
11:00 a.m.-11:15 a.m.	Break
11:15 a.m.-11:45 a.m.	PANEL PRESENTATION ON EXECUTIVE BRANCH INTERSTATE COMMUNICATION Bob Loux, Nevada Steve Frishman, Texas
11:45 a.m.-1:45 p.m.	LUNCH ON YOUR OWN
1:45 p.m.-3:30 p.m.	ROUND TABLE DISCUSSION BY LEGISLATIVE PARTICIPANTS
3:30 p.m.-3:45 p.m.	BREAK
3:45 p.m.-5:15 p.m.	FUTURE DIRECTIONS FOR LEGISLATIVE HLW WORKING GROUP
5:15 p.m.	ADJOURN

December 6, 1984

6:30 a.m.-7:00 a.m.	BADGING AT DESERT INN
7:00 a.m.-6:00 p.m.	TOUR OF NEVADA TEST SITE

NUCLEAR WASTE REPOSITORY MEETING
CLARK CO. COMP. PLANNING
30 NOV 1984

NAME	REPRESENTING	PHONE NUMBER
CINDY R. ALEXANDER	SAIC	818 3666010
ED McCANN	SAIC - Las Vegas	(702) 295 08
Michael E Spaeth	SAIC - Las Vegas	(702) 295-14
Paul Prestholt	US NRC	(702) 388-6
R M McCracken	RJM Assoc	(702) 482-94
Bob Loux	State of NV	885-37
Mike Baughman	Resource Concepts, Inc.	(702) 883-1600
Andrew BURNHAM	" " "	" " "
Gary Brown	City of L.V. DEUD	(702) 386-655
Joe Strolin	State Nuclear Waste Project Office	885-374
DENNIS BECHTEL	CLARK CO PLANNING	386-4181
Sue Volek	SAIC	295-0863
Fred Walden	NV Legis. Counsel Bureau	885-5639
CARL JOHNSON	STATE OF NEVADA	885-3744
L. JANE POULOS	CITY OF NORTH LAS VEGAS	649-5811
DON VIETH	NUC WASTE PROJECT OFFICE	

NNWSI PROJECT

Nevada Nuclear Waste Storage Investigations Project

BRIEFING ON

THE SCIENCE APPLICATIONS INTERNATIONAL CORPORATION NNWSI PROJECT SUPPORT CONTRACT

FOR

STATE INFORMAL ADVISORY GROUP

NOVEMBER 30, 1984

Nevada Operations Office

UNITED STATES DEPARTMENT OF ENERGY

NNWSI PROJECT

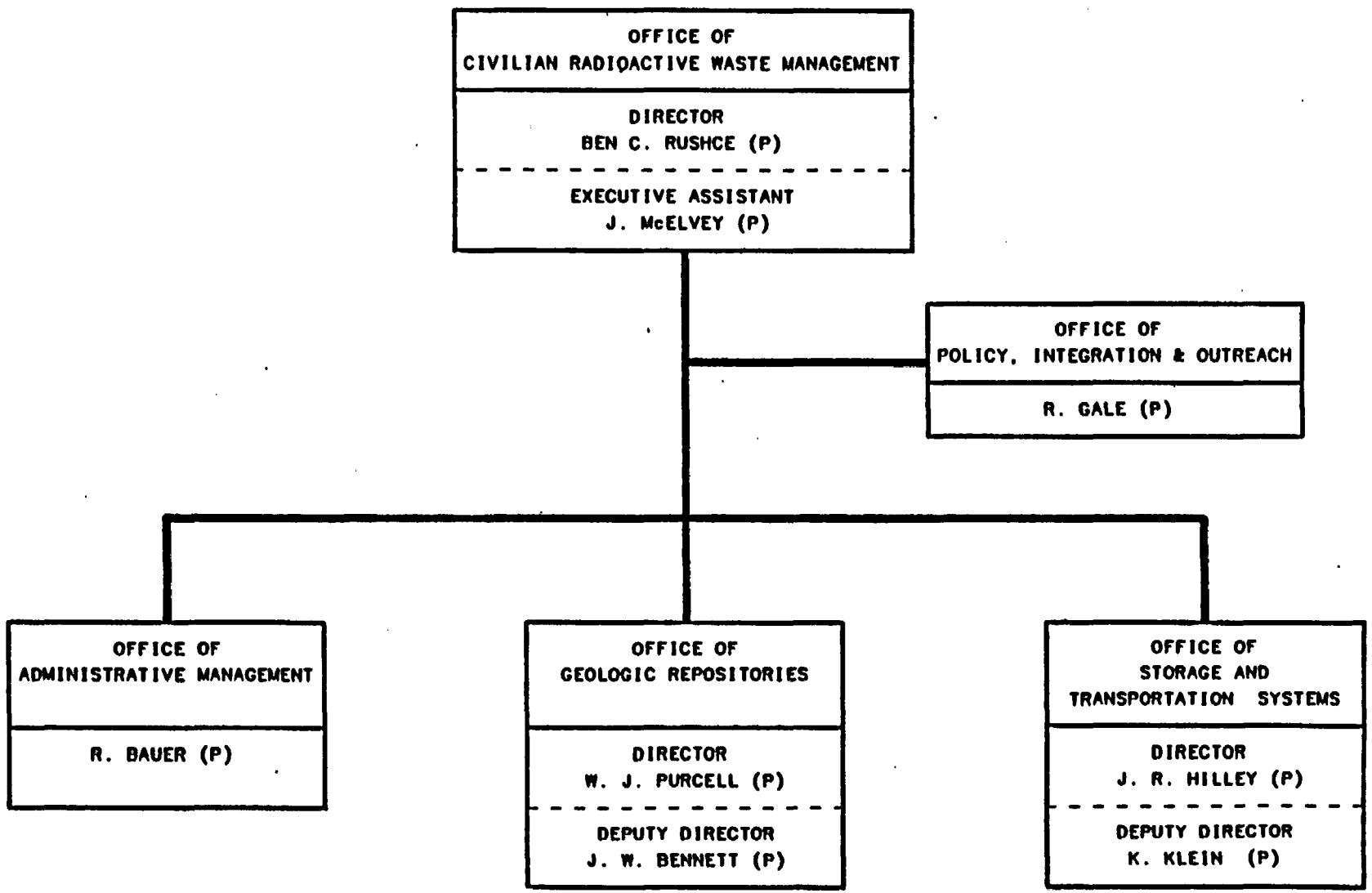
PURPOSE

"...TO EXPLAIN THE OVERALL SAI SCOPE OF WORK AS IT PERTAINS TO THE NUCLEAR WASTE REPOSITORY PROGRAM."

R. LOUX
NOV. 13, 1984

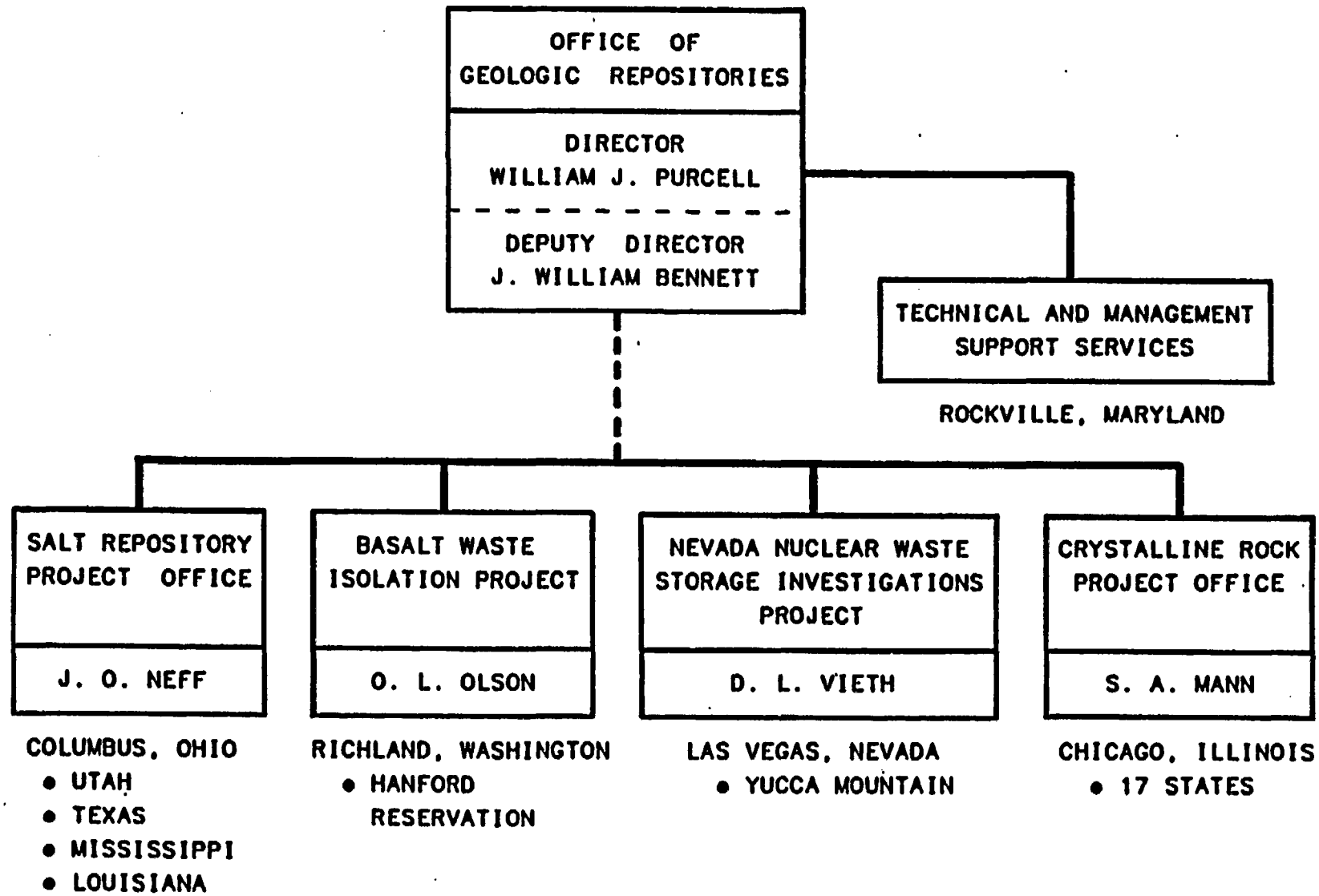
NNWSI PROJECT

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

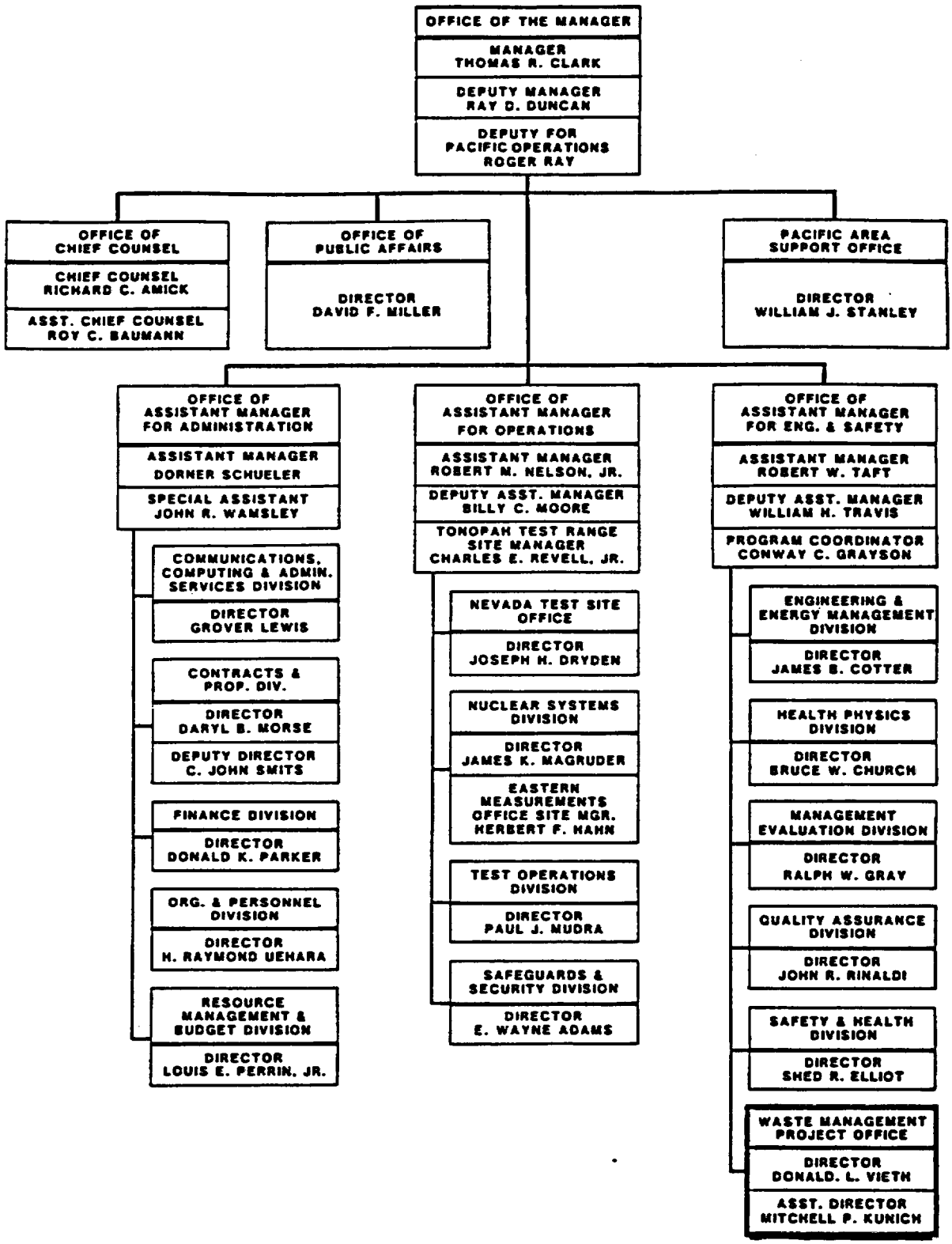


NNWSI PROJECT

OFFICE OF GEOLOGIC REPOSITORIES



U.S. DOE/NV ORGANIZATION

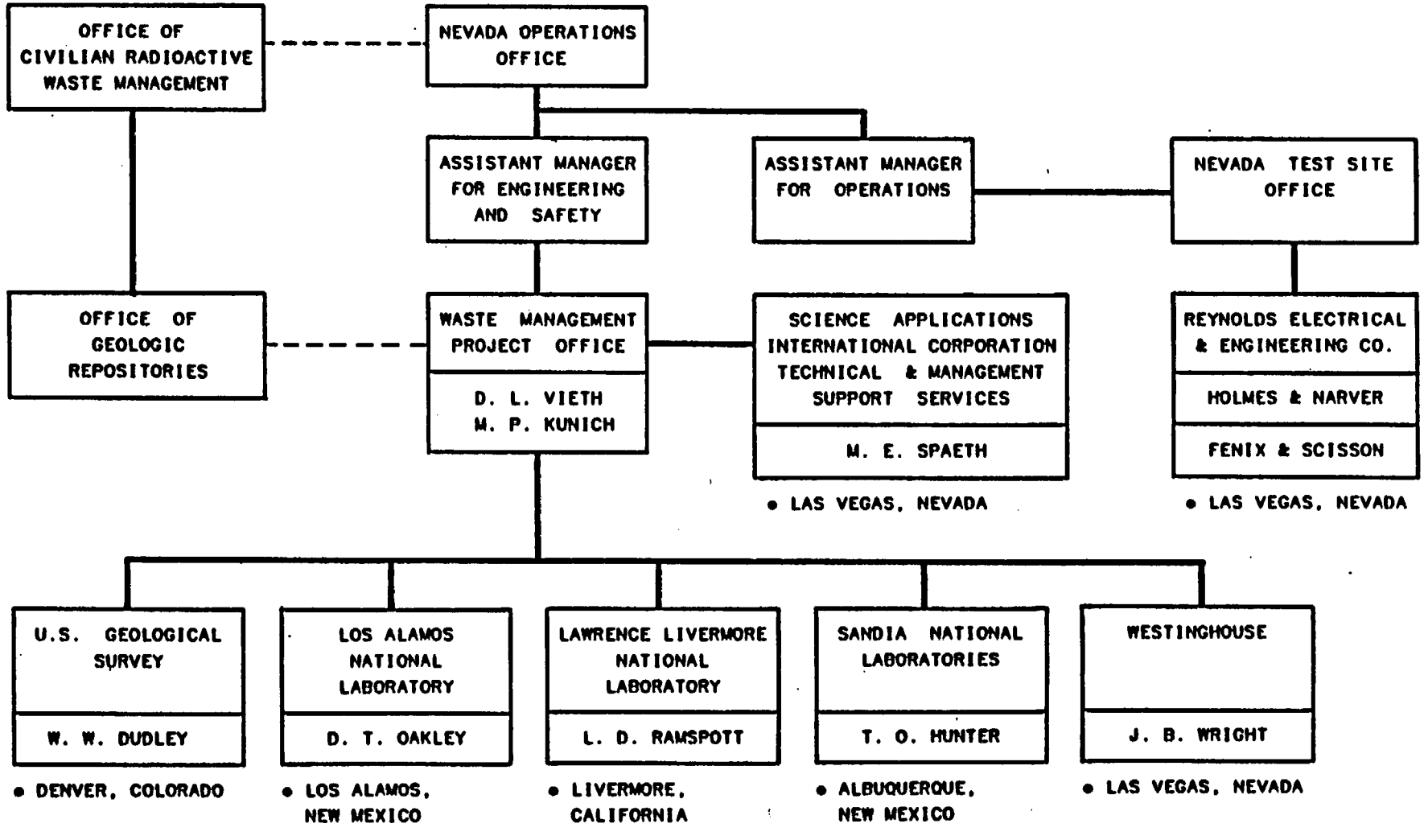


United States Department of Energy

NEVADA OPERATIONS OFFICE 8/13/84

NNWSI PROJECT

NNWSI PROJECT ORGANIZATION CHART



NNWSI PROJECT TECHNICAL AND MANAGEMENT SUPPORT SERVICES CONTRACT

- PROCUREMENT EVALUATION CRITERIA INCLUDED:
  - QUALIFICATIONS OF PROPOSED PERSONNEL
  - EXPERIENCE OF THE FIRM IN PLANNING AND MANAGING COMPLEX TECHNICAL PROJECTS, CONTROL SYSTEMS, AND A QUALITY ASSURANCE PROGRAM
  - EXPERIENCE OF THE FIRM IN THE NUCLEAR INDUSTRY AND WITH THE NUCLEAR REGULATORY COMMISSION LICENSING PROCEDURES
  - EXPERIENCE OF THE FIRM WITH THE NATIONAL ENVIRONMENTAL POLICY ACT
  - PROPOSED ORGANIZATIONAL STRUCTURE, STAFFING PLAN, WORK METHODS, GENERAL RESOURCES OF THE FIRM
  - COMMITMENT OF PROPOSED PERSONNEL
- COMPETITIVELY BID; 14 PROPOSALS RECEIVED
- TASK-ORDER CONTRACT WITH THREE-YEAR PERIOD OF PERFORMANCE, PLUS TWO ONE-YEAR OPTIONS
- CONTRACT SIGNED MARCH 4, 1983

NNWSI PROJECT TECHNICAL AND MANAGEMENT SUPPORT SERVICES CONTRACT

- PROCUREMENT EVALUATION CRITERIA INCLUDED:
  - QUALIFICATIONS OF PROPOSED PERSONNEL
  - EXPERIENCE OF THE FIRM IN PLANNING AND MANAGING COMPLEX TECHNICAL PROJECTS, CONTROL SYSTEMS, AND A QUALITY ASSURANCE PROGRAM
  - EXPERIENCE OF THE FIRM IN THE NUCLEAR INDUSTRY AND WITH THE NUCLEAR REGULATORY COMMISSION LICENSING PROCEDURES
  - EXPERIENCE OF THE FIRM WITH THE NATIONAL ENVIRONMENTAL POLICY ACT
  - PROPOSED ORGANIZATIONAL STRUCTURE, STAFFING PLAN, WORK METHODS, GENERAL RESOURCES OF THE FIRM
  - COMMITMENT OF PROPOSED PERSONNEL
- COMPETITIVELY BID; 14 PROPOSALS RECEIVED
- TASK-ORDER CONTRACT WITH THREE-YEAR PERIOD OF PERFORMANCE, PLUS TWO ONE-YEAR OPTIONS
- CONTRACT SIGNED MARCH 4, 1983

NNWSI PROJECT

CURRENT TASK PLANS

TASK 1 — MANAGEMENT SUPPORT

TASK 2 — SAIC QUALITY ASSURANCE

TASK 3 — NNWSI QUALITY ASSURANCE

TASK 4 — OFFICE SERVICE'S SUPPORT

TASK 5 — REGULATORY COMPLIANCE

TASK 6 — ENVIRONMENTAL COMPLIANCE

TASK 7 — CONSULTANT SUPPORT

TASK 1 — MANAGEMENT SUPPORT

PURPOSE: TO PROVIDE ADMINISTRATIVE SUPPORT TO THE NNWSI PROJECT

- DEVELOP AND MAINTAIN A PROJECT MONITORING SYSTEM (INCLUDING COMPUTER HARDWARE AND SOFTWARE)
- DEVELOP AND MAINTAIN A PROJECT DOCUMENTATION SYSTEM
- PREPARE REPORTS AND SPECIAL STUDIES
- ASSIST IN ORGANIZING MEETINGS, WORKSHOPS AND HEARINGS

NNWSI PROJECT

TASK 2 — SAIC QUALITY ASSURANCE

PURPOSE: TO ENSURE THE SAIC QUALITY ASSURANCE PROGRAM PLAN AND QUALITY ASSURANCE PROCEDURES MEET LEGAL REQUIREMENTS

- IMPLEMENT SAIC QUALITY ASSURANCE PLAN
- PERFORM QA TRAINING
- PERFORM INTERNAL AUDITS
- DOCUMENT SAIC QA ACTIVITIES

TASK 3 — NNWSI PROJECT QUALITY ASSURANCE

PURPOSE: TO ENSURE THAT ALL NNWSI PROJECT ACTIVITIES ARE PERFOMED IN ACCORDANCE WITH APPLICABLE QA PLANS, PROCEDURES AND ORDERS.

- REVISE AND MAINTAIN NNWSI PROJECT QA PLAN AND PROCEDURES
- REVISE AND MAINTAIN WMPO QA PLAN AND PROCEDURES
- ASSIST WMPO IN IDENTIFYING AND PREPARING NEW QA PROCEDURES AS REQUIRED
- REVIEW OF MAJOR AND/OR CRITICAL NNWSI PROJECT ACTIVITIES TO ENSURE QA PROCEDURES ARE IMPLEMENTED
- ASSIST WMPO IN CONDUCTING AUDITS ON NNWSI PROJECT PARTICIPANTS
- PERFORM QA REVIEWS AND DOCUMENT SUBSEQUENT RECOMMENDATIONS FOR PROJECT PARTICIPANTS' QA PROGRAM PLANS
- PROVIDE ADMINISTRATIVE SUPPORT TO WMPO IN IMPLEMENTING QA REQUIREMENTS
- DOCUMENT IMPLEMENTATION OF NNWSI PROJECT QA ACTIVITIES

NNWSI PROJECT

TASK 4 — OFFICE SERVICE SUPPORT

PURPOSE: TO PROVIDE SUPPORT SERVICES TO THE NNWSI PROJECT

- MAINTAIN A LAS VEGAS PROJECT OFFICE
- PLAN, ORGANIZE AND DIRECT TECHNICAL AND ADMINISTRATIVE CONTRACT ACTIVITIES
- PROVIDE GRAPHICS SERVICES
- PREPARE PRESENTATIONS FOR WMPO PERSONNEL; AND PREPARE SUPPORTING BACKGROUND MATERIAL, DATA RESEARCH DOCUMENTATION AND ANALYSES
- MAINTAIN A TECHNICAL LIBRARY

NNWSI PROJECT

TASK 5 — REGULATORY COMPLIANCE

PURPOSE: TO ENSURE THAT ALL APPROPRIATE NNWSI PROJECT ACTIONS, DECISIONS AND DOCUMENTATION ARE IN ACCORDANCE WITH THE APPLICABLE ADMINISTRATIVE, TECHNICAL AND LEGAL REQUIREMENTS

- DEVELOP REGULATORY COMPLIANCE PLANS AND PROCEDURAL AGREEMENT IMPLEMENTATION PROCEDURES; PARTICIPATE IN DOE/NRC WORKSHOPS; REVIEW AND ANALYZE RULES, REGULATIONS, TECHNICAL POSITIONS, REGULATORY GUIDES AND OTHER DOCUMENTS APPLICABLE TO GEOLOGIC REPOSITORIES; AND OTHER DUTIES RELEVANT TO MEETING REGULATORY REQUIREMENTS
- DEVELOP AND MAINTAIN A REGULATORY ANALYSIS AND CONTROL PROGRAM
- PREPARE THE NNWSI PROJECT REGULATORY DOCUMENTS

NNWSI PROJECT

TASK 6 — ENVIRONMENTAL COMPLIANCE

PURPOSE: TO ENSURE THAT ALL APPROPRIATE NNWSI PROJECT ACTIONS, DECISIONS AND DOCUMENTATION ARE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF RESPONSIBLE AGENCIES, THE NUCLEAR WASTE POLICY ACT, AND OCRWM PROGRAM REQUIREMENTS OF THE DOE; AND SUPPORTED BY DATA, ANALYSES AND CONCLUSIONS, AS REQUIRED

- REVIEW EXISTING ENVIRONMENTAL DATA, METHODOLOGIES, ANALYSES AND CONCLUSIONS
- PREPARE ENVIRONMENTAL DOCUMENTS AND PERMIT APPLICATIONS AS REQUESTED
- IMPLEMENT A METEOROLOGICAL MONITORING PROGRAM
- UNDERTAKE SOCIOECONOMIC STUDIES
- UNDERTAKE TRANSPORTATION STUDIES

NNWSI PROJECT

TASK 7 — CONSULTANT SUPPORT

PURPOSE: TO OBTAIN THE SERVICES OF A CONSULTANT WITH GEOLOGIC EXPERTISE TO PROVIDE SUPPORT TO SAIC CONCERNING THE TECHNICAL HISTORY AND DEVELOPMENT OF THE NNWSI PROJECT AND CONTAINMENT OF HIGH-LEVEL WASTE

NNWSI POSITION ON SCP ISSUES - DRAFT

OBJECTIVES: The purpose of this draft position paper is to review and restructure the SCP Issues Hierarchy taking into account new guidance from NRC (in the form of STP's and DTP's), the DOE (final version of 10 CFR 960) and information gained during the preparation of the EA. This review is based on:

(a) The optimization of costs and schedules associated with the various defined activities;

(b) The ensurance of satisfaction of the regulations with the highest degree of confidence, based on (a);

(c) The reduction of repetition at the information need and (possibly) activity level; and

(d) The production of an Issues Hierarchy which is easier to track for Q.A. and WBS purposes.

RATIONALE: By expressing the issues and information needs in terms of the system components or subcomponents they relate to, better definition can be reached at higher levels of the Hierarchy, thereby reducing redundancy and increasing efficiency and traceability. Performance assessment criteria (in the form of prioritization at all levels below the issue level) should be the driving force of the Hierarchy. Strong attempts have been made at all stages of the revised Hierarchy to retain as much of the old NNWSI Issues Hierarchy as possible. To this end,

(1) Key Issue 1 has been reworded for clarity and simplicity;

(2) Key Issues 2 and 3 are basically the same as in the old NNWSI Hierarchy;

(3) The issues have been reworded and reorganized somewhat to incorporate suggestions presented in the NRC Draft Generic Technical Position on Licensing Assessment Methodology for High-Level Waste Geologic Repositories (July, 1984). The ultimate result has been a set of information needs more in line with 10 CFR 960 than the previous set of NNWSI information needs.

METHOD: The issues have been developed so that they satisfy the regulations (40 CFR 191, 10 CFR 60, 10 CFR 960, excluding environmental and socio-economic considerations) on a one-to-one basis (i.e., each regulation is addressed in one issue, but each issue may address more tnan one regulation). This enables the information needs to be determined somewhat uniquely. To ensure this, all obvious repetitions have been removed from the information needs. This enables the data tracking system to start

at the information need level (See Figure 1). There are, of course, direct functional relationships between the issues, information needs and regulations. The information needs will initially be given a priority based on expert judgment and availability of previous sensitivity analyses. Each information need has a number of associated activities (these are not necessarily unique). These activities will also be prioritized, and have technical procedures and tests associated with or developed for them. Based on these activities, parameters and data are defined as being the effective outcome of the activities. These parameters/data will also be prioritized. Having obtained the "necessary" data, the performance assessment methodology can be performed. The details of this methodology are being developed by SNL. However, it is anticipated that this methodology will take a form somewhat similar to the following:

(1) scenario development (initial scenario definition and development can be made based on the activities definition);

(2) scenario analysis - model conceptualization and analysis;

(3) sensitivity analysis - based on modeling;

(4) uncertainty analysis - based on initial data and quantitative assessments; and

(5) development of probability distribution function(s).

Results from (3) and (4), when combined, can be used to update the prioritization levels initially defined for the issues, information needs, and parameters/data. This analysis will be directly related to compliance with the regulations. Loop A, shown in Figure 1 comprising reprioritization, data collection and performance assessment, may not need to be done often if at all; Loop B, within the performance assessment methodology and data collection, may need to be performed many times. Ultimately, an issue will fall out of the system of analysis if

(a) (3) and (4) combined with regulatory analysis lead to a very high degree of confidence of regulatory satisfaction (this level of confidence is as yet undetermined); or

(b) cost and schedule requirements outweigh assessed potential return from further performance assessment analysis.

In either case, progress for each facet of the Issues Hierarchy will be presented in the Semi-Annual Reports for NRC's information.

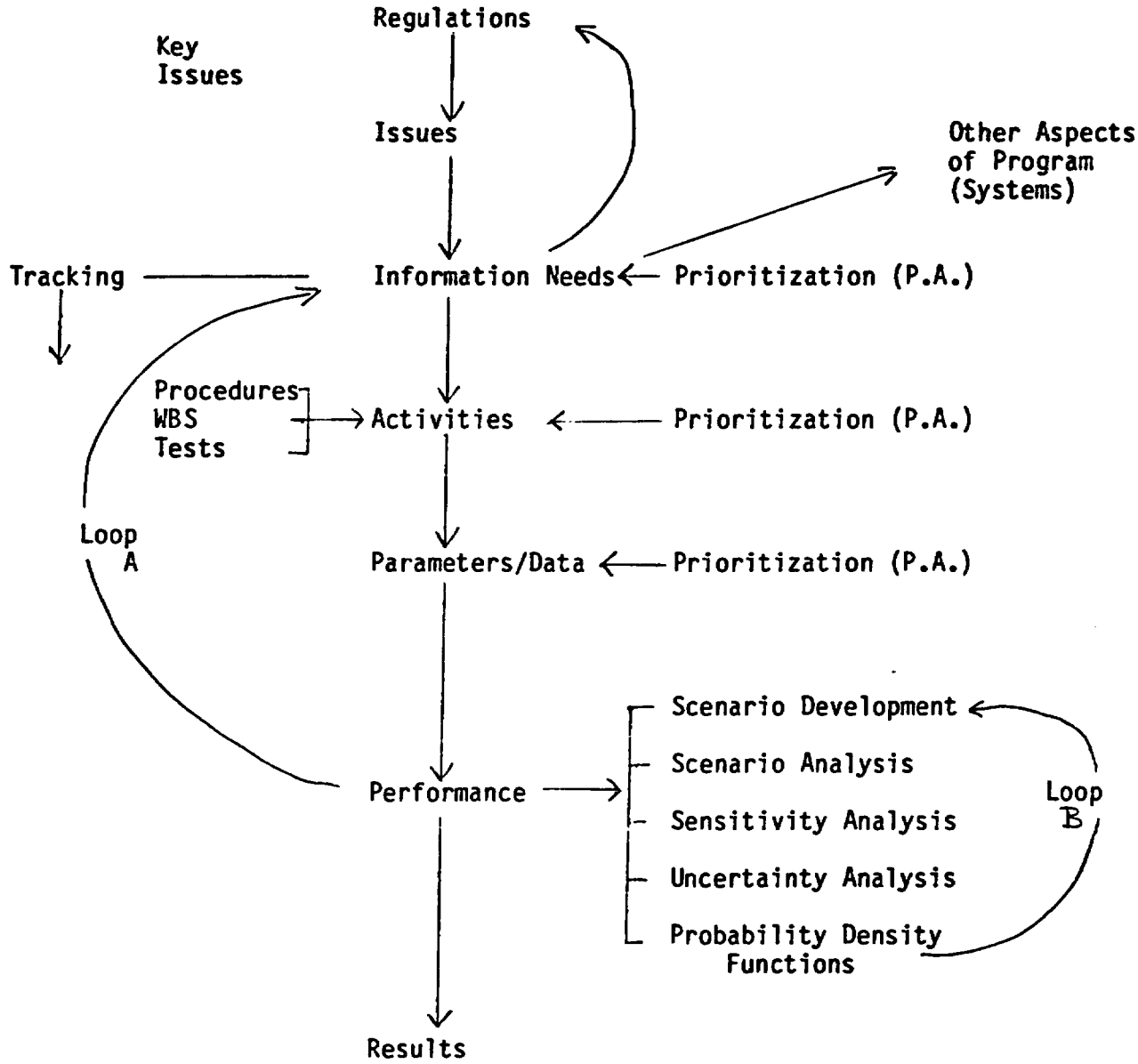


Figure 1. "Revised" NNWSI SCP Issues Hierarchy

Key Issues

1. The present waste isolation environment (defined as the waste package, the engineered barriers and the geologic setting) must be capable of containing and isolating the waste based on the release limits specified by the EPA and the NRC.

2. Potential changes (natural, man-made, and repository-induced) to the waste isolation environment must not significantly affect the ability of a repository to contain and isolate waste.

3. Construction, operation, and decommissioning of a repository must be such that the EPA and NRC requirements on timeliness, safety, economics and retrievability are satisfied.

Issues

1.1 Will the expected geologic conditions at the site be compatible with waste containment and isolation?

1.2 Will the expected geohydrologic conditions at the site be compatible with waste containment and isolation?

1.3 Will the expected geochemical characteristics of the site be compatible with waste containment and isolation?

1.4 Will the expected geomechanical properties of the site be compatible with waste containment and isolation?

1.5 Will any subsurface rock dissolution lead to unacceptable radionuclide releases?

1.6 Will the waste package and the engineered barrier system meet the requirements for waste containment, isolation and radionuclide release?

2.1 Will potential natural changes to the geologic setting affect the site's ability to contain and isolate waste?

2.2 Will potential man-induced changes affect the site's ability to contain and isolate waste?

2.3 Will potential repository-induced changes affect the site's ability to contain and isolate waste?

3.1 Will the waste package be cost effective and ensure safe handling, emplacement and retrieval?

3.2 Will local surface conditions at the site lead to significant cost increases or safety concerns for construction, operation and decommissioning of a repository?

3.3 Will local subsurface conditions at the site lead to significant cost increases on safety or retrievability concerns for construction, operation, and decommissioning of a repository?

Information Needs

1.1.1 Definition of the disturbed zone.

1.1.2 Estimates of and bounds on the geologic framework of the engineered barrier system.

1.1.3 Estimates of and bounds on the geologic framework of the region beyond the disturbed zone.

1.1.4 Evidence of drilling or other human intrusion in the vicinity of the site.

1.2.1 Geohydrologic properties of the engineered barrier system.

1.2.2 Geohydrologic properties of the region beyond the disturbed zone.

1.2.3 Estimates of and bounds on hydrologic flow paths, fluxes and travel times in the unsaturated zone within the engineered barrier system.

1.2.4 Estimates of and bounds on hydrologic flow paths, fluxes and travel times in the unsaturated zone beyond the disturbed zone.

1.2.5 Estimates of and bounds on hydrologic flow paths, fluxes and travel times in the saturated zone within the engineered barrier system.

1.2.6 Estimates of and bounds on hydrologic flow paths, fluxes and travel times in the saturated zone beyond the disturbed zone.

1.2.7 Hydrologic properties of the surface water system and any ground-water/surface water interactions.

1.2.8 Estimates of ground-water use in the vicinity of the site.

1.3.1 Determination of geochemical and hydrogeochemical conditions within the engineered barrier system.

1.3.2 Determination of geochemical and hydrogeochemical conditions within the host rock and surrounding units beyond the disturbed zone.

1.3.3 Estimates of and bounds on radionuclide retardation within the engineered barrier system.

1.3.4 Estimates of and bounds on radionuclide retardation beyond the disturbed zone.

1.4.1 Determination of the geomechanical properties of the rock within the engineered barrier system.

1.5.1 Estimates of and bounds on dissolution rates for the host rock.

1.6.1 Estimates of and bounds on radioactive release rates from the waste package.

1.6.2 Estimates of and bounds on release rates through the engineered barrier system.

1.6.3 Estimates of and bounds on release rates to the accessible environment.

2.1.1 Estimates of and bounds on potential natural changes to the geologic and geomorphic conditions in the vicinity of the site.

2.1.2 Potential effects of these changes on the engineered barrier system.

2.1.3 Potential effects of these changes on the region beyond the disturbed zone.

2.1.4 Estimates of and bounds on potential natural changes to the hydrologic conditions in the vicinity of the site.

2.1.5 Potential effects of these changes on the engineered barrier system.

2.1.6 Potential effects of these changes on the region beyond the disturbed zone.

2.1.7 Estimates of and bounds on potential natural changes in the geochemical conditions at the site.

2.1.8 Potential effects of these changes on the engineered barrier system.

2.1.9 Potential effects of these changes on the region beyond the disturbed zone.

2.1.10 Estimates of and bounds on potential natural changes in the geomechanical properties of the site.

2.1.11 Potential effects of these changes on the engineered barrier system.

2.2.1 Estimates of and bounds on potential changes to the ground-water system due to human activity.

2.2.2 Potential effects of these changes on the engineered barrier system.

2.2.3 Potential effects of these changes on the region beyond the disturbed zone.

2.2.4 Economic analysis of minable resources in the vicinity of the site.

2.2.5 Potential effects of mining on the engineered barrier system.

2.2.6 Potential effects of mining on the region beyond the disturbed zone.

2.2.7 Estimates of and bounds on potential changes in the geologic setting due to site characterization activities.

2.2.8 Potential effects of these changes on the engineered barrier system.

2.2.9 Potential effects of these changes on the region beyond the disturbed zone.

2.3.1 Estimates of and bounds on potential changes on the repository as a result of waste emplacement.

2.3.2 Potential effects of these changes on the engineered barrier system.

3.1.1 Designs and specifications of the waste package.

3.1.2. Definition of period during which waste could be retrieved and methods of retrieval.

3.1.3 Definition of the safety requirements for the waste package in terms of handling and emplacement.

3.1.4 Definition of the safety requirements for the waste package in terms of retrieval.

3.2.1 Impact of surface conditions on surface facility location and design.

3.2.2 Estimates of and bounds on potential flooding of the surface facilities.

3.2.3 Designs and specifications of institutional controls and performance monitoring of surface conditions.

3.2.4 Development of seismicity design criteria for surface facilities.

3.3.1 Impact of local geologic structure and hydrology on repository layout.

3.3.2 Impact of in situ stress and rockmass mechanical properties on size, shape, orientation, and stability of mined openings and on retrievability.

3.3.3 Impact of in situ temperature, thermal gradient, and rockmass thermal properties on subsurface facility location and design.

3.3.4 Impact of unexpected conditions on location and design of subsurface facilities.

3.3.5 Designs and specifications of institutional controls and performance monitoring of subsurface conditions.

3.3.6 Development of seismicity design criteria for subsurface facilities.

TPO Meeting
Nov. 29, 1984

EA Public Interaction

11-27-84	EA Interaction Activities - Implementation Plan Submitted to DOE-HQ
12-4/5-84	HQ & Project Offices personnel involved with EA Briefings attend training session, Washington, D.C.
12-19/20-84	Delivery of EA's to select State officials in person
12-20-84	HQ releases EA's to public
1-4-85	Dry run for briefing team
1-8-85	Briefing to State Officials, Carson City (9 a.m.)
1-22-85	Public Briefing, Las Vegas (7 p.m.)
1-23-85	Public Briefing, Beatty (7 p.m.)
1-24-85	Public Briefing, Reno (7 p.m.)
1-31-85(?)	HQ & Project Office personnel involved with EA Hearings attend training session
2-25-85	Public Hearing, Amargosa Valley (10 a.m. - 2 p.m.) (6 p.m. -10 p.m.)
2-26-85	" " , Las Vegas (")
2-28-85	" " , Reno (")

Nov. 29, 1984

TENTATIVE BRIEFING AGENDA

WELCOME & INTRODUCTION:		5 MIN
	PURPOSE, FORMAT	
	AGENDA	
	BRIEFING TEAM	
BACKGROUND:	NWPA	30 MIN
	PURPOSE OF EA	
	NWPA-EA vs. NEPA-EA	
EA:	ORGANIZATION	30 MIN
	TABLE OF CONTENTS	
	SUMMARY	
	REFERENCES	
QUESTIONS AND ANSWERS		REMAINING TIME UNTIL ALL QUESTIONS HAVE BEEN ANSWERED

Nov. 29, 1984

BRIEFING TEAM

DOE-HQ - NWPA, PURPOSE OF EA (PARKER)
VIETH - WELCOME, INTRODUCTION, PUBLIC COMMENT PROCESS, MODERATOR
BLANCHARD - EA ORGANIZATION, SUMMARY, REFERENCES, MODERATOR

*

VOEGELE, YOUNKER, DUDLEY	EARTH SCIENCE PORTION OF EA & COMPLIANCE WITH 10 CFR 960
FOLEY, BROWN, ALEXANDER	ENVIRONMENT, SOCIOECONOMICS & TRANSPORTATION PORTION OF EA & COMPLIANCE WITH 10 CFR 960
BELANGER	RADIOLOGICAL HEALTH PHYSICS - COVERAGE IN EA
FITZSIMMONS	" " " - NUCLEAR TEST PROGRAM
HUNTER	REPOSITORY DESIGN
GASSMAN	LEGAL ADVISEMENT ABOUT NWPA, 10 CFR 960
ROBERTS	STATE LIAISON, GRANT
OLSON/VOLEK	COORDINATION/LOGISTICS
WEST	NEWS MEDIA CONTACT

*PURPOSE OF "EXPERT" TEAM MEMBERS: EXPLAIN THAT KEY EA ISSUES RAISED DURING PREVIOUS HEARINGS HAVE BEEN INCORPORATED IN DRAFT NNWSI EA; EXPLAIN HOW PUBLIC CAN USE EA TO FIND ANSWERS TO QUESTIONS THAT THEY MAY HAVE; TO ENHANCE EA STAFF'S UNDERSTANDING OF PUBLIC COMMENTS SO THAT PLANS CAN BE DEVELOPED TO REVISE EA FOR FINAL VERSION AND PREPARE COMMENT RESPONSE DOCUMENT

Nov. 29, 1984

HEARING TEAM

DOE-HQ — Presiding Officer; Opens Hearings

Panel: Moderator - non-DOE person with Hearing experience
Panelist A - DOE Staff knowledgeable about EA (Blanchard)
Panelist B - State of Local community leader (e.g. Nye County Commissioner)

Vieth - Project Manager
Roberts - State Liaison
West - News Media Contact
Foley, Brown } Environmental, Socioeconomic, Transportation
Hunter - Repository Design
* Voegele, Younker, Dudley } - Earth Sciences
Belanger - Radiological Health Physics
Fitzsimmons - " " "
Volek - Logistics
Olson - Coordination
Gassman - Legal Counsel

* Purpose of "Expert" Team Members: Understand testimony and comments as basis for incorporating changes to EA and preparing Comment Response Document

DRAFT EXPLORATORY SHAFT TEST PLAN TOPICAL OUTLINE

1.0 OVERVIEW OF THE EXPLORATORY SHAFT PROJECT

- 1.1 Introduction
- 1.2 General Concept of a Geologic Repository at Yucca Mountain
- 1.3 Yucca Mountain Setting
- 1.4 Rationale for Explortory Shaft Tests
- 1.5 Exploratory Shaft and Drift Construction Operations
- 1.6 Integrated Data System (IDS)
- 1.7 Management, Control, and Major Decision Points
- 1.8 Quality Assurance Requirements
- 1.9 Safety and Environmental Effects
- 1.10 Schedule and Cost Estimates

2.0 INDIVIDUAL TEST PLANS

- 2.1 Introduction
- 2.2 Summary of Individual Tests
- 2.3 Detailed Test Plans
  - 2.3.1 Geology
  - 2.3.2 Geomechanics
  - 2.3.3 Hydrology
  - 2.3.4 Geochemistry
  - 2.3.5 Engineered Barrier Design

3.0 APPENDICES

- 3.1 Glossary
- 3.2 References
- 3.3 Appendices

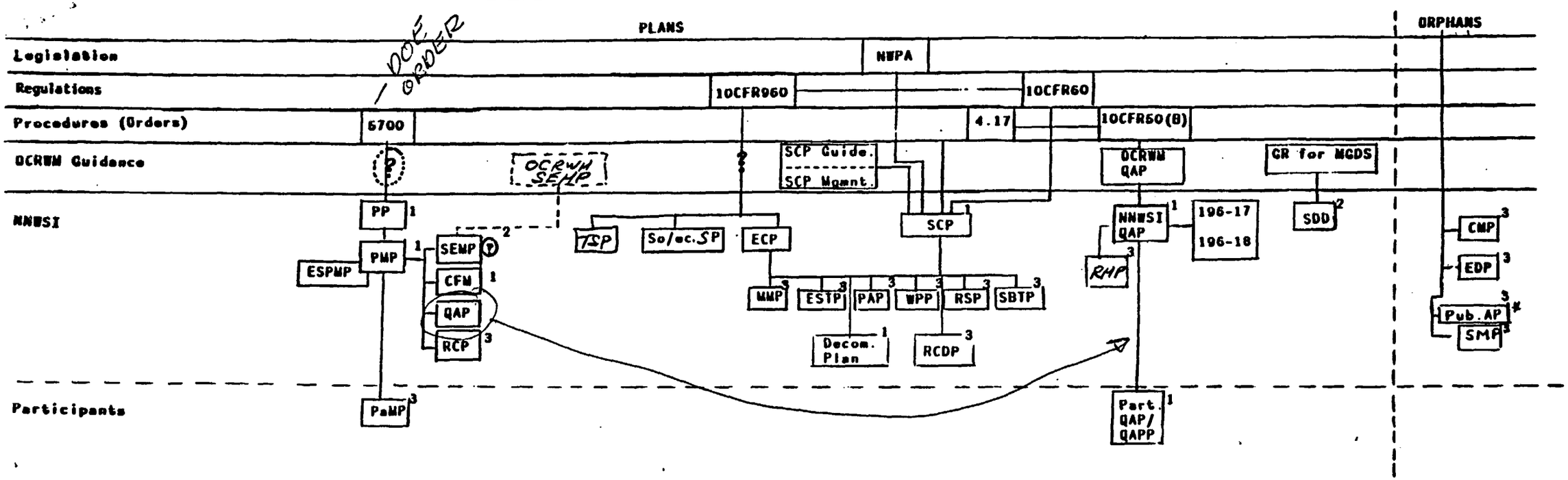
NNWSI PROJECT DOCUMENTATION
FY 84-85 PLAN SUMMARY
NOVEMBER 28, 1984

Plan (Acronym - Title)		Resp Org/ Indv	Prep Sched Complete	Resource est Complete	Outline Complete	First Draft Complete	Final Doc Complete
PP	Project Plan	SAIC Richards	—	—	—	Final Draft 10/23	TBD WMPO Rev.
PMP	Project Management Plan	SAIC Draper	10/15/84	—	10/15/84	10/30/84	1/15/85
ESPMP	Exploratory Shaft Proj Mgmnt Plan	NVO Fiore	Complete	1983			
PaMP	Participant Management Plan (Work Plan)	SAIC Draper	—	—	11/8/84	—	12/15/84
		SNL	—	—	11/8/84	—	12/15/84
		LLNL	—	—	11/8/84	—	12/15/84
		LANL	—	—	11/8/84	—	12/15/84
		USGS	—	—	11/8/84	—	12/15/84
		W	—	—	11/8/84	—	12/15/84
SEMP	Systems Engineering Mgmnt Plan	SNL Shipley	TBD - pending HQ Guidance				
CMP	Configuration Management Plan	TBD					
RCP	Regulatory Compliance Plan	SAIC Glora	12/30/84	12/30/84	12/30/84	6/30/85	TBD
So/ec SP	Socioeconomic Studies Plan	SAIC Foley	Comp	85 last Pln	4/6/84	4/16/84	1/30/85
ECP	Environmental Compliance Plan	SAIC Foley	TBD	8/31/85	1/15/85	Rev 1/23 8/31/85	TBD pend WMPO Rv. & HQ Guidance
MMP	Meteorological Monitoring Plan	SAIC McCann	Complete	6/15/84			
Decomm Plan	Decommissioning Plan for Repository	SAIC Voegele	—	—	—	Complete	TBD pend guidance

NNWSI PROJECT DOCUMENTATION
FY 84-85 PLAN SUMMARY
NOVEMBER 28, 1984

Plan (Acronym - Title)		Resp Org/ Indv	Prep Sched Complete	Resource est Complete	Outline Complete	First Draft Complete	Final Doc Complete
ESTP	Exploratory Shaft Test Plan	LANL Meyer			2/8/85		12/20/85
WPP	Waste Package Plan	LLNL Hansen				10/30/84	2/28/85
PAP	Performance Assessment Plan	SNL Bingham			2/8/85		12/20/85
RSP	Repository Sealing Plan	SNL Tillerson					
RCDP	Repository Conceptual Design Plan	SNL Dennis					
SBTP	Surface Base Test Plan	SAIC Jorgenson			2/8/85		12/20/85
RMP	Records Management Plan	SAIC Klein	9/84	TBD	9/84	2/20/85	TBD
QAP	Quality Assurance Plan	SAIC Klein	Complete - 5/84				
QAPP	Quality Assurance Program Plan	Various					
SDD	Systems Description Document	SNL Meyer					
SMP	Software Management Plan	TBD					
CMP	Construction Management Plan	TBD					
EDP	Equipment Development Plan	TBD					
TSP	Transportation Studies Plan	SAIC Foley	2/1/85	7/1/85	7/1/85	7/1/85	TBD pending WHPO Rev 1 HQ Guidance

PROJECT DOCUMENTATION (PLANS)



Key:

PP - Project Plan
PMP - Project Management Plan
ESPMP - Exploratory Shaft Project Management Plan
PaMP - Participant Management Plan
SEMP - Systems Engineering Management Plan
CFM - Configuration Management Plan
RCP - Regulatory Compliance Plan

SCP Guide. - SCP Guidance Plan from HQ
SCP Mgmnt. - SCP Management Plan from HQ
So/ec.SP - Socioeconomic Studies Plan
ECP - Environmental Compliance Plan
MMP - Meteorological Monitoring Plan
Decomm. Plan - Decommissioning Plan for Repository
ESTP - Exploratory Shaft Test Plan
WPP - Waste Package Plan
PAP - Performance Assessment Plan
RSP - Repository Sealing Plan
RCDP - Repository Conceptual Design Plan
SBTP - Surface Base Test Plan
RMP - Records Management Plan
QAP - Quality Assurance Plan
QAPP - Quality Assurance Program Plan
TSP - Transportation Studies Plan

GR for MGDS - Generic Requirements for Mined Geologic Disposal Systems
SDD - Systems Description Document

SMP - Software Management Plan
CMP - Construction Management Plan
EDP - Equipment Development Plan

* Public Affairs Plan

1 = Existing Requirements
2 = HQ Whims and Desires
3 = NNWSI Reports/Plans
4 = Participant Needs (Plans such as internal Program Plans, etc.)

5700 - DOE ORDER for Major Systems Aquisition

DRAFT
11-28-84

DRAFT SURFACE-BASED TEST PLAN (SBTP) TOPICAL OUTLINE

1.0 OVERVIEW OF THE SURFACE-BASED TESTING PROGRAM

1.1 Introduction

1.1.1 Purpose of the Test Plan

1.1.2 Scope of Surface-Based Testing

1.1.3 Correlation of the Test Plan with the SCP

1.2 Rationale for Surface-Based Testing

1.2.1 Requirements from 10 CFR 60 and 40 CFR 191

1.2.2 Correlation with NNWSI Issues and Information Needs

1.2.3 Use of Data in Performance Assessment

1.3 Management, Control, and Major Decision Points

1.3.1 Project Management

1.3.2 Data Management System

1.3.3 Prioritization of Testing Activities

1.3.4 Documentation of Test Results

1.3.5 Analysis of Test Results

1.3.6 Completion Schedules and Decision Points

1.3.7 Preparation of Final Reports

1.4 Quality Assurance

1.4.1 QA Administrative Procedures

1.4.2 Summary of QA Technical Procedures

2.0 DETAILED TESTS AND ACTIVITIES

2.1 Geology and Geophysics

2.1.1 Stratigraphy

2.1.1.1 Surficial Geology

2.1.1.2 Stratigraphic Framework of the Candidate Area

2.1.1.3 Stratigraphic Framework of the Site

2.1.2 Tectonics and Structural Geology

2.1.2.1 Structural Geology of the Site and Site Vicinity

2.1.2.2 Tectonic Framework of the Candidate Area

2.1.2.3 Tectonic History of the Candidate Area

2.1.2.4 Presence and Age of Faulting at the Site and Site Vicinity

2.1.3 Igneous Activity

2.1.3.1 History of Igneous Activity in the Site Vicinity

2.1.3.2 Extrusive Igneous History and Future Potential at the Site

2.1.3.3 Intrusive Igneous History and Future Potential at the Site

2.1.4 Seismicity

2.1.4.1 Seismicity of the Candidate Area

2.1.4.2 Seismicity of the Site

2.1.4.3 Potential Future Seismic Activity at the Site

2.1.4.4 Seismic Monitoring at the Site

2.1.5 Mineral and Energy Resources

2.1.5.1 Summary and Evaluation of Potential Mineral Resources at the Site

2.1.5.2 Summary and Evaluation of Potential Energy Resources at the Site

2.2 Geomechanics

2.2.1 Mechanical Properties of Rock Units

2.2.1.1 Mechanical Properties - Continua

2.2.1.2 Mechanical Properties - Discontinua

2.2.2 Thermal and Thermomechanical Properties

2.2.2.1 Thermal Conductivity

2.2.2.2 Thermal Expansion

2.2.2.3 Heat Capacity

2.2.3 Stress Field

2.2.3.1 Stress Field in the Site Vicinity

2.2.3.2 Stress Field at the Site

2.3 Hydrology

2.3.1 Surface Hydrology

2.3.1.1 Surface Flow Patterns in Candidate Area

2.3.1.2 Flood History and Potential Flood Hazard at Site

2.3.2 Regional Ground-Water System

2.3.2.1 Recharge and Discharge in Candidate Area

2.3.2.2 Ground-Water Domains in Candidate Area

2.3.2.3 Principal Ground-Water Flow Paths in the Site Vicinity

2.3.2.4 Ground-Water Isotope Chemistry in the Site Vicinity

2.3.3 Site Ground-Water Hydrology

2.3.3.1 Hydraulic Characteristics of Rock Units

2.3.3.2 Ground-Water Flow Paths at the Site

2.3.3.3 Hydrologic Coupled Effects

2.3.3.4 Hydrologic Monitoring and Verification

2.4 Geochemistry

2.4.1 Mineralogy and Petrology

2.4.1.1 Host Rock Mineralogy and Petrology

2.4.1.2 Mineralogy and Petrology of Rocks Surrounding the Host Rock

2.4.1.3 Mineralogy of Sorptive Minerals along Flow Path

2.4.1.4 Long-term Mineral Stabilities along Flow Path

2.4.1.5 Mineralogy of Fractures

2.4.1.6 Mineralogy Alteration History

2.4.2 Ground-Water Chemistry

2.4.2.1 Regional Ground-Water Chemistry

2.4.2.2 Site Ground-Water Chemistry

2.4.2.3 Changes in Water Chemistry along Flow Path

2.4.2.4 Geochemical Monitoring and Verification

2.4.3 Geochemical Retardation of Radionuclides

2.4.3.1 Radionuclide Speciation and Solubility

2.4.3.2 Sorption and Precipitation

2.4.3.3 Matrix Diffusion

2.4.3.4 Dynamic Transport Processes

2.4.3.5 Coupled Effects

2.4.4 Natural Geochemical Analogs

2.5 Climatology and Meteorology

2.5.1 Meteorological Monitoring at the Site

2.5.2 Paleoclimatology of the Candidate Area

GENERAL FORMAT FOR DETAILING FOURTH-LEVEL ACTIVITIES

A.B.C.D (Name of Activity)

A.B.C.D.1 Introduction

A.B.C.D.2 Correlation with NNWSI Issues Hierarchy

A.B.C.D.3 General Data Gathering Techniques

A.B.C.D.4 Parameters and Technical Procedures

A.B.C.D.4.1 (Parameter 1)

A.B.C.D.4.1.1 Sample Locations and Sampling Techniques

A.B.C.D.4.1.2 Field and Laboratory Analytical Procedures

A.B.C.D.4.1.3 Technical Quality Assurance

A.B.C.D.4.1.4 Completion Schedule

A.B.C.D.4.1.5 Where the Data will be Used

A.B.C.D.4.2 (Parameter 2)

(Etc.)

DRAFT PERFORMANCE ASSESSMENT PLAN TOPICAL OUTLINE

INTRODUCTION

1. TOTAL SYSTEM DEFINITION
   - 1.1 Objective
   - 1.2 Purpose and Need
   - 1.3 Description of the Work
   - 1.4 Schedule, Milestones, and Deliverables

2. GEOLOGIC SYSTEM ANALYSIS
   - 2.1 Objective
   - 2.2 Purpose and Need
   - 2.3 Description of the Work
   - 2.4 Schedule, Milestones and Deliverables

3. ENGINEERED SYSTEM ANALYSIS
   - 3.1 Objective
   - 3.2 Purpose and Need
   - 3.3 Description of the Work
   - 3.4 Schedule, Milestones, and Deliverables

4. COMPUTER CODE MODELS
   - 4.1 Objective
   - 4.2 Purpose and Need
   - 4.3 Description of the Work
   - 4.4 Schedule, Milestones and Deliverables
   - 4.5 References

5. TOTAL SYSTEM ANALYSIS

5.1 Objective

5.2 Purpose and Need

5.3 Description of the Work

5.4 Schedule, Milestones, and Deliverables

STATE PROGRAM GOALS

- TO INSURE THAT PUBLIC HEALTH AND SAFETY AND THE ENVIRONMENT ARE ADEQUATELY PROTECTED THROUGH ALL PHASES OF REPOSITORY SITING, CONSTRUCTION, OPERATIONS, CLOSURE, AND DECOMMISSIONING.

- TO ASSESS SOCIAL AND ECONOMIC IMPACTS THAT THE STATE OF NEVADA COULD EXPERIENCE AS A RESULT OF REPOSITORY SITING AND DEVELOPMENT WITH APPROPRIATE MITIGATION STRATEGY.

- TO PROVIDE FOR LOCAL GOVERNMENT COORDINATION AND FOR PUBLIC PARTICIPATION IN THE PROJECT.

- TO PROVIDE FOR EFFECTIVE POLICY GUIDANCE TO THE GOVERNOR AND OTHER STATE LEADERS.

- TO PROVIDE FOR SOUND AND EFFICIENT ADMINISTRATION AND MANAGEMENT OF THE STATE EVALUATION PROGRAM.

HEALTH AND SAFETY OBJECTIVES

- DETERMINE TECHNICAL ISSUES CRITICAL TO THE HEALTH AND SAFETY OF NEVADANS AND THEIR ENVIRONMENT.

- REVIEW RELEVANT U.S. DEPARTMENT OF ENERGY (DOE) PROGRAM PLANS, TECHNICAL STUDIES, AND OTHER DOCUMENTS TO ASSURE INTEGRATION OF NEVADA CONCERNS, ONGOING AWARENESS OF FEDERAL ACTIVITIES, INPUT INTO PROGRAM DESIGNS AND COORDINATION OF THE SCHEDULE OF ACTIVITIES.

- PROVIDE FOR STATE INITIATED, INDEPENDENT STUDY OF TECHNICAL ISSUES THAT HAVE BEEN IDENTIFIED AS CRITICAL AND THAT (A) ARE NOT BEING ADDRESSED BY D.O.E. AND THEIR CONTRACTORS, OR (B) THAT THE METHODS OR RESULTS USED BY THE D.O.E. AND THEIR CONTRACTORS ARE IN QUESTION BY THE STATE OF NEVADA, OR (C) THE AREAS OF STUDY ARE SO CRITICAL THAT DUPLICATIVE STUDIES ARE WARRANTED.

- PROVIDE ON-SITE MONITORING OF ALL FEDERAL TECHNICAL FIELD AND LABORATORY ACTIVITIES WITH REGARD TO SITE SCREENING AND CHARACTERIZATION IN ORDER TO MAKE COMMENTS AND RECOMMENDATIONS AND TO UNDERSTAND HOW THESE TECHNIQUES AND METHODS AFFECT THE OVERALL STUDY.

ISSUES CRITICAL TO

HEALTH, SAFETY AND THE ENVIRONMENT

SITE SUITABILITY ISSUES

1) CHARACTERIZATION OF MOISTURE MOVEMENT THROUGH THE UNSATURATED ZONE.

2) RELATIONSHIP OF YUCCA MOUNTAIN GROUNDWATER REGIME TO THE REGIONAL AQUIFER SYSTEM.

3) EFFECT OF FUTURE CLIMATIC VARIATIONS AND RESULTING CHANGES IN THE HYDROGEOLOGIC REGIME ON THE INTEGRITY OF THE SITE.

4) EFFECTS OF FUTURE FAULTING OR OTHER TECTONIC EVENTS ON THE INTEGRITY OF THE SITE.

5) EFFECTS OF FUTURE VOLCANISM ON THE INTEGRITY OF THE SITE.

6) HUMAN INTERFERENCE OF SITE DUE TO PERCEIVED PRESENCE OF EXTRACTABLE NATURAL RESOURCES.

ISSUES CRITICAL TO

HEALTH, SAFETY AND THE ENVIRONMENT

SITE PERFORMANCE ISSUES

1) GROUND WATER TRAVEL TIME TO THE ACCESSIBLE ENVIRONMENT.

2) EFFECT OF HOST ROCK GEOCHEMISTRY ON THE RETARDATION OF RADIONUCLIDE TRANSPORT.

3) EFFECT OF FUEL CLADDING, WASTE CANISTER MATERIALS, AND BACKFILL IN PREVENTING OR RESTRICTING RADIONUCLIDE TRANSPORT.

4) UNCERTAINTY IN PROJECTING PERFORMANCE ASSESSMENTS TO THE 1,000 AND 10,000 YEAR TIME PERIODS.

5) MAINTENANCE OF WASTE CANISTER RETRIEVABILITY OPTION.

6) DESIGN OF A LONG-TERM REPOSITORY MONITORING NETWORK.

7) MAXIMUM EXPECTED RADIONUCLIDE RELEASE RATE FROM THE ENGINEERED SYSTEM.

ISSUES CRITICAL TO

HEALTH, SAFETY AND THE ENVIRONMENT

ENVIRONMENTAL ISSUES

1) IDENTIFICATION OF NUCLEAR WASTE TRANSPORTATION IMPACTS ON THE ENVIRONMENT OF SOUTHERN NEVADA.

2) IMPACTS OF THE REPOSITORY ON THREATENED AND ENDANGERED SPECIES.

3) IMPACTS OF THE REPOSITORY ON CULTURAL, ARCHAEOLOGICAL AND HISTORIC RESOURCES.

4) IMPACTS OF REPOSITORY SITING AND OPERATION ON LAND USE SURROUNDING THE SITE.

5) IMPACTS ON AESTHETICS AND RECREATION.

6) IMPACTS FROM SITE CHARACTERIZATION, REPOSITORY CONSTRUCTION AND OPERATION ON THE ENVIRONMENT.

7) ADEQUACY OF CONTROLS ON HUMAN INTERFERENCE DURING REPOSITORY OPERATION.

8) EFFECTS OF REPOSITORY SITING, CONSTRUCTION, AND OPERATION ON WATER RIGHTS AND WATER USE.

9) EFFECTS OF REPOSITORY SITING, CONSTRUCTION, AND OPERATION ON AIR AND WATER QUALITY.

FY 84 RESEARCH PROJECT I

"UNSATURATED ZONE MOISTURE MIGRATION
IN SELECTED HYDROGEOLOGIC ENVIRONMENTS"

PROJECT GOALS

1) TO COMPARE YUCCA MOUNTAIN UNSATURATED ZONE MOISTURE MIGRATION DATA TO USGS DATA.

2) TO COMPARE MOISTURE MIGRATION DATA FROM DIFFERENT HYDROGEOLOGIC ENVIRONMENTS TO YUCCA MOUNTAIN.

PHASE I - FEASIBILITY

SPECIFIC OBJECTIVES

1) ESTABLISH A METHODOLOGY FOR EMPLACEMENT OF NEUTRON ACCESS TUBES, THERMOCOUPLE PSYCHROMETERS AND OTHER SOIL MOISTURE SENSING DEVICES IN THICK UNSATURATED ZONES.

2) DEMONSTRATE THE FEASIBILITY OF COLLECTING IN-SITU MONITORED MOISTURE MIGRATION DATA USING SUCH INSTALLATIONS.

3) DEVELOP METHODS OF EXTRACTING SOIL MOISTURE FROM THE UNSATURATED ZONE FOR GEOCHEMICAL STUDIES.

4) IF SUCCESSFUL, EXPAND RESEARCH TO SELECTED HYDROGEOLOGIC ENVIRONMENTS FOR COMPARISON WITH YUCCA MOUNTAIN UNSATURATED ZONE DATA AND ASSOCIATED ANALYSES.

RESEARCH PROJECT I

WORK PLAN - PHASE I FEASIBILITY

1) DRILL TWO HOLES BY DUAL WALL, REVERSE CIRCULATION METHOD, 600-800 FT. DEEP. ONE HOLE BELOW WATER TABLE; ONE HOLE ABOVE.

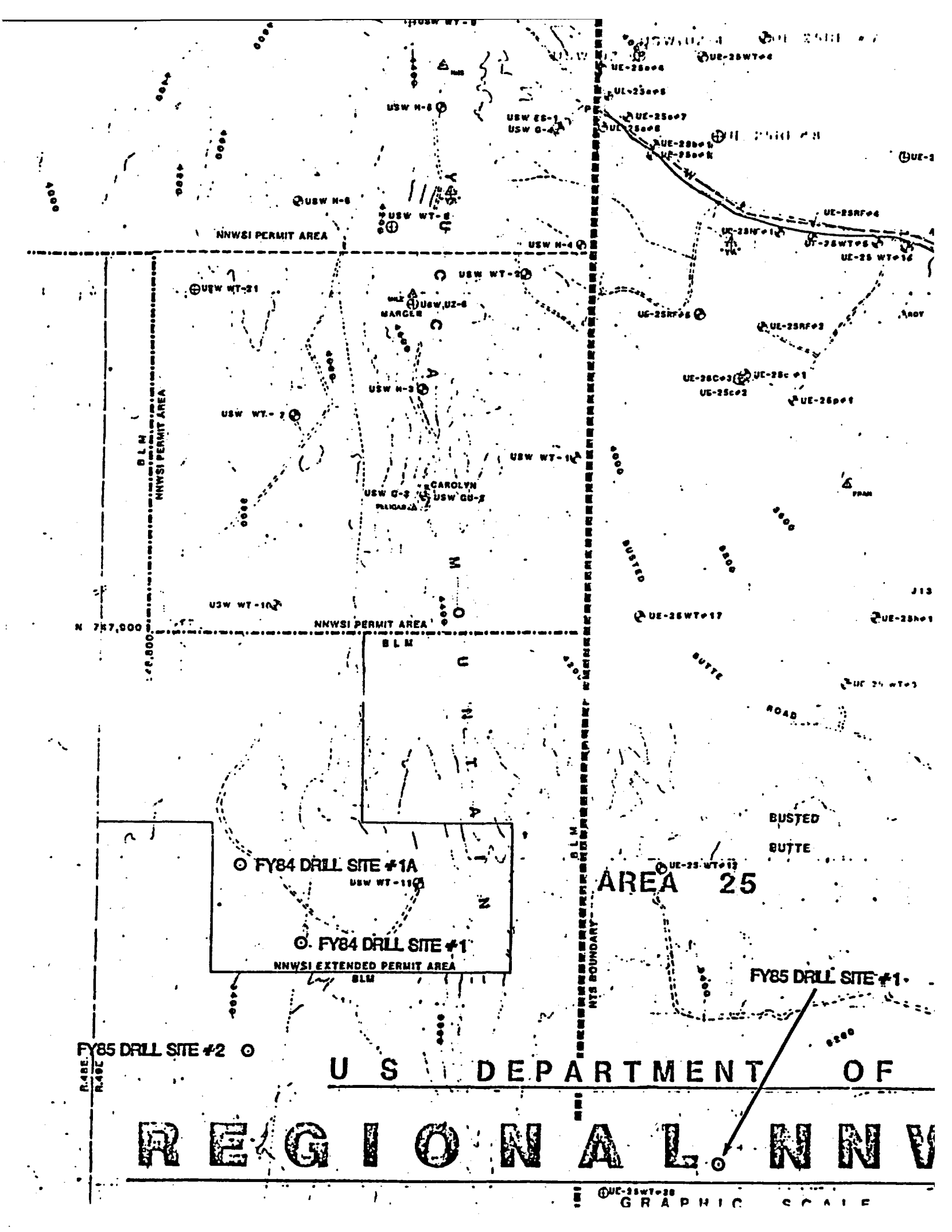
2) EMPLACE INSTRUMENTS
   - IN WATER TABLE HOLE, SELECT 8 ZONES FOR MOISTURE COLLECTION SAMPLERS.
   - ABOVE WATER TABLE HOLE, SELECT 8 ZONES FOR MOISTURE SENSING PROBES.

3) NEAR DEEP HOLES, DRILL SEVERAL SHALLOW (< 150 FT.) NEUTRON PROBE HOLES TO MONITOR NEAR SURFACE MOISTURE MOVEMENT.

WORK PLAN - PHASE II IMPLEMENTATION

1) SELECT SITES FOR DUAL HOLE DRILLING PROGRAM
   - PLUVIAL CLIMATE ANALOG
   - YUCCA MOUNTAIN ENVIRONMENT

2) MONITOR SITES DURING CHARACTERIZATION


NNWSI PERMIT AREA
USW H-6
USW H-5
USW ES-1
USW G-4
USW H-4
USW WT-2
USW WT-21
USW UZ-6
MARKER
USW H-3
USW WT-7
USW WT-1
CAROLYN
USW G-2
USW GU-3
PELICAN
USW WT-10
N 787,000
NNWSI PERMIT AREA
BLM
NNWSI PERMIT AREA
BLM
FY84 DRILL SITE #1A
USW WT-11
FY84 DRILL SITE #1
NNWSI EXTENDED PERMIT AREA
BLM
FY85 DRILL SITE #2
FY85 DRILL SITE #1
NTS BOUNDARY
AREA 25
BUSTED
BUTTE
ROAD
UE-25WT#4
UE-25WT#6
UE-25RF#4
UE-25RF#5
UE-25RF#3
UE-25c#3
UE-25c#1
UE-25c#2
UE-25p#1
UE-25WT#17
UE-25WT#18
UE-25WT#20
R.48E.
R.49E.
U S DEPARTMENT OF
R E G I O N A L N N W
GRAPHIC SCALE

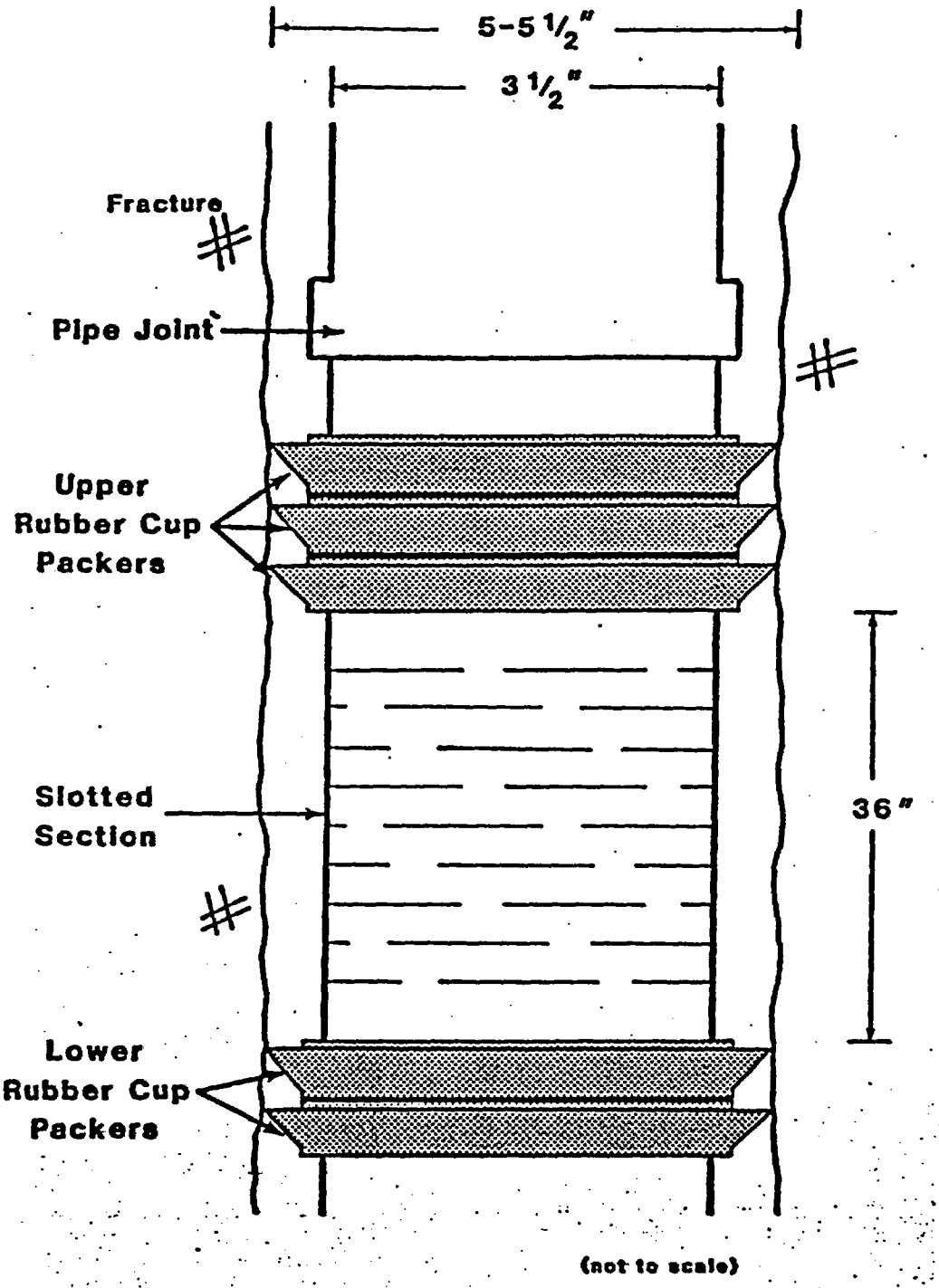


FIGURE 2

Typical psychrometer sampling interval showing relationship of slotted casing and rubber packers

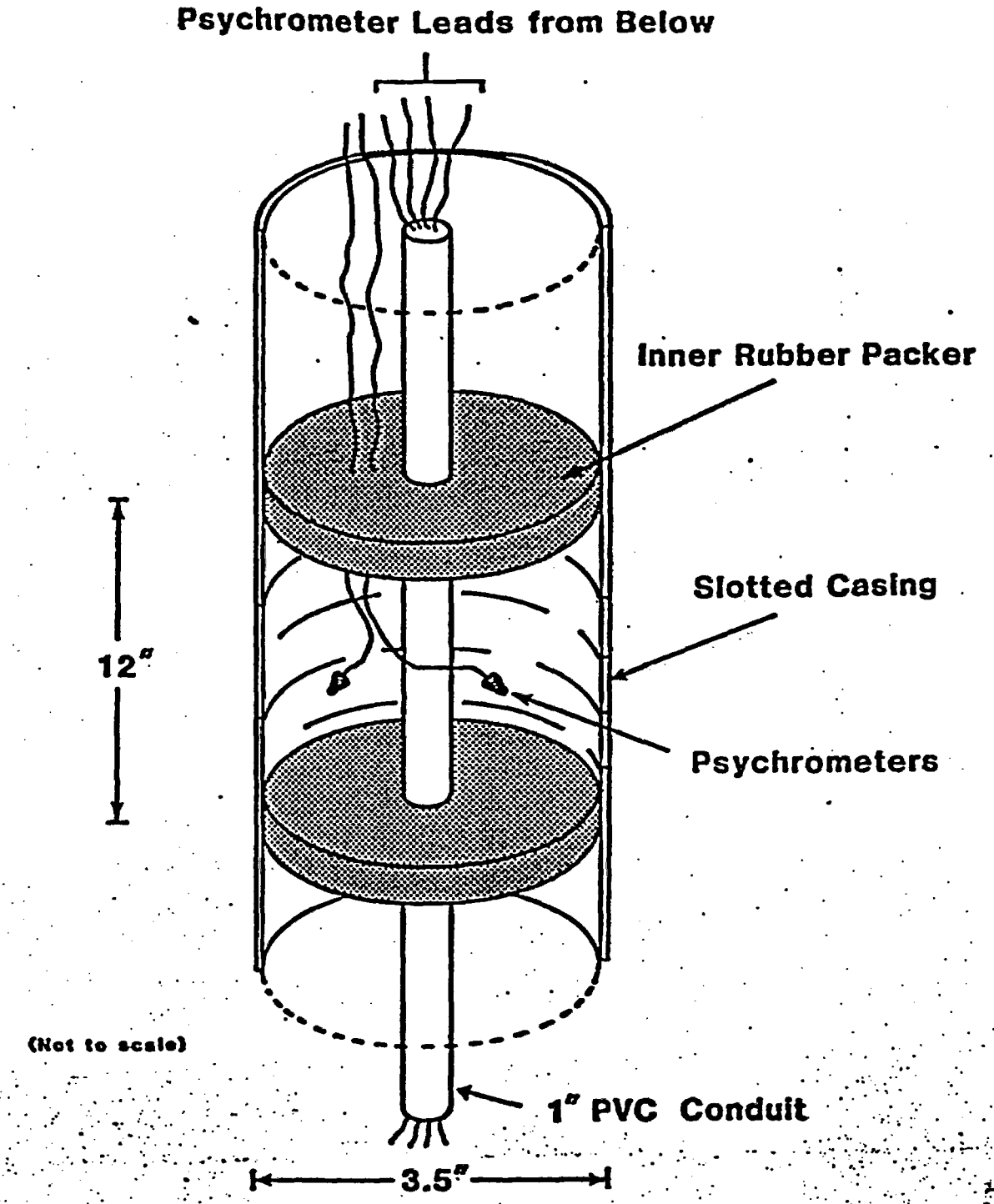


FIGURE 3

Cutaway view of psychrometer

sampling interval

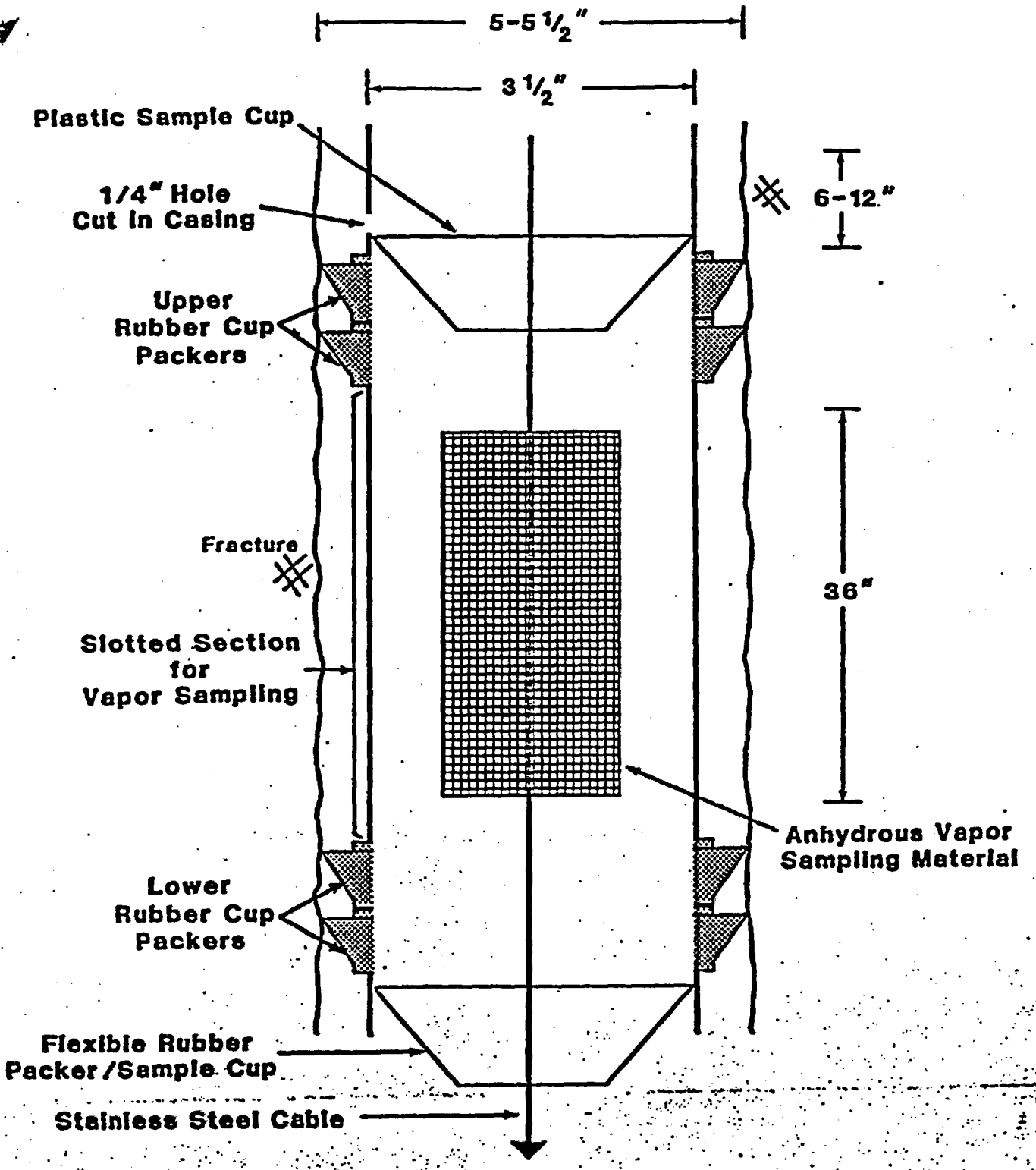


FIGURE 4 (not to scale)

Cutaway of geochemical fluid sampling string

in place in neutron access hole

FY 84 RESEARCH PROJECT II

"REGIONAL GROUND-WATER FLOW AND HYDRAULIC CONTINUITY BETWEEN YUCCA MOUNTAIN AND ADJACENT AREAS"

PROJECT GOAL

1) TO HELP DEFINE CONTINUITY OF FLOW SYSTEMS IN YUCCA MOUNTAIN REGION.

SPECIFIC OBJECTIVE

1) DEFINE WATER MOVEMENT PATTERNS WITHIN YUCCA MOUNTAIN AND THE CONNECTION WITH ADJACENT AREA WITH HYDROGEOCHEMISTRY AND ENVIRONMENTAL ISOTOPES.

FY 84 RESEARCH PROJECT II

WORK PLAN

1) COLLECT PERIODIC (MONTHLY?) WATER SAMPLES AT VARIOUS WELLS AND SPRINGS ON YUCCA MOUNTAIN AND ADJACENT AREAS.

2) PERFORM LABORATORY ANALYSES FOR MAJOR IONS, SELECTED TRACE ELEMENTS AND ENVIRONMENTAL ISOTOPES.

3) PERFORM STATISTICAL ANALYSES OF TIME SERIES DATA.

4) ANALYZE SPATIAL DISTRIBUTION WITH MIXING CELL MODEL.

FY 85 RESEARCH PROJECTS

HYDROGEOLOGY

1) DISTRIBUTION AND AMOUNT OF PLUVIAL CLIMATE GROUNDWATER DISCHARGE (RECHARGE) IN THE NTS REGION.

2) ANALYSIS OF SHORT-TERM CLIMATE AND WEATHER INFLUENCE ON SURFACE WATER HYDROLOGY AND POTENTIAL RECHARGE.

3) ASSESSMENT OF ^{14}C AGE DATE CORRECTIONS FOR UNSATURATED AND SATURATED ZONE WATERS.

4) CONTINUE UNSATURATED ZONE MOISTURE MIGRATION STUDY.

5) CONTINUE REGIONAL FLOW SYSTEM GEOCHEMISTRY STUDY.

GEOLOGY

1) ASSESSMENT OF FAULT ACTIVITY FROM LOW-SUN ANGLE PHOTOGRAPHY.

2) EXAMINATION OF DRILL CORE FOR MINERAL RESOURCES.

11-15-84
Gary

WBS 1.2.4.6.4

Performance Confirmation (PC)

1. Objective and Issues Addressed

The objectives of this WBS element are to plan and conduct field and laboratory experiments and to perform engineering analyses and evaluations to identify non-reference geologic conditions and waste and waste package characteristics, and to test the performance of the natural and engineered barriers (i.e., to identify nonreference conditions and out-of specification performance of th the SITE, REPOSITORY, AND WASTE HANDLING SYSTEMS.) If appropriate, modifications to the reference design will be specified in a timely manner during the repository design, construction, and operational periods.

The PC "program shall have been started during site characterization and it will continue until permanent closure", in accordance with 10 CFR 60.140(b). At the time of the decision on final closure the PC system will provide the data and analyses with which to make the assessment of reasonable assurance that the repository will isolate waste in accordance with the requirements of the NWPA and subsequent regulations. In the initial years, this WBS element will establishing the quantitative criteria for making this final assessment, as well as initial assessment for licensing.

The information needs addressed by this task constitute that portion of the set of information needs of the NNWSI Issues Hierarchy that relate to the SITE, REPOSITORY, AND WASTE HANDLING SYSTEMS. There are deficiencies, however, in the existing NNWSI Information Needs, as indicated by the fact that the following additional information needs have been identified from the Yucca Mountain Mined Geologic Disposal System Requirements (SR) document. Those additional information needs are listed here:

1. With what accuracy and level of confidence must the waste properties and conditions be evaluated prior to emplacement for licensing and for amendment of license for closure:
   (a) Thermal power,
   (b) Thermal power decay rate,
   (c) Radionuclide inventory,
   (d) Surface dose rate,
   (e) Other properties to be determined,
   (f) Waste form integrity,
   (g) Container integrity,
   (h) Other conditions to be determined?

2. With what accuracy and level of confidence must the waste package response to disposal conditions be evaluated for licensing and for amendment of license closure:
   (a) What criteria shall be used in the selection of a representative waste package for testing

and/or monitoring?

(b) What criteria shall be used in the selection of a representative waste package environment for testing and/or monitoring?

(c) What waste form temperature history criteria shall be used in the selection of representative waste and waste form testing and monitoring?

(d) What waste package degradation rate shall be considered acceptable for disposal of waste?

(e) What laboratory tests and experiments shall be conducted to focus on the internal condition of the waste package in an environment which duplicates the disposal environment?

(e) Other processes/parameters to be determined?

3. With what accuracy and level of confidence must the geologic properties and conditions be evaluated for licensing and for amendment of license for closure?

   (a) What values for geologic parameters and other geologic information and processes will be established as a baseline:
   - Rock stress,
   - Rock deformations and displacements,
   - Water inflow rates and locations,
   - Groundwater conditions,
   - Rock pore water pressures (including along fractures and joints)
   - Thermal and thermomechanical response of the rock mass,
   - Other parameters and information to be determined?

   (b) what limits of deviation of actual subsurface conditions from the baseline are acceptable?

   (c) What deviations from baseline conditions that result from construction and operation of the geologic repository are acceptable?

   (d) What spatial and temporal frequency of measurements shall be used in monitoring and evaluating the performance of the geologic system?

4. With what accuracy and level of confidence must the natural and engineered barriers performance be evaluated for licensing and for amendment of license for final closure?

   (a) What baseline criteria must be established for the performance of the natural and engineered barriers?

   (b) What backfill placement and compaction methods and procedures must be used to meet the performance criteria?
   - What is the required placement density?
   - What is acceptable settlement of fill?
   - What are acceptable water flow rates through fill?
   - What tests shall be conducted of placement and compaction procedures prior to initiating permanent backfill placement operations?
   - Other conditions to be determined?

   (c) What are the criteria for effectiveness of the water

seals used in subsurface openings, and what methods and procedures must be used for installing them?
- What are the required installation parameters?
- What are acceptable water flow rates around or through the seals?
- What tests shall be conducted measure the effectiveness of the seals and thier installation procedures prior to full-scale sealing operatons?

(d) What are criteria for interaction effects between waste packages, backfill, rock mass, seals, and groundwater?

5. What is the maximum calculational uncertainty allowable for performance assessment tools for licensing and for amendment of the license for final closure?
   (a) What are the criteria for application of these tools by the performance confirmation system?
   (b) What criteria must be used to specify adjustments to the repository facility design or construction methods and/or to the waste package design that become necessary to accomodate specific geologic conditions encountered during in-situ monitroing, field and laboratory testing, construction, and operation of the geologic repository?
   (c) What criteria must be used to specify adjustments to the repository facility design or construction methods and/or to the waste package design that become necessary to accomodate specific properties and conditions of waste received at the repository and/or that are necessary on the basis of results from the waste package testing and monitoring program?
   (d) What criteria must be used to specify adjustments to the repository facility design or construction methods and/or to the waste package design that become necessary on the basis of results from the natural and engineered barrier testing program?

6. What performance confirmation records shall be maintained by the INFORMATION SYSTEM?

7. What decision making methodology shall be employed in using the performance confirmation data and analyses to make determinations of the retrieval requirements?

8. How shall the site characterization, exploratory shaft testing, and other test and evaluation activities be integrated into a performance confirmation program that spans the time period from site characterization through final closure?

9. What monitoring, testing, and experiments should be performed to accomplish the functions of the performance confirmation system during each stage of repository development, design, construction, and operation?

10. What precautions should be taken in the performance confirmation program to assure that the postclosure performance of the natural and engineered barriers will not be adversely affected?

11. What precautions should be taken in the performance confirmation program to assure that the construction and operation of the repository will not be adversely affected by the performance confirmation activities?

12. What procedures and methods shall be used by the performance confirmation system to assure compatability with other repository subsystems during design, construction, and operation of the repository?

13. What specific non-radioactive hazardous material discharge limits are applicable to the performance confirmation system as a whole?
    (a) How shall these discharge limits be allocated between the subsystems of the performance confirmation system?

14. What specific limits are applicable to the performance confirmation system as a whole on release of radioactive material to the off-site environment and direct radiation exposures to the public?
    (a) How shall these release and exposure limits be allocated between the subsystems of the performance confirmation system?

15. What radiation protection requirements shall be placed upon the performance confirmation system to control exposures to persons in restricted and unrestricted areas within the site boundary?
    (a) How shall the radiation protection requirements be allocated and applied to each of the subsystems of the performance confirmation system?

16. What provision shall be made for conducting tests that NRC may deem appropriate or necessary for administering the regulations of 10 CFR 60 Subpart F?
    (a) How shall these tests be allocated between the subsystems of the performance confirmation system?

17. What assurance must be established that the physical systems, structures, and components of the functional performance confirmation system which are important to safety will continue to perform necessary safety functions in the event of:
    (a) anticipated natural phenomena and environmental conditions,
    (b) dynamic events of equioment failure or similar failure events, or
    (c) credible fires or explosions?
    (d) How shall the measures for assurance be allocated between the subsystems of the performance

confirmation system?

18. What periodic inspection, testing, and maintenance must be performed to assure continued functioning and readiness of the physical systems, structures, and components of the performance confirmation system which are important to safety?
    (a) How shall these periodic inspection, testing, and maintenance requirements be allocated between the subsystems of the performance confirmation system?

19. What precautions must be taken in operations involving radioactive waste to preclude the possibility of a nuclear-criticality accident under normal or accident conditions?
    (a) What operational constraints must be placed on the subsystems of the performance confirmation system to assure against nuclear criticality?

20. What procedures shall be provided for reporting to the NRC any changes propose to the underground facility design, construction methods, and waste package design?

2. Principal Investigator

A. L. Stevens, Division 6313, Sandia National Laboratories

3. Statement of Work

Although this task begins during the Site Characterization phase, the testing and analysis activities conducted during this period are under the auspices of the Site Characterization Program at the Exploratory Shaft (ES) Test Facility. Upon the completion of the ES testing (nominally 3/89), the Performance Confirmation task must be ready to assume responsibility for the testing and evaluation work. Thus, during the period of time during which site characterization is in progress, the work to be performed under Performance Confirmation is as follows:

A. Develop Interim Test Plan Guidelines for planning the testing and evalation work to be performed during the period between completion of the ES testing (3/89) and the beginning of operation of the repository (1998).

B. Develop the Performance Confirmation System Conceptual Operations Plan (to accompany the Repository Conceptual Design Report) to define the preliinary operational plans for the PC System and to form the basis for the Performance Confirmation System design requirements.

C. Develop the Draft Performance Confirmation Interim Test Plan for the testing and evaluation work to be performed during the interim period between the completion of ES testing and beginning of operation of the repository.

D. Develop the Performance Confirmation System facility design requirements for inclusion in the Title I Facility

Requirements Report.

E. Develop the Final Performance Confirmation Interim Test Plan for testing and evaluation work to be performed during the interim period between the completion of ES testing and the beginning of operation of the repository.

Following completion of the site characterization testing, the work to be performed under this task is as follows:

F. Conduct Performance Confirmation testing and evaluation during the period between completion of ES testing and the begining of construction of the repository facility.

G. Conduct Performance Confirmation testing and evaluation during the period of construction of the repository facility.

H. Conduct Performance Confirmation testing and evaluation during the period of operation and closure of the repository.

4. Data and Materials Needed

A. Data required for this task include essentially the entire set of data acumulated for the NNWSI repository.

B. Materials required for these tests and analyses will include:
(1) Samples of tuff rock acquired from the repository horizon as mining progresses for laboratory testing,
(2) Access to the rock mass for conducting in-situ tests on and within the rock itself for evaluating the structural, thermomechanical, geochemical, hydrological, and seismological performance of the repository,
(3) Samples of the waste package materials for tests to evaluate performance under in-situ conditions.
(4) Access to waste handling systems for evaluation of the waste characteristics and performance of waste emplacement and retrieval equipment and methods.

C. Computer codes and analysis methods required to model and evaluate performance will include those used for design and performance assessment of the repository system. New models and computer codes will be developed and certified, as required, throughout the life of the project.

5. Non-Standard Methods/Techniques

A. Such non-standard methods and techniques as are developed, certified, and applied during the site characterization and design stages will be used for performance confirmation evaluations.

B. Such new non-standard methods and techniques as are identified as needed for performance confirmation

will be developed and certified as required throughout the life of the project.

6. Location of Work

Work will be performed at the Yucca Mountain site and at the laboratories of the project participants and contractors, as required. Integration of all work will occur at Sandia National Laboratories, Albuquerque, New Mexico.

7. Quality Assurance Requirements

Testing and analysis will be conducted in accordance with the NNWSI Quality Assurance Procedure II-1 and will be Quality Assurance Level III (Minor).

8. Application of Results

In the initial years of this project the results of this WBS element will be criteria and plans used for the design, construction and operation of the facilities, and criteria to be used as the basis for evaluating performance of the appropriate subsystems of the repository system. As construction and operations proceed, the data, analyses, and evaluations obtained this WBS element will be used to specify appropriate modifications to the reference design. Finally, at the time of decision on final closure, the accumulated data, analyses, and evaluations will be used to make recommendation on permanent closure of the repository.

9. Schedule

Starting date: 1985
Anticipated ending date: Closure of the repository

10. Past and Expected Achievements

10.1 Significant Achievements to Date

The data base and analysis techniques that are currently in existence, and that will be used by this task, have been developed under other WBS elements.

10.2 Planned Achievements

FY86

- Develop Interim Test Plan Guidelines for planning the testing and evaluation work to be performed during the period between completion of the ES testing and the beginning of operation of the repository.

FY87

- Develop the Performance Confirmation System Conceptual Operations Plan (to accompany the Repository Conceptual Design Report) to define the preliminary operational plans for the PC System. This will form the basis for the Performance Confirmation System design requirements.
- Develop the Draft Performance Confirmation Interim Test

Plan for the testing and evaluation work to be performed during the interim period between the completion of ES testing and beginning of operation of the repository.

FY88

- Develop the Performance Confirmation System facility design requirements for inclusion in the Title I Facility Requirements Report.
- Issue the Performance Confirmation Interim Test Plan Final Report.

FY89 through FY97

- Conduct the Performance Confirmation Interim Testing Program from completion of the site characterization testing through the period of design and construction of the repository.
- Specify modifications as appropriate, to the repository design and construction throughout the period of design and construction.

FY90

- Issue the Performance Confirmation System Operations Plan to accompany the Title I Design Report.

Operational Period, FY98 onward

- Perform testing and analyses, and specify modifications to the repository design and construction, as required, throughout the operational life of the repository.

Closure

- Assess the performance of the repository for reasonable assurance that it will perform in the post-closure period within the specifications included in the NWPA and subsequent regulations.

11. Milestones and Deliverables

Level ?

M___ Interim Test Plan Guidelines

The deliverable will be a report giving guidelines for development of the Interim test plan.

Deliverable date: 5/86

M___ PC System Conceptual Operations Plan

The deliverable will be a report on the concepts of operation of the Performance Confirmation System. This report will accompany the Repository Conceptual Design Report and form the basis for the PC System design requirements.

Deliverable date: 9/87

M___ Draft Performance Confirmation Interim Test Plan

The deliverable will be a plan for conducting tests and evaluations during the interim period between completion of the ES testing and start of operations of the repository.

Deliverable date: 6/87

M___ PC System Facilities Design Requirements

The deliverable will be a report describing the requirements for facilities to support the Performance Confirmation activities during operation of the repository.

Deliverable date: 2/88

M___ Final Performance Confirmation Interim Test Plan

The deliverable will be a report describing the plans for conducting tests and evaluations during the Interim Period.

Deliverable date: 9/88

12. Cost

FY85 -	Labor Cost:	$25k	Other Cost:	$0
FY86 -	Labor Cost:	100K	Other Cost:	$0

Total Projected Cost: $1,355K (for FY85 - FY88)

1.2.3 PERFORMANCE CONFIRMATION SYSTEM

SUBSYSTEMS ARE:

- 1.2.3.1 WASTE EVALUATION SYSTEM
- 1.2.3.2 GEOLOGIC EVALUATION SYSTEM
- 1.2.3.3 NATURAL AND ENGINEERED BARRIERS EVALUATION SYSTEM
- 1.2.3.4 DESIGN MODIFICATION SYSTEM

DEFINITION:

The subsystem of the REPOSITORY SYSTEM that consists of field and laboratory experiments, associated instrumentation, and engineering analyses that are used to identify nonreference geologic conditions and waste characteristics, to test the performance of the natural and engineered barriers, and to accordingly specify appropriate modifications to the reference design during repository construction and operation [1.2 FR#3].

FUNCTIONAL REQUIREMENTS:

1. To evaluate the properties and condition of waste received at the repository and to monitor and test waste package response to representative disposal conditions [10 CFR 60.135(a), 60.140(d)(2)&(3), and 60.143(a)].

2. To evaluate geologic conditions that are encountered during in situ testing and construction and that also result from construction and operation of the geologic repository [10 CFR 60.133(b), 60.140(a)(1), and 60.140(d)(2)&(3)].

3. To monitor, test, and evaluate natural and engineered barrier performance during in situ experiments and for actual waste emplacements [10 CFR 60.140(a)(2) and 60.140(d)(2)&(3)].

4. To provide and execute an established plan for feedback and analysis of performance confirmation data and for implementation of appropriate action [10 CFR 60.140(d)(2),(3),&(4)].

PERFORMANCE CRITERIA:

1a. Evaluation of the properties and condition of received waste shall be accomplished with at least the same accuracy and level of confidence with which reference waste characteristics were specified and approved during licensing review. The permissible uncertainty on any property or condition of received waste shall not exceed ____% of the uncertainty of that value that was allowed for in the design of any system that interacts with the waste [10 CFR 60.101 and 60.140(a)(2)].

1b. Evaluation of the response of waste packages to disposal conditions shall be accomplished with at least the same accuracy and level of confidence that was predicted and approved during licensing review. The permissible uncertainty on any parameter monitored to evaluate waste package response shall not exceed ____% of the uncertainty that was allowed for in the design of any system that interacts with the waste package [10 CFR 60.101 and 60.140(a)(2)].

2. Evaluation of the geologic conditions shall be accomplished with at least the same accuracy and level of confidence with which reference geologic conditions were specified and approved during licensing review. The permissible uncertainty on any geologic parameter shall not exceed ____% of the uncertainty of that parameter that was allowed for in the design of any system that interacts with the geology [10 CFR 60.101 and 60.140(a)(1)].

3. Evaluation of natural and engineered barrier performance shall be accomplished with at least the same accuracy and level of confidence that was predicted and approved during licensing review. The permissible

uncertainty on any parameter monitored to evaluate barrier performance shall not exceed ____% of the uncertainty of that parameter that was allowed for in the design of any system that interacts with the natural and/or engineered barriers [10 CFR 60.101 and 60.140(a)(2)].

4. Analysis of performance confirmation data and recommendation of appropriate actions shall be performed using validated and verified analysis tools that have calculational uncertainties no larger than those accepted during licensing review [10 CFR 60.101 and 60.140].

CONSTRAINTS:

A. The PERFORMANCE CONFIRMATION SYSTEM shall interact with the 1.2.5.1 INFORMATION SYSTEM to assure that appropriate records are maintained and reports are made on the tests, experiments, and recommended changes that are performed and developed; implementation of changes recommended on the basis of analyses of performance confirmation data and test results shall be accomplished in accordance with the performance requirements and constraints of the affected (sub)systems and shall be reported to the NRC; NRC review and approval of the recommended actions is not required for implementation of the change, provided that the change does not involve a deviation from the conditions of the license or an unreviewed safety question [interaction with 1.2.5.1 INFORMATION SYSTEM and 1.2 C#0].

B. The information gathered by the PERFORMANCE CONFIRMATION SYSTEM shall be the basis upon which a positive determination is made that there is reasonable assurance the postclosure performance objectives of 10 CFR 60 and 40 CFR 191 will be met. A negative determination is one possible basis upon which a decision to retrieve the emplaced radioactive waste would be made [1.2 PC#3, 1.2 C#Q, and 10 CFR 60.101].

C. During the construction and operation of the repository, the PERFORMANCE CONFIRMATION SYSTEM shall implement continuation of the performance

confirmation program that was started during site characterization; the performance confirmation program shall continue until permanent closure [10 CFR 60.140(b)].

D. The PERFORMANCE CONFIRMATION SYSTEM shall perform in situ monitoring, laboratory and field testing, and in situ experiments as appropriate to accomplish its functional requirements [10 CFR 60.140(c)].

E. The PERFORMANCE CONFIRMATION SYSTEM shall not adversely affect the ability of the 2.1 NATURAL BARRIER SYSTEM and the 2.2 ENGINEERED BARRIER SYSTEM to meet their Performance Criteria and Constraints [10 CFR 60.140(d)(1) and 1.2 C#R].

F. Except as necessary to accomplish its functional requirements, the PERFORMANCE CONFIRMATION SYSTEM shall not interfere with construction and operation of the repository.

G. The PERFORMANCE CONFIRMATION SYSTEM shall interact with the 1.1 SITE, 1.3 WASTE EMPLACEMENT PACKAGE, 1.2.1 MINING, 1.2.2 WASTE HANDLING, 1.2.4. DECOMMISSIONING, and 1.2.5 SUPPORT SYSTEMS to accomplish its Functional Requirements 1, 2, and 4 using procedures and methods that are compatible with these systems [1.2 C#BB].

H. Discharges of nonradioactive, hazardous materials to the environment by the PERFORMANCE CONFIRMATION SYSTEM shall be limited such that all discharges by all subsystems of the 1.2 REPOSITORY SYSTEM are within applicable Federal, State, and local limits; specific materials discharged are identified and appropriate discharge limits are specified for each affected subsystem of the PERFORMANCE CONFIRMATION SYSTEM; the resulting set of applicable requirements for the PERFORMANCE CONFIRMATION SYSTEM as a whole are _____ [interaction with _____ SYSTEM(S) and 1.2 C#B].

I. Release of radioactive material and direct radiation to the environment from the PERFORMANCE CONFIRMATION SYSTEM shall be limited such that it and all other subsystems of the 1.2 REPOSITORY SYSTEM will collectively satisfy Constraint #C of the 1.2 REPOSITORY SYSTEM; specific requirements are stated for each subsystem of the PERFORMANCE CONFIRMATION SYSTEM; the resulting set of requirements applicable to the PERFORMANCE CONFIRMATION SYSTEM as a whole are _____ [interaction with _____ SYSTEM(S) and 1.2 C#C and R].

J. Radiation protection requirements placed upon the PERFORMANCE CONFIRMATION SYSTEM to control exposures to persons in restricted and unrestricted areas within the site boundary shall be sufficient, along with similar requirements on other subsystems of the 1.2 REPOSITORY SYSTEM, for Constraints #D, E, F, G, H, I, J, K, L, M, and N of the 1.2 REPOSITORY SYSTEM to be satisfied; specific requirements are stated for each subsystem of the PERFORMANCE CONFIRMATION SYSTEM; the resulting set of requirements applicable to the PERFORMANCE CONFIRMATION SYSTEM as a whole are _____ [interaction with _____ SYSTEM(S) and 1.2 C#D-N].

K. The testing program conducted using the PERFORMANCE CONFIRMATION SYSTEM shall include such tests as the NRC deems appropriate or necessary for the administration of the regulations of 10 CFR 60 Subpart F; the DOE shall perform or permit the NRC to perform these tests [1.2 FR#3 and C#P].

L. The physical systems, structures, and components of the functional PERFORMANCE CONFIRMATION SYSTEM which are important to safety shall continue to perform necessary safety functions in the event of anticipated natural phenomena and environmental conditions; the physical systems, structures, and components, the safety functions they perform, and phenomena and conditions under which they must continue to perform are identified for each functional subsystem of the PERFORMANCE CONFIRMATION SYSTEM [1.2 C#S].

M. The physical systems, structures, and components of the PERFORMANCE CONFIRMATION SYSTEM which are important to safety shall continue to perform necessary safety functions if the dynamic effects of equipment failure or similar events occur; the physical systems, structures, and components, the safety functions they perform, and the failure events under which they must continue to perform are identified for each functional subsystem of the PERFORMANCE CONFIRMATION SYSTEM [1.2 C#T].

N. The physical systems, structures, and components of the PERFORMANCE CONFIRMATION SYSTEM which are important to safety shall continue to perform necessary safety functions during or after credible fires or explosions; the physical systems, structures, and components, the safety functions they perform, and the fire or explosion conditions under which they must continue to perform are identified for each functional subsystem of the PERFORMANCE CONFIRMATION SYSTEM [1.2 C#U].

O. The physical systems, structures, and components of the PERFORMANCE CONFIRMATION SYSTEM which are important to safety shall permit periodic inspection, testing, and maintenance sufficient to assure continued functioning and readiness; the physical systems, structures, and components, the safety functions they perform, and their inspection, testing, and maintenance requirements are identified for each functional subsystem of the PERFORMANCE CONFIRMATION SYSTEM [1.2 C#X].

P. Operations involving radioactive waste shall be performed in a manner that precludes the possibility of a nuclear criticality accident under normal and accident conditions, unless at least two unlikely, independent, and concurrent or sequential changes in the conditions essential to nuclear criticality safety have occurred; the PERFORMANCE CONFIRMATION SYSTEM must interact with the 1.2.2 WASTE HANDLING SYSTEM, including loading, assembly, and handling of the waste emplacement test packages such that the effective multiplication factor is sufficiently below unity to show a 5% margin after allowance for the associated uncertainties; specific operations and precautions against nuclear criticality are identified for the 1.2.3.1 WASTE EVALUATION SYSTEM [1.2 C#Y].

Q. Other constraints . . . . . TBD.

INTERACTIONS:

1.1 SITE SYSTEM

1.3 WASTE EMPLACEMENT PACKAGE

1.2.1 MINING SYSTEM

1.2.2 WASTE HANDLING SYSTEM

1.2.4 DECOMMISSIONING SYSTEM

1.2.5 SUPPORT SYSTEM

1.2.5.1 INFORMATION SYSTEM

2.1 NATURAL BARRIER SYSTEM

2.2 ENGINEERED BARRIER SYSTEM

1.1 SITE SYSTEM

Subsystems are:

1.1.1 SURFACE SYSTEM
1.1.2 SUBSURFACE SYSTEM

DEFINITION:

The SITE SYSTEM is the natural portion of the PRECLOSURE WASTE DISPOSAL SYSTEM that provides the location for the controlled area of the radioactive waste disposal facility.

FUNCTIONAL REQUIREMENTS:

1. To provide a location for the construction, operation and decommissioning of the surface and subsurface facilities.

PERFORMANCE CRITERIA:

1. The site shall be characterized and licensed so that construction operations can begin no later than ___ in order that radioactive waste can be accepted for disposal no later than January 31, 1998 (interaction with 1.2 REPOSITORY SYSTEM and 1.0 PC#1).

CONSTRAINTS:

A. Any projected effects of predicted tectonic phenomena or igneous activity on repository construction, operation, or closure must not cause radiological exposures to the general public or releases of radioactive materials to restricted and unrestricted areas such that the safety

requirements set forth in 10 CFR Part 20, 10 CFR Part 60, and 40 CFR 191, subpart A are not met (960.5-2-11(a)). Limitations on acceptable predicted occurrences of tectonic phenomena and igneous activity are ___.

B. Based on the predicted nature and rates of fault movement or other ground motion, engineering measures that are beyond reasonably available technology will not be used for exploratory-shaft construction or for repository construction, operation, or closure (960.5-2-11(d)). Limitations are be based on fault movement or other ground motion that can be accommodated by reasonably available technology and are ___.

INTERACTIONS:

1.2 REPOSITORY SYSTEM

1.2.4 DECOMMISSIONING SYSTEM

1.3 WASTE EMPLACEMENT PACKAGE SYSTEM

DEFINITION:

The portion of the PRECLOSURE WASTE DISPOSAL SYSTEM that consists of the nuclear-waste form and a sealed container surrounding it. The boundary of the WASTE EMPLACEMENT PACKAGE SYSTEM is the outer edge of the container.

FUNCTIONAL REQUIREMENTS:

1. Contain the radioactive waste during all normal handling operations and, in the event of accidents or other unexpected dynamic events, help protect against the dispersal of radioactivity.

2. Provide a means for unique waste package identification.

PERFORMANCE CRITERIA:

1. The WASTE EMPLACEMENT PACKAGE must be capable of maintaining waste containment during normal transportation, handling, emplacement, and retrieval operations; design basis accidents; and potential natural phenomena (10 CFR 60.135(b)(3), 10 CFR 131(b)(1), 10 CFR 60.111(b)).

   Maintenance of waste containment is defined as the external release of not more than:

   a. for normal operations, environments and natural phenomena, ___ total curies per package or a leak rate of ___ or less curies/hour/package, and

   b. for accidents, dynamic effects, or unexpected natural phenomena, ___ total curies per package or a leak rate of ___ or less curies/hour/package.

   To ensure these criteria are satisfied, the WASTE EMPLACEMENT PACKAGE must be capable of maintaining containment during and after various test conditions. For example, these tests could include the following:

   a. Drop test: a free vertical drop for a distance of___ times its length (for satisfying 10 CFR 60.131 (b)(2), protection against dynamic effects of equipment failure and similar events).

   b. Fire test: exposure to a ___ C, ___ minute fire (for satisfying 10 CFR 60.131 (b)(3), protection against fires and explosions).

2. The package identification must be consistent with the permanent records contained in the 1.2.5.1 INFORMATION SYSTEM and remain legible at least to the end of the period of retrievability (10 CFR 60.135 (b)(4)). The retrieval period is defined in System 1.2, constraint Q. A measure of the legibility of the code has not currently been determined, but could, for example, be defined as having the characteristics necessary such that, following surface cleaning, the code can be read with remote equipment or visually through a hot-cell facility window.

CONSTRAINTS:

A. The waste emplacement package must be compatible (physical, mechanical, chemical) with transportation, handling, emplacement, and retrieval devices. As such, the waste package has the following interface requirements:

   a. maximum weight ___ kg;

   b. maximum dimensions and tolerances ___;

   c. contain any materials that could interact with these devices and decrease their expected performance;

   d. remote handling features ___;

   e. other ___.

[Interaction with the WASTE HANDLING SYSTEM (1.2.2.), TRANSPORTATION SYSTEM (outside YMWDS), BOREHOLE MINING AND CONSTRUCTION (1.2.1.3)].

B. The features of the WASTE EMPLACEMENT PACKAGE must combine with all the WASTE HANDLING (1.2.2) operations in order that these operations can be conducted safely [10 CFR 60.131(b)(1)]. This regulatory constraint will be satisfied by compliance with functional requirement #1 and the following specific safety-related regulations:

   a. The WASTE EMPLACEMENT PACKAGE must function together with the WASTE HANDLING SYSTEM (1.2.2) and the SUBSURFACE SYSTEM (1.1.2) to ensure that total worker exposure does not exceed 10 CFR 60.111 and 10 CFR 20 limits. In order to satisfy this interaction, the radiation dose at the surface of the package must not exceed ___ rem/hr [interaction with SYSTEMS 1.2.2 and 1.1.2].

   b. Waste materials must be consolidated prior to placement within the waste package in order to limit the availability and generation of particulates [10 CFR 60.135(c)(2)]. Additionally, 10 CFR 20, 30 CFR 57, and OSHA regulations require that dispersibility of the waste be limited as follows:

Following design basis accidents, the amounts of the waste form that are available as particulates in the size range of less than 200 microns but greater than 10 microns in equivalent sphere diameter must not exceed the limits established by 10 CFR 20 and the "as low as reasonably achievable" (ALARA) public and occupational limits. These latter limits must be determined and relate to controlling the dispersal (less than 200 microns) and inhalation (less than 10 microns) of particles by personnel during the preclosure period. The containment provided by the metallic cladding portion of the waste form can be credited in satisfying this function.

c. The potential for criticality of the waste contained within the WASTE EMPLACEMENT PACKAGE must be limited. As such, the criticality parameter, Keff, shall not exceed 0.95 unless at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to criticality control [10 CFR 60.131(b)(7) and interaction with the WASTE PREPARATION SYSTEM 1.2.2.2].

C. The thermal output of an emplaced waste package must be such that the temperature of the immediately surrounding ___ m of rock does not exceed ___ C [interaction with the SUBSURFACE SYSTEM (1.1.2)].

D. The WASTE EMPLACEMENT PACKAGE must be configured, handled, and emplaced such that at no time will the temperature inside the waste form exceed ___ C [interaction with the postclosure WASTE FORM SYSTEM (2.2.1.2)].

E. The permanent waste package label or identification cannot impair the ability of the WASTE EMPLACEMENT PACKAGE to satisfy its primary preclosure function (#1 above) or the postclosure functions of the WASTE PACKAGE SYSTEM, [10 CFR 60.135(b)(4)].

F. The waste package cannot contain amounts of the following materials that could compromise the ability of the underground facility to satisfy the postclosure performance criteria objectives: explosive, pyrophoric, chemically reactive, or free liquids [10 CFR 60.135(b)].

G. The in-situ chemical, physical, and nuclear properties of the waste package and its interactions with the emplacement environment cannot compromise the performance of the UNDERGROUND FACILITY BARRIER (2.2.2) or NATURAL BARRIER (2.1) SYSTEMS [10 CFR 60.135(a)].

H. In order to ensure structural integrity during handling and through the retrieval period, the following must be satisfied [performance assessment of the WASTE EMPLACEMENT PACKAGE]:

a. externally applied stress must not exceed ___ pascals at any location on the WASTE EMPLACEMENT PACKAGE.

b. internally generated stress must not exceed ___ pascals at any location on the WASTE EMPLACEMENT PACKAGE.

I. The WASTE EMPLACEMENT PACKAGE and the BOREHOLE (1.2.1.3) SYSTEMS must interact such that the postclosure WASTE PACKAGE (2.2.1) containment requirement can be met [performance assessment of the WASTE PACKAGE (2.2.1)/ externally applied stress].

J. The design and specifications of the WASTE EMPLACEMENT PACKAGE must be cost effective [10 CFR 960.5.1(a)(3)]. Although the entire YMWDS must be cost effective (see constraint ___ in SYSTEM 1.0), this constraint is called out because of its specific inclusion in the regulations.

INTERACTIONS:

1. SUBSURFACE, 1.1.2

2. BOREHOLE AND MINING CONSTRUCTION, 1.2.1.3

3. WASTE HANDLING, 1.2.2
   a. RECEIVING, 1.2.2.1
   b. PREPARATION, 1.2.2.2
   c. STORAGE, 1.2.2.3
   d. EMPLACEMENT, 1.2.2.4
   e. RETRIEVAL, 1.2.2.5
   f. SHIPPING, 1.2.2.6

4. WASTE EVALUATION, 1.2.3.1

5. NATURAL BARRIER, 2.1

6. WASTE PACKAGE, 2.2.1
   a. WASTE-FORM-SUPPORT, 2.2.1.2
   b. WASTE FORM, 2.2.1.3

7. UNDERGROUND FACILITY BARRIER, 2.2.2

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DRAFT ISSUE - ORIENTED SITE TECHNICAL POSITION (ISTP) FOR THE NNWSI PROJECT

The subject NRC draft is attached for your review and comment. The draft was transmitted to the Project under a cover letter from Ralph Stein requesting comments by December 10, 1984. We are also including a copy of an NRC to DOE transmittal letter which may provide additional insight into the NRC's intent relative to the ISTPs. Similar ISTPs have been prepared for the SRP program and BWIP.

The first part of the ISTP package consists of an introductory section that provides the NRC's intent relative to the ISTP concept, and their approach to categorizing, identifying and addressing issues in the context of the SCP and CAA. Much of the material in the introductory section is derived from the BWIP Site Characterization Analysis (NUREG-0960). The balance of the ISTP is categorized into Draft Site Issues for:

- o Hydrology
- o Waste Package
- o Geochemistry
- o Geologic Repository Operations Area Design/Rock Mechanics, and
- o Geology/Geophysics

This document is of major significance to the Project since it will, when issued as a final STP, reflect NRC's expectations relative to a major portion of the site characterization program and CAA content. We must, therefore use this public comment period to develop useful comments on the draft.

Please review the attached draft with emphasis on those areas directly relevant to your individual work scopes. We have included the entire package since there will be an overlap between the various technical areas (for example, geochemistry and waste package) and a thorough review will require familiarity

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with all categories of issues. In addition to the review topics noted in RW-23's transmittal letter, the following points should be considered during your review:

1. Are the issues clearly stated - i.e., are they ambiguous or unclear?

2. Are the issues truly specific to the NNWSI Project?

3. Are the issues, as stated, technically correct and is the logic (rationale) for their inclusion defensible?

So that we can prepare a consolidated set of NNWSI Project comments by December 10, please forward your input to the attention of M. D. Voegele of SAIC no later than December 4.

If you have any questions, please contact J. S. Szymanski of my office or M. A. Glora of SAIC.

for
Donald L. Vieth, Director
Waste Management Project Office

WMPO:JSS-316

Enclosures:
As stated

cc:
M. D. Voegele, SAIC, Las Vegas, NV
M. A. Glora, SAIC, Las Vegas, NV
M. B. Blanchard, WMPO, DOE/NV
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 2 1984

Mr. W. J. Purcell
Associate Director
Office of Geologic Repositories
Office of Civilian Radioactive
Waste Management
U. S. Department of Energy
RW-20
Washington, D.C. 20545

Dear Mr. Purcell:

The purpose of the geologic repository prelicensing consultation and guidance program now being conducted by the NRC and DOE staffs is to fully inform the DOE about the type and amount of information that must be provided in a license application to allow a licensing decision to be made by the NRC. As one important mechanism in this process the staff has developed Issue-Oriented Site Technical Positions (ISTPs) which identify issues the NRC staff considers must be addressed at the time of repository licensing. The purpose of this letter is to transmit these ISTPs to DOE and to describe their part in the prelicensing consultation program.

Enclosed are 10 copies each of the ISTPs for the following potential geologic repository sites:

- Basalt Waste Isolation Project (BWIP)
- Nevada Nuclear Waste Storage Investigations (NNWSI)
- Salt Repository Project (SRP)
  - Permian Basin Sites
  - Paradox Basin Sites
  - Gulf Coast Dome Sites

These ISTPs provide guidance on what the NRC staff considers to be issues that need to be addressed in an acceptable license application for a potential high-level waste geologic repository by presenting information needs (issues) and associated rationales. These issues and rationales were developed by a systematic and comprehensive assessment of the overall geologic repository and its components. The NRC has elected to develop guidance of this form and in this early period of the prelicensing process to provide a logical framework for addressing pertinent issues relating to site characterization and design development.

The ISTPs address site issues in the areas of geology/geophysics, waste package, geologic repository operations area design/rock mechanics, hydrology, and geochemistry. The issues in the ISTPs for geology/geophysics and hydrology are the same for all of the sites at a broad level but are different for the most specific level to account for different site characteristics. The ISTPs for the other technical areas are essentially the same for all the sites presently being considered, but contain minor differences reflecting differences in the media for each project.

At present, DOE is in the process of preparing the Environmental Assessments (EAs) for site screening required by the NWPA. The staff will be reviewing and commenting on these upon their publication. As noted in the text of the ISTPs, these staff documents address licensing issues which need to be resolved prior to licensing of a site. The ISTPs will therefore not be utilized as a benchmark in the staff's review of the EAs, nor will DOE be expected to address the ISTPs in their resolution of comments.

Note

The staff is transmitting to the Federal Register a Notice of Availability on the ISTPs which provides for a 60-day public comment period. In addition to soliciting public comments, the staff solicits comments from the DOE. The copies which we are transmitting with this letter are for your convenience in developing comments from your staff, the field offices, and your contractors. The Division of Waste Management requests that the Department provide a single set of comments for each of these documents.

If you have any questions about these documents, please contact Hubert Miller, Chief, Repository Projects Branch, Division of Waste Management (FTS-427-4177).

Sincerely,

[redacted]

Hubert J. Miller, Chief
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures:
Issue-Oriented Site Technical Positions

cc: D. Vieth (NNWSI ISTP only)
O. L. Olson (BWIP ISTP only)
J. Neff (SRP ISTPs only)
R. Stein (All ISTPs)
C. Head (All ISTPs)

DRAFT SITE ISSUES

FOR

GEOLOGIC REPOSITORY OPERATIONS AREA DESIGN/ROCK MECHANICS

4.0 Geologic Repository Operations Area Design/Rock Mechanics

4.1 How is the geologic repository operations area designed to maintain radiation dose levels and concentrations of radioactive material specified in 10 CFR Part 60.111(a)?

4.1.1 What are the restricted and unrestricted areas of the geologic repository operations area?

4.1.2 What provisions are taken in the design to assure that, during normal operations, releases of radioactive material into the air in the restricted area do not exceed limits specified in 10 CFR Part 20.103?

4.1.3 How do the design criteria and design address levels of radiation and releases of radioactive materials to unrestricted areas within the limits specified by 10 CFR Parts 20.105 and 20.106?

4.1.4 How does the design of structures, systems and components important to safety incorporate the design criteria of 10 CFR Part 60.131?

4.1.4.1 How does design of the structures, systems and components important to safety account for natural phenomena and environmental conditions?

4.1.4.2 How does design of the structures, systems and components important to safety account for protection against equipment failure, fires and explosions, accident conditions, utility failures and criticality as required by 10 CFR Part 60.131?

4.1.4.3 How does design account for instrumentation and control systems to monitor and control the behavior of structures, systems and components important to safety for normal and accident conditions as required by 10 CFR Part 60.131?

4.1.4.4 How will inspection, testing, and maintenance be accounted for in the design of structures, systems and components important to safety?

4.1.5 How are surface facilities in the geologic repository operations area designed to meet 10 CFR Part 20 and EPA requirements?

4.1.5.1 How does the design of surface facilities account for radiation control, effluent monitoring and waste treatment as required by 10 CFR Part 60.132?

4.1.6 How does the underground facility design address the requirements for flexibility of design, underground openings and rock excavation as stated in 10 CFR Part 60.133?

4.1.7 How is the underground facility designed to provide for possible water or gas intrusion into the geologic repository?

4.1.8 How is the underground facility ventilation system designed to restrict releases to limits specified on 10 CFR Part 60.111(a)?

4.1.9 How does the design permit implementation of a performance confirmation program as specified in Part F of 10 CFR Part 60?

4.2 How is the underground facility designed to permit retrieval of waste in accordance with the performance objectives of 10 CFR Part 60.111?

4.2.1 How does the design account for natural conditions such as in situ stresses, heterogeneities and anomalies that affect the ability to retrieve as required by 10 CFR Part 60.111(b)?

4.2.2 How does the design account for geologic repository induced, thermal-hydrological-mechanical-chemical conditions that affect the ability to retrieve as required by 10 CFR Part 60.111(b)?

4.2.2.1 What effect does thermal loading have on in situ stresses, heterogeneities and anomalies in the tuff media?

4.2.2.2 If spalling occurs how will it affect the ability to retrieve waste packages?

4.2.2.3 If the heat produced by the waste packages is sufficient to produce steam (if water is present) in the geologic repository, what effect will steam have on the ability to retrieve waste packages?

4.2.2.4 What effect will water (if any is present) in the underground facility have on the ability to retrieve waste packages?

4.2.2.5 What effect will retrieval have on the ventilation system requirements?

4.2.3 What effect does backfill have on the ability to retrieve (if backfill is emplaced prior to permanent closure)?

4.2.3.1 How will backfill (if any) be remined in order to remove the waste packages?

4.2.3.2 How will waste packages retrieval be affected by changes in backfill properties due to thermal-hydrological-mechanical-chemical processes?

4.2.4 What provisions are contained in the design to assure that, during retrieval, releases of radioactive material into the air in the restricted areas do not exceed limits specified in 10 CFR Part 20.103?

4.3 How is the backfill component of the engineered barrier system designed to meet the release rate requirements (10 CFR 60.113(ii)(b))?

4.3.1 How does the design incorporate the geologic and natural processes which will cause water to contact the backfill?

4.3.1.1 How much, by what means, and from what sources is intrusion of water into the engineered barrier system anticipated?

4.3.2 How does the design incorporate the geologic repository-induced changes on the geologic setting which will cause water to contact the backfill?

4.3.2.1 What effect does the excavation of openings have on rock movement or fracturing and permeabilities in the underground facility, shafts and boreholes?

4.3.2.2 What effects do thermal gradients caused by waste emplacement have on rock movement or fracturing and permeabilities in the underground facility, shafts and boreholes?

4.3.3 How will borehole and shaft seals be designed to meet the release rate requirement to the accessible environment (60.112)?

4.3.3.1 How does borehole and shaft seal design account for changes in characteristics of sealing materials?

4.3.3.2 What effect will construction of the shafts (e.g., rock damaged zone, liner effects), boreholes and in situ testing have on the ability to seal openings?

4.3.3.3 How will placement of borehole and shaft seals be controlled to ensure that the performance objective stated as 10 CFR Part 60.112 is met?

4.3.3.4 How does sealing system design account for rock movement and fracturing, and groundwater chemical interaction?

4.4 How is the backfill component of the engineered barrier system designed to prevent the function of the waste packages from being compromised?

4.4.1 How does the design incorporate the effects of the coupled thermal-hydrological-mechanical-chemical processes on the properties of the backfill component of the engineered barrier system?

4.4.1.1 How does the design incorporate the effects of heat and radiation from the waste packages on the hydraulic conductivity, porosity, and permeability of the backfill component of the engineered barrier system?

4.4.1.2 How does the design incorporate the effects of groundwater flow and chemical composition of the groundwater on the properties of the backfill component of the engineered barrier system?

4.5 How is the backfill component of the engineered barrier system designed to control releases of radionuclides?

4.5.1 What characteristics of the backfill component of the engineered barrier system will control releases of radionuclides?

4.5.2 How will the placement methods for the backfill component of the engineered barrier system be controlled to ensure that the system will meet the release rate requirements as stated in 10 CFR Part 60.113?

4.5.3 What level of performance is expected for the backfill component of the engineered barrier system in order to meet the release rate requirements stated in 10 CFR Parts 60.112 and 60.113?

4.6. How does the geologic repository design account for the effects of the disturbed zone, including borehole and shaft seals, in meeting the release rate requirements of 10 CFR 60.112?

4.6.1 How will borehole and shaft seals be designed to meet the release rate requirements to the accessible environment (60.112)?

4.6.1.1 How does borehole and shaft seal design account for changes in characteristics of sealing materials?

4.6.1.2 What effect will construction of the shafts (e.g., rock damaged zone, liner effects), boreholes and in situ testing have on the ability to seal openings?

4.6.1.3 How will placement of borehole and shaft seals be controlled to ensure that the performance objective stated as 10 CFR Part 60.112 is met?

4.6.1.4 How does the sealing system design account for rock movement and fracturing, and groundwater chemical interaction?

4.6.2 How does the design incorporate the effects of thermal loading on the geomechanical properties of the rock in the disturbed zone?

Discussion

The rationale for each issue is described in the subsequent discussion. In the discussion, the broadest issues, i.e., those that would appear in the first tier of a hierachy of issues and sub-issues (logic tree) are related directly to the performace issues that are listed in the Background section above. Other issues are related by technical argument to the issue(s) directly above in the logic tree.

4.1 How is the geologic repository operations area designed to maintain radiation dose levels and concentrations of radioactive material within the limits specified in 10 CFR Part 60.111(a)?

10 CFR Part 60 contains design criteria incorporating the standards for protection against radiation (10 CFR 20) for the operational period of the repository. These include criteria for both the restricted and unrestricted areas of the geologic repository operations area. DOE should identify those structures, systems and components which are important to safety. The natural and induced geologic conditions and their effects on operation and performance of the geologic repository operations area should be considered.

4.1.1 What are the restricted and unrestricted areas of the geologic repository operations area?

To apply 10 CFR Part 20 - Standards for Protection Against Radiation, as specified in 10 CFR Part 60.111(a) and .131(a), it is necessary to determine the boundaries of the restricted and unrestricted areas based on the design for the geologic repository operations area.

4.1.2 What provisions are taken in the design to assure that, during normal operations, releases of radioactive materials into the air in the restricted area do not exceed limits specified in 10 CFR Part 20.103?

10 CFR Part 60.131 requires that the geologic repository operations area shall be designed to maintain radiation doses, levels and concentrations of radioactive material in air in restricted areas within the limits specified in 10 CFR Part 20.103. The requirement applies to the restricted area during normal operations only.

4.1.3 How do the design criteria and design address levels of radiation and releases of radioactive materials to unrestricted areas within the limits specified by 10 CFR Parts 20.105 and .106?

10 CFR Part 60.111(a) and 60.131(a) applies limits on levels of radiation and release of radioactive material in the unrestricted areas of the geologic repository operations area by 10 CFR Parts 20.105 and 106. The design for the geologic repository operations area should identify how levels and releases will be kept below those specified in Part 20 during normal operations of the facility.

4.1.4 How does the design of structures, systems and components important to safety incorporate the design criteria of 10 CFR Part 60.131?

10 CFR Part 60.131(a) requires that the geologic operations area be designed to maintain radiation doses, levels and concentrations within the limits specified in 10 CFR Part 20. The dispersal of radioactive contamination must be monitored and controlled.

4.1.4.1 How does design of the structures, systems, and components important to safety account for natural phenomena and environmental conditions?

10 CFR Part 60.131(b) requires that structures, systems, and components important to safety be designed so that natural phenomena and environmental conditions anticipated at the geologic repository operations area will not interfere with necessary safety functions.

4.1.4.2 How does design of the structures, systems, and components important to safety protect against equipment failure, fires, and explosions, accident conditions, utility failures, and criticality as required by 10 CFR Part 60.131?

10 CFR 60.131(b) requires that the structures, systems, and components important to safety be designed to (1) withstand dynamic effects of equipment failure, (2) protect against fires and explosions, (3) be capable of responding to emergencies, (4) ensure that utility service systems can function under normal and accident conditions, and (5) ensure that nuclear criticality is not possible.

4.1.4.3 How does design account for instrumentation and control systems to monitor and control the behavior of structures, systems, and components important to safety for normal and accident conditions as required by 10 CFR Part 60.131?

10 CFR Part 60.131(b) requires that the design of structures, systems, and components important to safety be designed to include provisions for

intrumentation and control systems to monitor and control behavior over anticipated ranges for normal and accident conditions.

4.1.4.4 How will inspection, testing, and maintenance be accounted for in the design of structures systems and components important to safety?

10 CFR Part 60.131(b) requires that structures, systems, and components important to safety are designed to permit periodic inspection, testing and maintenance.

4.1.5 How are surface facilities in the geologic repository operations area designed to meet 10 CFR Part 20 and EPA requirements?

10 CFR Part 60.132 requires that the surface facilities of the geologic repository operations area are designed to ensure that EPA and 10 CFR 20 standards are met.

4.1.5.1 How does design of surface facilities account for radiation control, effluent monitoring, and waste treatment as required by 10 CFR Part 60.132?

10 CER Part 60.132 requires that surface facilities provide for radiation and effluent control and monitoring and prevent releases exceeding the levels stated in 10 CFR 20 and the EPA standard.

4.1.6 How does the underground facility design address the requirements for flexibility of design, underground openings and rock excavation as stated in 10 CFR Part 60.133?

Underground facility design must be flexible enough to accommodate site specific conditions. Consideration must be given to construction methods and the design of underground openings to limit the potential for creating a preferential pathway for groundwater or radioactive waste migration.

4.1.7 How is the underground facility designed to provide for possible water or gas intrusions into the geologic repository?

Intrusion of water and gas may have a detrimental effect on the construction and operation of the underground facility, and therefore effect the ability of the geologic repository to meet the performance objectives of 10 CFR 60.

4.1.8 How is the underground facility ventilation system designed to restrict releases of radioactive materials to limits specified in 10 CFR Part 60.111(a)?

The underground facilities ventilation system must control the release of radioactive particulates and gases to within the limits specified in 10 CFR Part 20. 10 CFR Part 60.133(g) requires that the ventilation system function during normal and accident conditions and the ventilation of excavation and waste emplacement areas be separate.

4.1.9 How does the design permit implementation of a performance confirmation program as specified in Part F of 10 CFR Part 60?

As part of the design, a system must be developed for assessing how closely actual performance compares with the performance predicted during design. The design should allow the instrumentation system to monitor repository performance without interference from repository operations. The performance confirmation program should gather information on the response and interactions between the geologic media and waste form for comparison to baseline data and expected responses.

4.2 How is the underground facility designed to permit retrieval of waste in accordance with the performance objectives of 10 CFR Part 60.111?

As required by 10 CFR Part 60.111(b) retrieval of the waste is an option that must be maintained for a period of up to 50 years after the initiation of waste placement or until a performance confirmation is completed and accepted by NRC. The design criteria and design for the geologic repository must allow for the retrievability option as required by 10 CFR Part 60.133(c).

4.2.1 How does the design account for natural conditions such as in-situ stresses, heterogeneities and anomalies that affect the ability to retrieve as required by 10 CFR Part 60.111(b)?

The natural conditions of tuff will dictate many of the design details. The amount of fracturing, heterogeneity, anisotropic properties, anomalous zones, ambient temperature, and other geologic conditions will affect storage room and emplacement hole dimensions and retrieval equipment. The design criteria should address how the adverse siting conditions, if present, will affect the ability to retrieve.

4.2.2 How does the design account for geologic repository induced, thermal-hydrologic-mechanical-chemical conditions that affect the ability to retrieve as required by 10 CFR Part 60.111(b)?

The excavation and development of a geologic repository operations area results in changes in the existing natural conditions. Stress gradients will develop around the openings. As repository excavation proceeds, the stresses throughout the geologic repository area will be redistributed. The stress conditions at retrieval will be a function of excavation techniques and excavation sequence.

Stability of the rock mass is dependent on the magnitude of the stress components, the rock mass strength, thermal loading and the orientation and geometry of the excavations.

The environment at the time of retrieval, (e.g., the presence of steam), will influence the type of equipment used, the configuration of geologic repository openings, ventilation requirements, and safety measures.

4.2.2.1 What effect does thermal loading have on in situ stresses, heterogeneities and anomalies in the tuff media?

The thermal load imposed by the emplacement of waste will create a thermal gradient in the rock mass. The limits and magnitude of the gradient need to be defined along with resultant thermal expansion and stress changes.

4.2.2.2 If spalling occurs how will it affect the ability to retrieve waste packages?

Spalling may occur in the form of roof falls, pillar slabbing, or floor heave. The e nt of spalling will affect retrieval time, equipment, worker safety, and t.. ability to relocate a waste package for retrieval. The design criteria for underground openings requires that the retrievability option be maintained and the potential for rock movement be minimized as stated in 10 CFR Part 60.133(e).

4.2.2.3 If the heat produced by the waste packages is sufficient to produce steam (if water is present) in the geologic repository, what effect will steam have on the ability to retrieve waste packages?

Groundwater may begin to resaturate the waste emplacement rooms when they are sealed off. Retrieval would necessitate re-entry of the room. The effects of steam (if any) in the emplacement rooms upon retrieval should be considered.

4.2.2.4 What effect will water (if any is present) in the underground facility have on the ability to retrieve waste packages?

Groundwater may begin to resaturate the waste emplacement rooms when they are sealed off. Retrieval would necessitate re-entry of the room. The effects of water in the emplacement rooms upon retrieval should be considered.

4.2.2.5 What effect will retrieval have on the ventilation system requirements?

Ventilation requirements during retrieval will be a function of rock temperature, backfill conditions and time allowed for precooling. Depending on the magnitude of retrieval, the ventilation capacity of the confined air circuit may need to be enlarged for retrieval. The rock temperature at various times in the retrieval period needs to be defined in terms of the ventilation capacity required for retrieval. The retrieval environment, including temperature, humidity, and air quality will directly affect the type of equipment and the measure taken to keep equipment in operation. Elevated temperatures may preclude the presence of workers leading to a need for remote-controlled equipment. Temperature levels and resultant equipment requirements for retrieval need to be identified.

4.2.3 What effect does backfill have on the ability to retrieve (if backfill is emplaced prior to permanent closure)?

The presence of backfill may affect all of the operations necessary to retrieve the waste. Equipment systems, ventilation systems, excavation equipment, and repository facilities will need to consider the backfill during design. Equipment and excavation systems must identify how the increased temperatures will affect their ability to retrieve. Handling and storing backfill during retrieval operations should be considered in the repository design.

4.2.3.1 How will backfill be remined in order to remove the waste packages?

Remining of backfill may require advanced technology to assure proper equipment operation and worker safety. Under the conditions presently expected during retrieval, remining the backfill may require a remote-controlled excavation system. The system for remining the backfill and appropriate design criteria for the equipment should be identified.

4.2.3.2 How will waste package retrieval be affected by changes in backfill properties due to thermal-hydrological-mechanical-chemical processes?

The ability of the excavation equipment to remine the backfill will depend on an accurate assessment of the backfill physical properties at the time of retrieval. Groundwater resaturation, consolidation, and thermal effects on the backfill may require different handling procedures at the time of retrieval than when placed. The limits of the expected changes and their effects on the retrieval systems require identification.

4.2.4 What provisions are taken in the design to assure that, during retrieval, releases of radioactive material into the air in the restricted areas do not exceed limits specified in 10 CFR Part 20.103?

The retrieval option may possibly require additional provisions if it is necessary to handle contaminated material in the underground facility caused by package failure. Consideration should be given to such problems and what effects these events would have on controlling radioactive material in the restricted area.

4.3 How is the backfill component of the engineered barrier system designed to meet the release rate requirements (10 CFR 60.113 (ii)(b))?

10 CFR 60.113 requires that the release of radionuclides from the engineered barriers to the geologic setting be gradual over a long period of time. Backfill design will be significantly affected by the role of the backfill in mitigating radionuclide releases.

4.3.1 How does the design incorporate the geologic and natural processes which will cause water to contact the backfill?

Fracturing of the rock mass will allow groundwater to enter the disturbed zone adjacent to the engineered barriers. All factors should be considered in identifying the natural geologic factors that could cause water to enter the underground facility.

4.3.1.1 How much, by what means, and from what sources is intrusion of water into the engineered barrier system anticipated?

Intrusion of water into the engineered barrier system can be gradual or sudden and occur in any quantity. Sources of water intrusion could include unidentified boreholes and groundwater. Potential water intrusions and their impact on geologic repository operations should be addressed.

4.3.2 How does the design incorporate the geologic repository-induced changes on the geologic setting which will cause water to contact the engineered barrier system periphery?

Excavation of a geologic repository, applied thermal loads, and the construction of vertical shafts and boreholes may enhance the flow of groundwater into the repository system. Changes in the natural conditions which may contribute to groundwater inflow should be identified and their impacts assessed.

4.3.2.1 What effect does the excavation of geologic repository openings have on rock movement or fracturing and permeabilities in the underground facility, shafts and boreholes?

The excavation of geologic repository openings will change the in situ stress conditions in the geologic repository operations area and surrounding strata. The change in stress may create fractures and open existing fractures thus enhancing permeability. Increased permeability and its effect on inflows need to be identified.

4.3.2.2 What effects do thermal gradients caused by waste emplacement have on rock movement or fracturing and permeabilities in the underground facility, shafts and boreholes?

The response of the underground facility and geologic setting to thermal loads should be defined in terms of fracture frequency and fracture opening. Expansion of geologic materials may initially close some fractures. Subsequent cooling may result in the realization of some unrecoverable strains and resultant permeability enhancement. The effects of thermal loading on fractures in the underground facility and geologic setting must be addressed, as required by 10 CFR Part 60.133(i), to assess how water could contact the engineered barrier system.

4.3.3 How will borehole and shaft seals be designed to meet the release rate requirements to the accessible environment (60.112)?

Construction of shafts and boreholes alters the geologic setting and can create potential pathways for groundwater flow and migration of radionuclides. Since these pathways could adversely affect the isolation capabilities of the repository, the NRC has required in 10 CFR Part 60.134(a) that boreholes and shafts be sealed at permanent closure of the facility. Seal system characteristics will be based on the performance DOE will require of the seal system.

4.3.3.1 How does borehole and shaft seal design account for changes in characteristics of sealing materials?

The compatibility of the physical and chemical characteristics of the seal material to the host rock is an important consideration in seal design. Aspects of the geologic setting should not have a detrimental affect on the integrity of the seal material. Therefore, to meet the requirements of 10 CFR Part 60.134(b), the effect of the geologic setting on seal properties must be addressed.

4.3.3.2 What effect will construction of the shafts (e.g., rock damaged zone, liner effects), boreholes and in situ testing have on the ability to seal openings?

Construction of shafts, borehole drilling, and exploratory testing will change the rock characteristics surrounding the openings. Potential effects are rock damage by excavation and stress redistribution around the opening. The effect of these phenomena on the ability to seal the openings should be assessed.

4.3.3.3 How will placement of borehole and shaft seals be controlled to ensure that the performance objective stated as 10 CFR Part 60.112?

The placement techniques used in sealing shafts and boreholes could be a controlling factor in seal performance. Reliability must be obtained in the methods and equipment used to install the seal materials. The reproducibility of results using these methods and equipment must be demonstrated, through field testing of emplacement methods and monitoring the performance of the emplaced seals over time.

4.3.3.4 How does the sealing system design account for rock movement and fracturing and groundwater chemical interaction?

Rock mass instabilities could cause shearing of the seal system in shafts and boreholes. Effects of deformation on the seal materials and seal system should be assessed.

4.4 How is the backfill component of the engineered barrier system designed to prevent the function of the waste packages from being compromised?

The engineered barrier system includes the material surrounding the waste package. How water moves through the part of the engineered barrier system surrounding the waste package will affect the performance of the waste package and therefore, release rates from the geologic repository.

4.4.1 How does the design incorporate the effects of coupled thermal-hydrological-mechanical-chemical processes on the properties of the backfill component of the engineered barrier system?

Changes to the engineered barrier system components will occur due to the combined processes caused by waste emplacement. The impact of the anticipated changes on the backfill must be addressed in the design as required by 10 CFR Part 60.113.

4.4.1.1 How does the design incorporate the effects of heat and radiation from the waste package on the hydraulic conductivity, porosity, and permeability of the backfill component of the engineered barrier system?

Heat from the waste packages will increase in temperature of the surrounding material. The material temperature will increase to a maximum and then gradually decrease. The effects of thermal loading on the hydrologic characteristics of the backfill must be assessed.

Temperature variations may also change the state of stress in the backfill. The effects of stress on the hydrologic characteristics of the backfill must be addressed. Radiation from the waste package can adversely affect the properties of the backfill. Changes in characteristics could cause release rates of radionuclides through the backfill which exceed those specified in 10 CFR 60.113.

4.4.1.2 How does the design incorporate the effects of groundwater flow and the chemical composition of the groundwater on the properties of the backfill component of the engineered barrier system?

Channeling in the backfill from groundwater flow in the underground facility after permanent closure could affect the engineered barrier system performance by allowing more water to contact the waste package. This may result in greater releases of radionuclides through the engineered barrier system than was originally designed for. Alterations due to chemical interactions with the groundwater could adversely affect the performance of the backfill.

4.5 How is the backfill component of the engineered barrier system designed to control releases of radionuclides?

As stated in 10 CFR Part 60.113, the performance objectives of the engineered barriers are to limit the radionuclide release from a geologic repository. Before a license can be granted, there must be reasonable assurance that these objectives will be met.

4.5.1 What characteristics of the backfill component of the engineered barrier system will control releases of radionuclides?

To comply with the performance objectives for the engineered barrier system as stated in 10 CFR Part 60.112 and 60.113, it will be necessary to determine the characteristics of the materials used in the backfill. It should be shown how these characteristics will limit releases of radionuclides.

4.5.2 How will placement methods for the backfill component of the engineered barrier system be controlled to ensure that the system will meet the release rate requirements as stated in 10 CFR Part 60.113?

Placement of engineered barrier system components can be a controlling factor in their performance. Proper control of placement must be maintained to assure the expected in situ characteristics of the engineered barrier system components will meet the performance objective of 10 CFR Part 60.113.

4.5.3 What level of performance is expected for the backfill component of the engineered barrier system in order to meet the release rate requirements stated in 10 CFR Parts 60.112 and 60.113?

Because performance of the engineered barrier system is based on meeting the EPA standard, it is important to establish what the performance levels will be expected for each engineered barrier system component. By establishing what is expected with respect to performance, design criteria can be developed to meet those objectives.

4.6 How does the geologic repository design account for the effects of the disturbed zone, including borehole and shaft seals, in meeting the release rate requirements of 10 CFR 60.112?

After permanent closure, the geologic repository operations area will induce changes in the host rock. The radial extent to which these changes affect geologic repository performance is called the disturbed zone. To predict releases to the accessible environment, it is important to know the mechanism and rate at which radionuclides will be released from the disturbed zone.

4.6.1 How will borehole and shaft seals be designed to meet the release rate requirements to the accessible environment (60.112)?

Construction of shafts and boreholes alters the geologic setting and can create potential pathways for groundwater flow and migration of radionuclides. Since these pathways could adversely affect the isolation capabilities of the repository, the NRC has required in 10 CFR Part 60.134(a) that boreholes and shafts be sealed at permanent closure of the facility. Seal system characteristics will be based on the performance DOE will require of the seal system.

4.6.1.1 How does borehole and shaft seal design account for changes in characteristics of sealing materials?

The compatibility of the physical and chemical characteristics of the seal material to the host rock is an important consideration in seal design. Aspects of the geologic setting should not have a detrimental affect on the integrity of the seal material. Therefore, to meet the requirements of 10 CFR Part 60.134(b), the effect of the geologic setting on seal properties must be addressed.

4.6.1.2 What effect will construction of the shafts (e.g., rock damaged zone, liner effects), boreholes and in situ testing have on the ability to seal openings?

Construction of shafts, borehole drilling, and exploratory testing will change the rock characteristics surrounding the openings. Potential effects are rock damage by excavation and stress redistribution around the opening. The effect of these phenomena on the ability to seal the openings should be assessed.

4.6.1.3 How will placement of borehole and shaft seals be controlled to ensure that the performance objective stated as 10 CFR Part 60.112.?

The placement techniques used in sealing shafts and boreholes could be a controlling factor in seal performance. Reliability must be obtained in the methods and equipment used to install the seal materials. The reproducibility of results using these methods and equipment must be demonstrated, through field testing of emplacement methods and monitoring the performance of the emplaced seals over time.

4.6.1.4 How does the sealing system design account for rock movement and fracturing and groundwater chemical interaction?

Rock mass instabilities could cause shearing of the seal system in shafts and boreholes. Effects of deformation on the seal materials and seal system should be assessed.

The compatibility of the chemical characteristics of the seal material and the host rock is an important consideration in seal design. Incompatibility could result in seal deterioration by chemical attack which could result in failure of the seal system.

4.6.2 How does the design incorporate the effects of thermal loading on the geomechanical properties of the rock in disturbed zone?

Thermal loading caused by the emplacement of waste in the repository will change the geomechanical properties of the surrounding rock. The amount and significance of these changes need to be assessed.

UPDATE
YUCCA MOUNTAIN MINED GEOLOGIC DISPOSAL SYSTEM DESCRIPTION

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PURPOSE OF UPDATE

- REFRESHER ON PURPOSE, NEEDS, ROLE, AND CURRENT STATUS OF DOCUMENT
- DISCUSS THE ROLE OF THE SYSTEM DESCRIPTION IN THE OCRWM REQUIREMENT FOR SYSTEMS ENGINEERING
- DISCUSS THE POSSIBLE ROLE OF THE SYSTEM DESCRIPTION AS IT RELATES TO THE REQUIREMENT FOR SYSTEMS INTEGRATION IN THE SCP
- DISCUSS PROJECT ISSUES RESULTING FROM PREPARATION OF THE SYSTEM DESCRIPTION

SYSTEM DESCRIPTION - PURPOSE

PROVIDE A THOROUGH, ORGANIZED, BASELINED DESCRIPTION OF THE REQUIREMENTS THAT MUST BE MET BY THE MINED GEOLOGIC DISPOSAL SYSTEM PROPOSED FOR YUCCA MOUNTAIN.

SYSTEM DESCRIPTION - NEED

MEETING RADIOACTIVE WASTE DISPOSAL SYSTEM REQUIREMENTS IS THE DRIVING FORCE FOR ALL NNWSI EFFORTS DURING SITE CHARACTERIZATION, REPOSITORY AND WASTE PACKAGE DESIGN, PERFORMANCE ASSESSMENT, AND IF SELECTED AS THE FIRST REPOSITORY SITE, DURING LICENSING, CONSTRUCTION, OPERATION, CLOSURE, AND DECOMMISSIONING.

ASSUMPTIONS MADE DURING DEVELOPMENT

- REQUIREMENTS WILL BE STATED EXPLICITLY WITH A MINIMUM OF MOTHERHOOD STATEMENTS
- ONLY REQUIREMENTS WILL BE INCLUDED
- PROJECT ASSISTANCE IS ESSENTIAL IN REQUIREMENTS IDENTIFICATION AND IN AGREEING ON THE APPROPRIATE LEVEL OF DETAIL FOR SYSTEM REQUIREMENTS
- ALL REQUIREMENTS WILL BE INCLUDED EVEN THOUGH WORK TO DEMONSTRATE COMPLIANCE IS MINOR

POSSIBLE SOURCES OF SYSTEM REQUIREMENTS

- FEDERAL LEGISLATION
- IMPLEMENTING REGULATIONS
- POLICY EXPRESSED THROUGH GUIDANCE
- DOE ORDERS
- STATE AND LOCAL REGULATIONS
- INDUSTRY CODES AND STANDARDS
- NNWSI POLICY

REQUIREMENTS EMPHASIZED IN THE INITIAL SYSTEM DESCRIPTION (SITE SELECTION AND LICENSING)

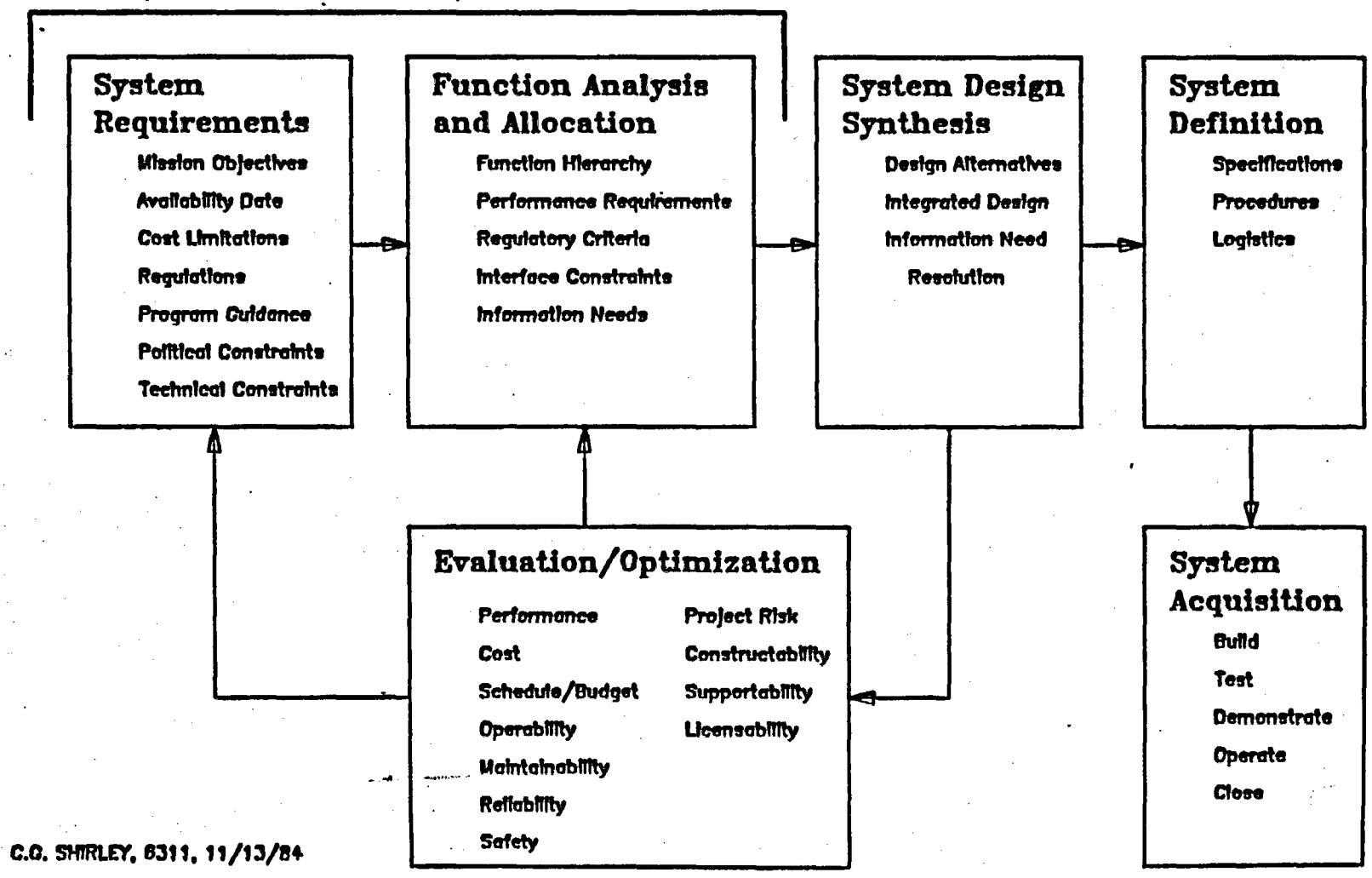
- Nuclear waste policy act of 1982 (PL-97-425)
- 40 CFR 191 (proposed)
- 10 CFR 60 and parts of the following included by reference:
  - 10 CFR 50 appendix B - quality assurance requirements
  - 10 CFR 51 - licensing and regulatory policy and procedures for environmental protection
- 10 CFR 20 and referenced parts of:
  - 10 CFR 19 notices, instructions, and reports to workers; inspections
  - 10 CFR 71 packaging and transportation
- 10 CFR 960
- 30 CFR chapter I, subchapters D, E, and N - mined safety and health administration

REQUIREMENTS EMPHASIZED IN THE INITIAL SYSTEM DESCRIPTION (CONT'D.)

- DOE ORDER 5632 SERIES - SAFEGUARDS AND SECURITY, INFERRED BY 10 CFR 60
- DOE ORDER 5500.3 - EMERGENCY PLANNING, REQUIRED BY 10 CFR 960
- DOE MISSION PLAN
- GENERIC REQUIREMENTS FOR A MINED GEOLOGIC DISPOSAL SYSTEM (GR)

APPLICABLE FEDERAL, STATE, AND LOCAL REQUIREMENTS WILL BE ADDED IN SUBSEQUENT REVISIONS

WHERE DOES THE SYSTEM DESCRIPTION FIT IN THE SYSTEMS ENGINEERING PROCESS?



C.C. SHIRLEY, 6311, 11/13/84

STEPS IN PREPARATION OF THE SYSTEM DESCRIPTION USING THE SYSTEMS ENGINEERING PROCESS

- FUNCTION ANALYSIS - IDENTIFY THE FUNCTIONS AND SUBFUNCTIONS THAT MUST BE PERFORMED IF THE YUCCA MOUNTAIN MINED GEOLOGIC DISPOSAL SYSTEM IS TO MEET THE TOP-LEVEL OBJECTIVE OF RADIOACTIVE WASTE DISPOSAL AND ISOLATION.

- REQUIREMENTS IDENTIFICATION - IDENTIFY APPLICABLE REQUIREMENTS

- FUNCTIONAL ALLOCATION - LINK REQUIREMENTS WITH FUNCTIONS AND SUBFUNCTIONS

THESE STEPS ARE ACCOMPLISHED WITHOUT CONSIDERATION FOR THE FACILITIES, EQUIPMENT, PERSONNEL, AND PROCEDURES THAT WILL BE COMBINED DURING DESIGN TO MEET THE REQUIREMENTS.

FUNCTION ANALYSIS - DEVELOPMENT OF FUNCTION HIERARCHY

- TOP LEVEL OF FUNCTION HIERARCHY

  Q. WHAT FUNCTIONS MUST BE PERFORMED BY A MINED GEOLOGIC DISPOSAL SYSTEM AT YUCCA MOUNTAIN?

  A. DISPOSAL OF RADIOACTIVE WASTE AND ISOLATION FROM ACCESSIBLE ENVIRONMENT (YUCCA MOUNTAIN MINED GEOLOGIC DISPOSAL SYSTEM)

- SECOND LEVEL

  Q. WHAT FUNCTIONS ARE REQUIRED FOR DISPOSAL AND ISOLATION?

  A1. DISPOSAL OF RADIOACTIVE WASTE (PRECLOSURE WASTE DISPOSAL SYSTEM)

  A2. ISOLATION OF RADIOACTIVE WASTE (PRECLOSURE WASTE DISPOSAL SYSTEM)

- THIRD LEVEL

  Q1. WHAT IS REQUIRED FOR DISPOSAL?

  A1. SITE FOR CONSTRUCTION (SITE SYSTEM)

  A2. REPOSITORY CONSTRUCTION AND OPERATION (REPOSITORY SYSTEM)

  A3. WASTE EMPLACEMENT PACKAGE PREPARATION (WASTE EMPLACEMENT PACKAGE)

FUNCTION ANALYSIS - DEVELOPMENT OF FUNCTION HIERARCHY (CONT'D.)

- THIRD LEVEL (CONT'D.)

  Q2. WHAT IS REQUIRED FOR ISOLATION?

  A1. NATURAL ISOLATION (NATURAL BARRIER SYSTEM)

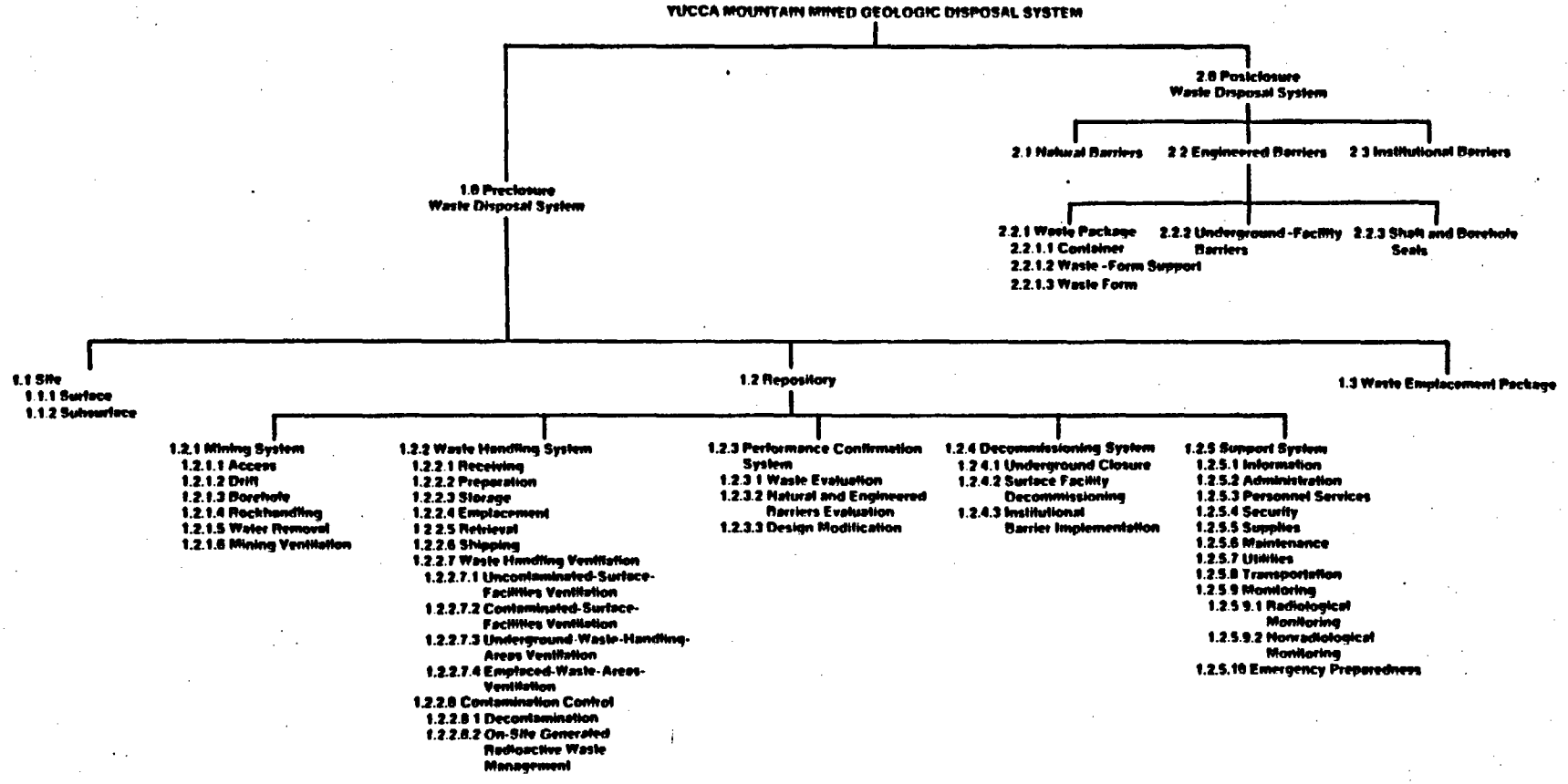
  A2. ENGINEERED SYSTEM CONTAINMENT AND ISOLATION (ENGINEERED BARRIER SYSTEM)

  A3. INSTITUTIONAL CONTROL TO PREVENT HUMAN DISRUPTION (INSTITUTIONAL BARRIER SYSTEM)

- NTH LEVEL

  CONTINUED IDENTIFICATION OF FUNCTIONS TO A LEVEL THAT IS WARRANTED BY THE CONTROLLING REQUIREMENTS

FUNCTIONAL STRUCTURE OF THE YUCCA MOUNTAIN MINED GEOLOGIC DISPOSAL SYSTEM



FUNCTIONAL ALLOCATION (LINKING REQUIREMENTS AND FUNCTIONS)

- ASSOCIATION OF REQUIREMENTS IDENTIFIED WITH FUNCTIONS THAT MAKE UP THE HIERARCHY

*NOTE: USUALLY REQUIREMENTS ARE LEVIED EXPLICITLY ON HIGH-LEVEL FUNCTIONS AND NOT ON THE SUBFUNCTIONS THAT MAKE UP THE HIGH-LEVEL FUNCTION. THE SYSTEM DESCRIPTION MAKES EXPLICIT THE FACT THAT REQUIREMENTS MUST BE MET BY THE COMBINED FUNCTIONS. REQUIREMENTS MUST BE ESTABLISHED FOR THESE SUBFUNCTIONS TO MAKE SURE THE TOTAL SYSTEM IS MEETING OVERALL REQUIREMENTS. DESIGN THEN TAKES THESE REQUIREMENTS AND BASED ON THE UNCERTAINTY SURROUNDING DESIGN'S ABILITY TO MEET THE REQUIREMENTS, DECIDES ON A FACTOR OF SAFETY AND ISSUES DESIGN CRITERIA.

FUNCTIONAL ALLOCATION

- REQUIREMENTS ARE ASSOCIATED WITH FUNCTIONS IN THE HIERARCHY IN A STRUCTURED FORMAT BY ANSWERING THE QUESTIONS FOLLOWING THE HEADINGS BELOW.

  DEFINITION - WHAT IS THE FUNCTIONAL SYSTEM? WHAT IS ITS FUNCTIONAL RELATIONSHIP TO FUNCTIONS ABOVE IT IN THE HIERARCHY? WHAT ARE THE PHYSICAL PARTS AND BOUNDARIES OF THE SYSTEM?

  FUNCTIONAL REQUIREMENTS - WHAT IS THE FUNCTIONAL SYSTEM SUPPOSED TO DO TO CONTRIBUTE TO THE TOTAL FUNCTION OF THE YUCCA MOUNTAIN MINED GEOLOGIC DISPOSAL SYSTEM?

  PERFORMANCE CRITERIA - HOW WELL DOES THE FUNCTION HAVE TO BE PERFORMED? WHAT INDICATORS WILL BE USED TO EVALUATE PERFORMANCE?

FUNCTIONAL ALLOCATION (CONT'D.)

CONSTRAINTS - WHAT LIMITATIONS ARE PLACED ON THE FUNCTIONAL SYSTEM AS A RESULT OF INTERACTIONS WITH OTHER FUNCTIONS, REGULATIONS, DESIGN, AND THE PHYSICAL AND CHEMICAL ENVIRONMENT IN WHICH THE FUNCTION MUST BE PERFORMED?

INTERACTIONS - WHAT ARE THE INTERNAL AND EXTERNAL FUNCTIONS THAT INTERACT WITH THE FUNCTION BEING DESCRIBED AND WHICH MAY AFFECT ITS PERFORMANCE?

SYSTEM DESCRIPTION ORGANIZATION

- Introduction
- System Descriptions
- References - Full Citations
- Glossary - Appendix A
- Waste Source System Interface - Appendix B
- NNWSI Issues Hierarchy - Appendix C

EXAMPLE SYSTEM DESCRIPTIONS

- SITE
- WASTE EMPLACEMENT PACKAGE
- PERFORMANCE CONFIRMATION SYSTEM

USES OF THE SYSTEM DESCRIPTION

- BASELINE OF DISPOSAL SYSTEM TECHNICAL REQUIREMENTS
- ESTABLISH EXPLICIT LINK BETWEEN REQUIREMENTS AND NNWSI ACTIVITIES TO ESTABLISH COMPLIANCE
- PROVIDES THE TRACEABILITY REQUIRED IN THE LICENSING PROCESS
- A TOOL FOR ASSESSING THE IMPACT OF REGULATORY CHANGES
- A TOOL FOR HELPING ENSURE THAT NNWSI ADDRESSES REQUIREMENTS IN APPROPRIATE DETAIL AT THE APPROPRIATE TIME
- ENHANCEMENT OF THE SYSTEMS PERSPECTIVE FOR NNWSI PARTICIPANTS

*A SYSTEMATIC APPROACH FOR IDENTIFYING AND STRUCTURING INFORMATION NEEDS AND DEFINING WORK PLANS (INFORMATION NEED LEVEL OF DETAIL IN NRC DRAFT SITE ISSUES FOR GEOLOGIC REPOSITORY OPERATIONS AREA DESIGN/ROCK MECHANICS).

SITE CONSTRAINT B:

- BASED ON THE PREDICTED NATURE AND RATES OF FAULT MOVEMENT OR OTHER GROUND MOTION, ENGINEERING MEASURES THAT ARE BEYOND REASONABLY AVAILABLE TECHNOLOGY WILL NOT BE USED FOR EXPLORATORY-SHAFT CONSTRUCTION OR FOR REPOSITORY CONSTRUCTION, OPERATION, OR CLOSURE (960.5-2-11(D)).

INFORMATION NEEDS

- IN 3.3.3 ADDRESSES THE DEVELOPMENT OF THE NATURAL AND MAN-MADE SEISMICITY DESIGN CRITERIA FOR SURFACE AND SUBSURFACE FACILITIES.

- NEW IN--WILL ENGINEERING MEASURES THAT ARE BEYOND REASONABLY AVAILABLE TECHNOLOGY HAVE TO BE IMPLEMENTED FOR EXPLORATORY-SHAFT CONSTRUCTION OR FOR REPOSITORY CONSTRUCTION, OPERATION, OR CLOSURE TO ACCOMMODATE THE PREDICTED NATURE AND RATES OF FAULT MOVEMENT OR OTHER GROUND MOTION.

REASONABLY AVAILABLE TECHNOLOGY -- (FROM SITING GUIDELINES)

TECHNOLOGY WHICH EXISTS AND HAS BEEN DEMONSTRATED OR FOR WHICH THE RESULTS OF ANY REQUISITE DEVELOPMENT, DEMONSTRATION, OR CONFIRMATORY TESTING EFFORTS BEFORE APPLICATION WILL BE AVAILABLE WITHIN THE REQUIRED TIME PERIOD.

WASTE EMPLACEMENT PACKAGE PERFORMANCE CRITERIA 2:

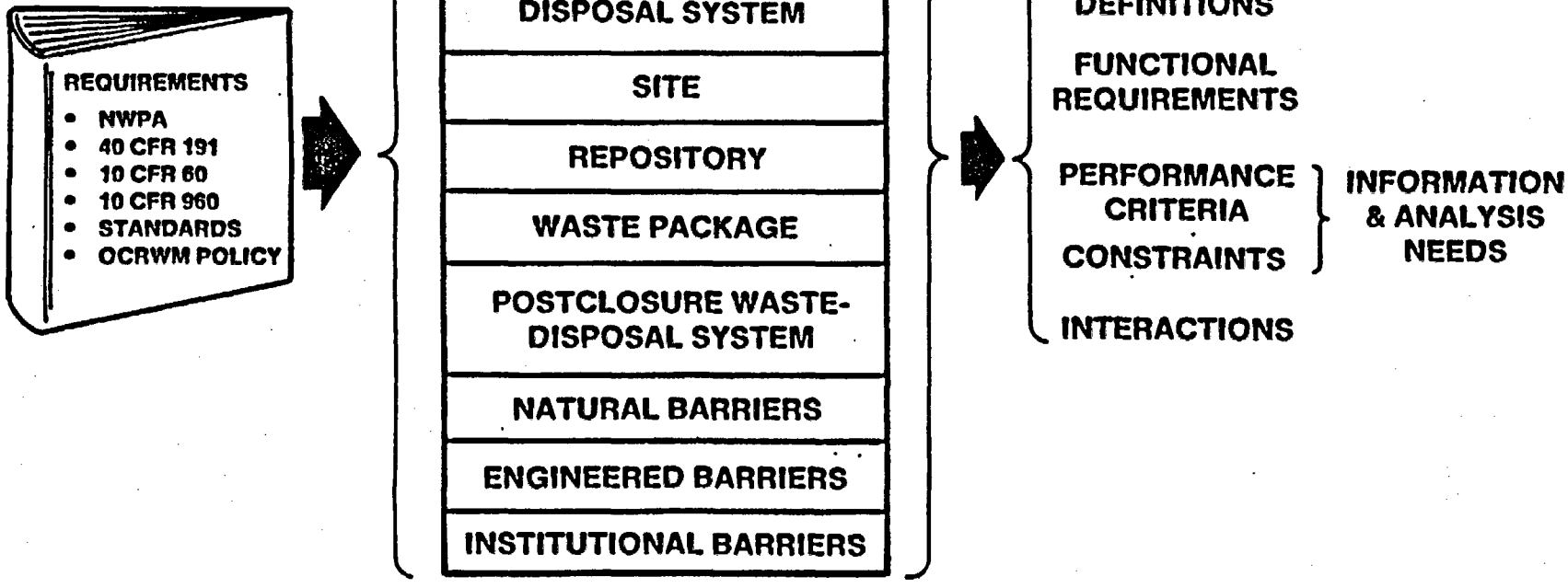
- THE PACKAGE IDENTIFICATION MUST BE CONSISTENT WITH THE PERMANENT RECORDS CONTAINED IN THE 1.2.5.1 INFORMATION SYSTEM AND REMAIN LEGIBLE AT LEAST TO THE END OF THE PERIOD OF RETRIEVABILITY (10 CFR 60.135(B)(4)).

INFORMATION NEEDS DERIVED FROM THIS CRITERION:

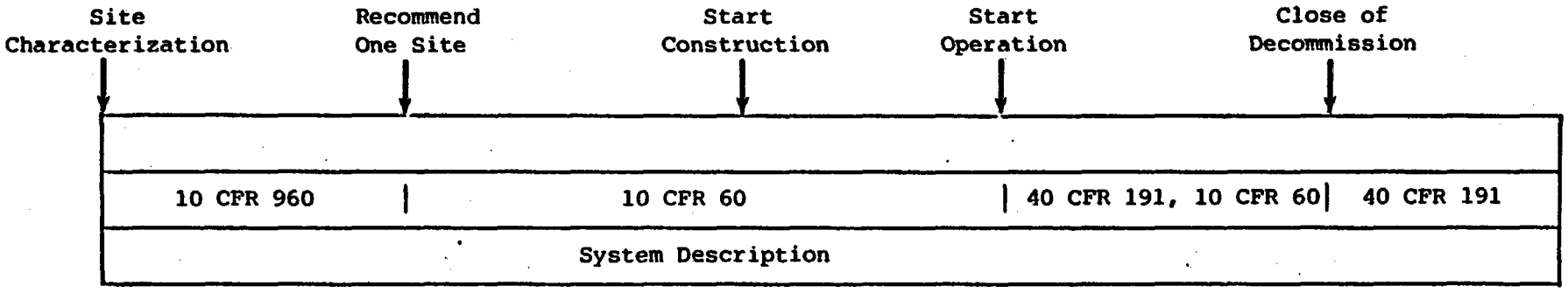
- DESIGNS AND SPECIFICATIONS DEVELOPED TO SATISFY THE WASTE EMPLACEMENT PACKAGE LABELING REGULATION.

- IDENTIFICATION OF A METHOD TO READ THE WASTE EMPLACEMENT PACKAGE LABEL FOLLOWING RETRIEVAL.

THE SYSTEMS APPROACH TO IDENTIFYING NNWSI INFORMATION AND ANALYSIS NEEDS



TIME SCOPE OF REQUIREMENTS IN SYSTEM DESCRIPTION



*REQUIREMENTS IN SYSTEM DESCRIPTION MAY BE ADDRESSED AT DIFFERENT TIMES OR IN DIFFERENT DETAIL DURING SITE SELECTION AND LICENSING PROCESS.

*DIFFERENT SUBSETS OF REQUIREMENTS WILL BE ADDRESSED IN DIFFERENT NNWSI TECHNICAL DOCUMENTS.

SYSTEM DESCRIPTION SCHEDULE

- JUNE 1985 - BASELINED SYSTEM DESCRIPTION (M120)
- SEPTEMBER 1986 - UPDATE TO INCLUDE APPLICABLE FEDERAL, STATE, LOCAL REQUIREMENTS (M150)
- SEPTEMBER 1987 - UPDATE TO REFLECT STATUS AT END OF CONCEPTUAL DESIGN (M159)
- SEPTEMBER 1988 - UPDATE (M194)
- SEPTEMBER 1989 - UPDATE TO REFLECT STATUS AT END OF TITLE I DESIGN (M195)
- JULY 1990 - UPDATE TO ACCOMPANY APPLICATION FOR CONSTRUCTION AUTHORIZATION (M160)

*UPDATES AND ANY INTERIM CHANGES APPROVED VIA NNWSI CHANGE CONTROL BOARD

SYSTEM DESCRIPTION STATUS - WHAT NEEDS TO HAPPEN BEFORE BASELINING?

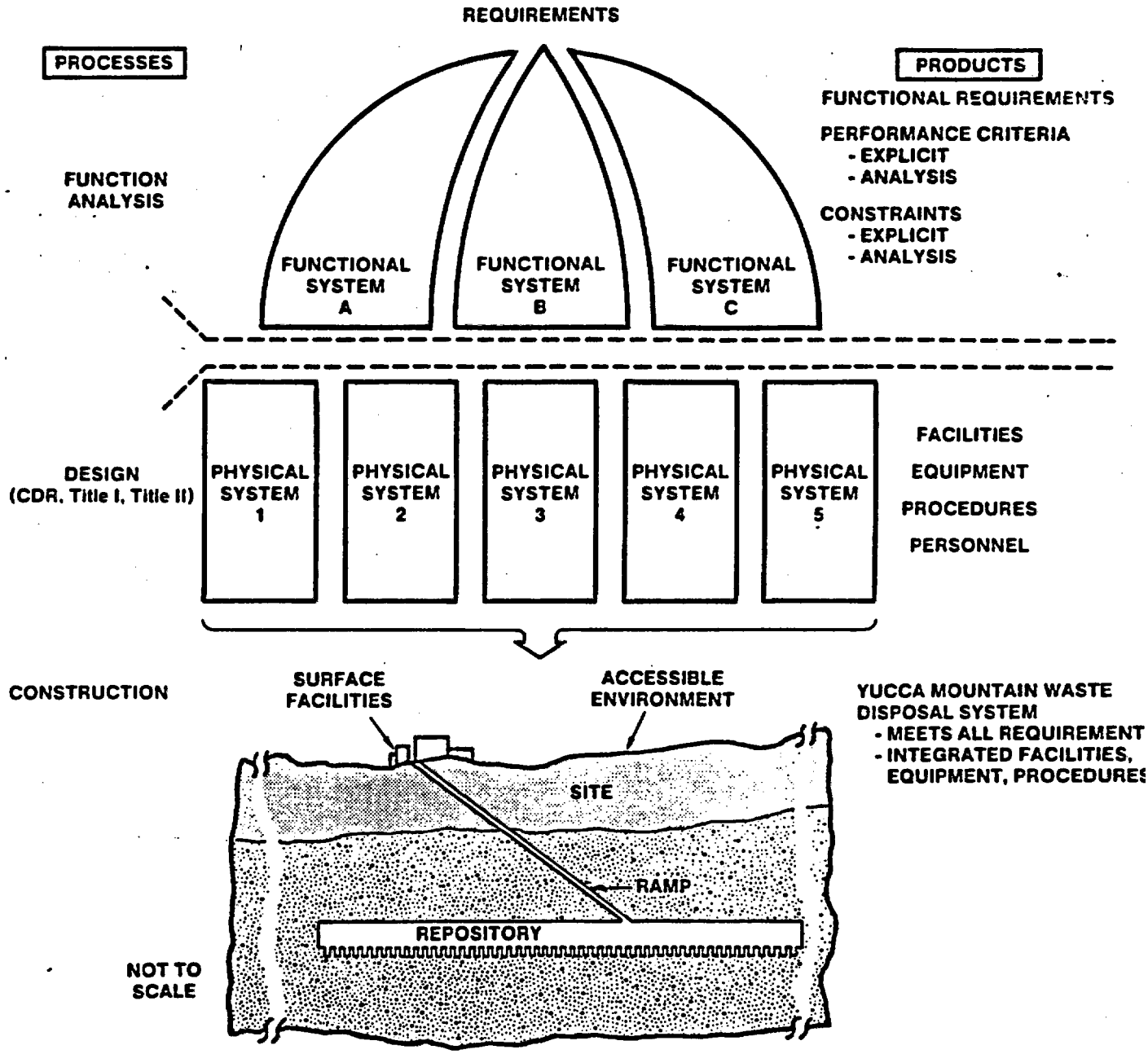
- REFINE EXISTING TEXT
  - REMOVE DUPLICATION
  - COMPLETE INTERACTIONS
  - ORGANIZE CONSTRAINTS BY TOPIC
- CROSS-REFERENCE REQUIREMENTS AND ISSUES HIERARCHY (NEW TASK)
- FLESH-OUT EXISTING INFORMATION NEEDS (NEW TASK)
- COMPLETE REFERENCES, GLOSSARY, APPENDIX B, APPENDIX C
- DEVELOP CROSS-REFERENCE MATRICES APPENDIX D - EXAMPLES INCLUDE:
  - REQUIREMENTS VS ISSUES HIERARCHY
  - REQUIREMENTS VS DATE TO BE ADDRESSED
  - REQUIREMENTS VS WBS
  - REQUIREMENTS VS SOURCE DOCUMENTS
- PEER, LINE, AND PROJECT REVIEW OF COMPLETE DOCUMENT

SYSTEM DESCRIPTION - ISSUES REQUIRING PROJECT DIRECTION AND PARTICIPATION

- APPROPRIATE LEVEL OF DETAIL - AT WHAT POINT DO WE CROSS THE LINE BETWEEN REQUIREMENTS AND DESIGN PREROGATIVES?

- WHICH OTHER REQUIREMENTS ARE APPROPRIATE TO INCLUDE IN FUTURE UPDATES?
  - FEDERAL REGULATIONS
  - STATE AND LOCAL REGULATIONS
  - DOE ORDERS
  - OTHERS

- PROJECT HELP BEFORE BASELINING IS ESSENTIAL TO ASSURE ACCURACY AND COMPLETENESS OF REQUIREMENTS.


REQUIREMENTS
PROCESSES
PRODUCTS
FUNCTIONAL REQUIREMENTS
PERFORMANCE CRITERIA
- EXPLICIT
- ANALYSIS
CONSTRAINTS
- EXPLICIT
- ANALYSIS
FUNCTION ANALYSIS
FUNCTIONAL SYSTEM A
FUNCTIONAL SYSTEM B
FUNCTIONAL SYSTEM C
DESIGN (CDR, Title I, Title II)
PHYSICAL SYSTEM 1
PHYSICAL SYSTEM 2
PHYSICAL SYSTEM 3
PHYSICAL SYSTEM 4
PHYSICAL SYSTEM 5
FACILITIES
EQUIPMENT
PROCEDURES
PERSONNEL
CONSTRUCTION
SURFACE FACILITIES
ACCESSIBLE ENVIRONMENT
SITE
RAMP
REPOSITORY
NOT TO SCALE
YUCCA MOUNTAIN WASTE DISPOSAL SYSTEM
- MEETS ALL REQUIREMENT
- INTEGRATED FACILITIES, EQUIPMENT, PROCEDURES

TAKE-HOME MESSAGES

- SYSTEMS ENGINEERING WILL BE REQUIRED BY OCRWM
  - THE SYSTEM DESCRIPTION IS A KEY PART OF EFFECTIVE SYSTEMS ENGINEERING

- SYSTEMS ENGINEERING, IF INTELLIGENTLY APPLIED, CAN IMPROVE THE QUALITY OF NNWSI PRODUCTS

- THE SYSTEM DESCRIPTION IS IMPORTANT IN RELATION TO PROJECT ACTIVITIES GOING ON NOW

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

SYSTEMS ENGINEERING AND SYSTEMS ENGINEERING MANAGEMENT

CLINTON G. SHIRLEY

and

J. GARY YEAGER

SANDIA NATIONAL LABORATORIES
ALBUQUERQUE, NM 87185

C.G. SHIRLEY, 6311, 11/9/84

OBJECTIVES OF THE PRESENTATION

(1) Provide an understanding of the system engineering and system engineering management requirements that are being established by OCRWM and OGR and suggest a sensible way to implement these methodsin the NNWSI Project.

(2) Give an update on the System Description (Requirements) Document and describe its role in systems engineering and the NNWSI Project.

REFERENCES

DOE Order 5700.3B, "Major System Acquisition Procedures," 9/8/83.

DOE Order 5700.4A, "Project Management System," 11/17/83

Draft Attachments to DOE Order 5700.3B: III–1 "Systems Engineering Process"
III–2 "Systems Engineering Management Plan Guidelines"
III–3 "Outline of a Test and Evaluation Plan and Procedure"
III–4 "Configuration Management Plan"
III–5 "Configuration Management Process Flow"
III–6 "Configuration Management Process"
III–7 "Cost and Schedule Control Systems Criteria"

OCRWM, "Program Level Systems Engineering Management Plan," draft, 8/22/84.

OGR, "Program Element Level Systems Engineering Management Plan," draft, 11/84

Wilton P. Chase, Management of System Engineering, John Wiley & Sons, Inc., 1974.

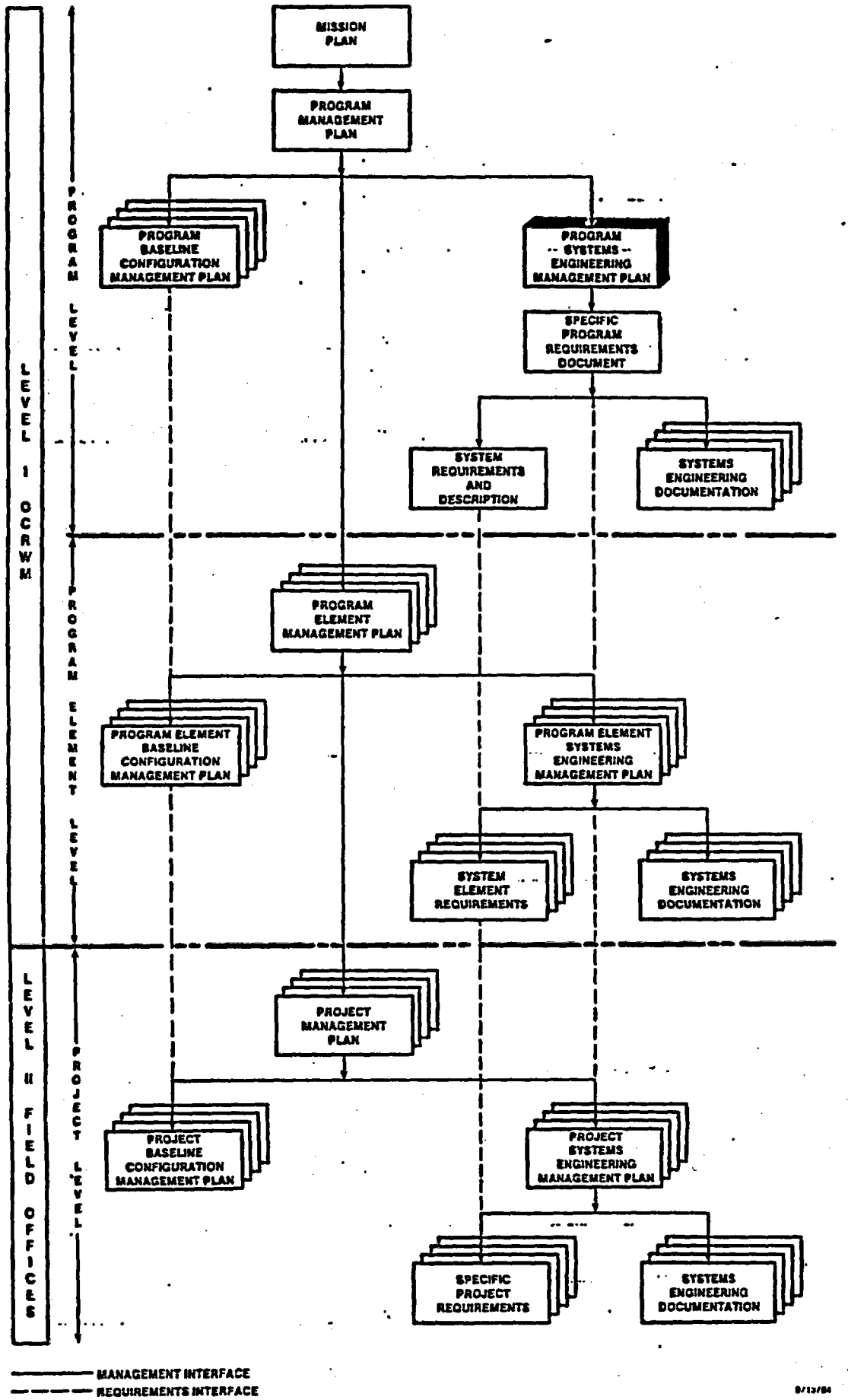


Figure 3-1. Systems engineering and Program docume[illegible] relati[illegible]

SYSTEMS ENGINEERING

OCRWM SEMP AND OGR SEMP DEFINITION

"The application of scientific and engineering efforts (1) to transform Program requirements into a description of system performance parameters and a system configuration through the use of an iterative process of definition, synthesis, analysis, design, test, and evaluation; (2) to integrate related technical parameters and ensure compatibility of all physical, functional, and system interfaces in a manner which optimizes the total system definition and design; and (3) to integrate reliability, maintainability, safety, survivability, human, and other such factors into the total engineering effort."

SYSTEMS ENGINEERING MANAGEMENT

OCRWM SEMP AND OGR SEMP DEFINITION

"The combination of management actions to be accomplished during the life cycle of the waste management system necessary to manage and document the engineering effort directed toward meeting total system requirements."

C.C. SHIRLEY, 6311, 11/12/84

Systems Engineering

Formal use of standard analytical methods to coordinate all of the project's technical activities, AS, NOT AFTER, they are performed, to obtain an integrated and optimized total-system that satisfies all of the projects goals and objectives.

Systems Engineering Management

Control of the systems engineering process to increase the potential for success.

MYTHS vs REALITY

Myths:

– Wilton P. Chase, *Management of System Engineering*

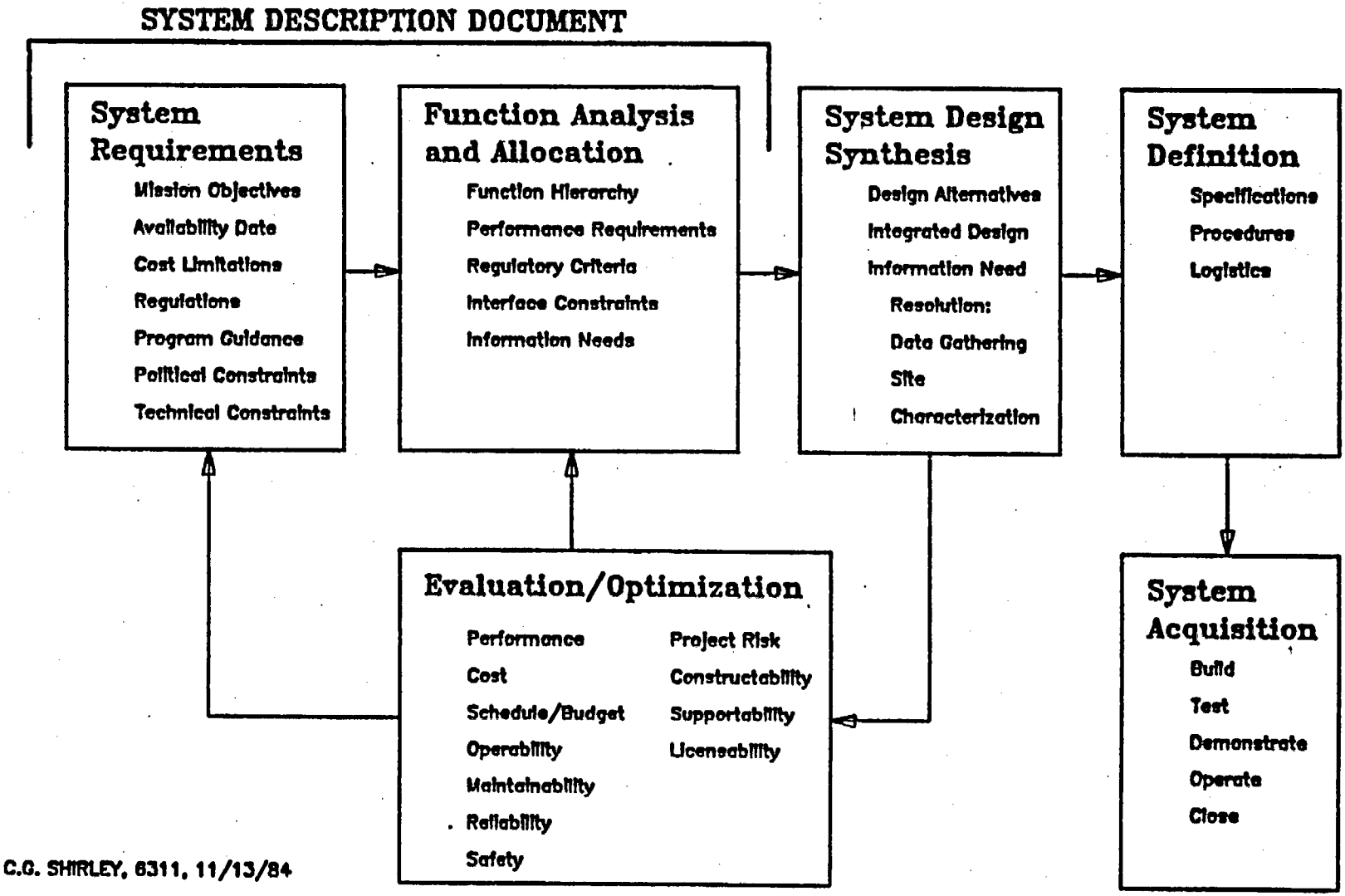
(1) "If you prescribe a procedure...you can impose it by management edict... to obtain a successful system design."
(2) "By emphasizing qualitative characteristics of system performance, and by assigning them quantitative values as design requirements, you can motivate designers to do a better job."
(3) "Employment of a highly structured data reporting scheme will result in more adequate design solutions."
(4) "If you have enough money and engineers you can solve any design problem within a restricted time period."

Reality:

"Much effort needs to be applied by both system–oriented engineers and hardware designers to mutually streamline their intergroup communication techniques in order to serve their common objectives without benefit of any middleman group of "system engineering specialists," and without a need for crutches."

"Hopefully, a system can be precisely described and its description accurately communicated to whoever must deal with it. However, it is virtually impossible for any two individuals to achieve a common understanding of a given system."

SYSTEMS ENGINEERING PROCESS



C.G. SHIRLEY, 6311, 11/13/84

EFFECTIVE SYSTEM ENGINEERING MANAGEMENT

Systems engineering management means to organize and manage a project so that all the parts are fully integrated to achieve the project goals.

Effective systems engineering management is achieved when measures are taken to:

Facilitate Communications

Streamline Controls

Simplify the Paperwork

C.G. SHIRLEY, 6311, 11/14/84

FACILITATE COMMUNICATIONS

Reason: To integrate the perspectives of all the disciplines involved in the system design. This does not mean to synthesize the results of independently conducted system design studies. The integration of results of system design studies must be done during, not after, the performance of those studies.

How? Provide the opportunity for all disciplinary specialists to acquire the systems viewpoint and an understanding of the role their specialties play in the system design effort.

STREAMLINE CONTROLS

Reason: To provide a clear delineation of the level of detail that will be controlled by the systems engineering management procedures. Over control inhibits inventive talent and is costly. Under control is also costly because it will likely result in an unsatisfactory product that will require an inordinate number of modifications.

How? Simplify the organizational structure, limit the number of people employed in management functions, and indoctrinate managers to avoid the natural tendency to slip into consideration of design details that are more appropriately the concern of the end–item designers.

SIMPLIFY THE PAPERWORK

Reason: To facilitate communications, streamline management controls, and enable efficient system management.

How? Standardize communication media and limit systems management's specification of requirements only to the level of detail that enables end–item designers to prepare the detailed design specifications necessary for producing and testing the end items.

NNWSI IS DOING SYSTEMS ENGINEERING AND SYSTEMS ENGINEERING MANAGEMENT

BUT

We need to improve our implementation.

We need to demonstrate that we are.

WHAT CAN NNWSI DO TO IMPROVE ITS ITS SYSTEMS ENGINEERING MANAGEMENT?

(1) NNWSI demonstrates some amount of the following problems:

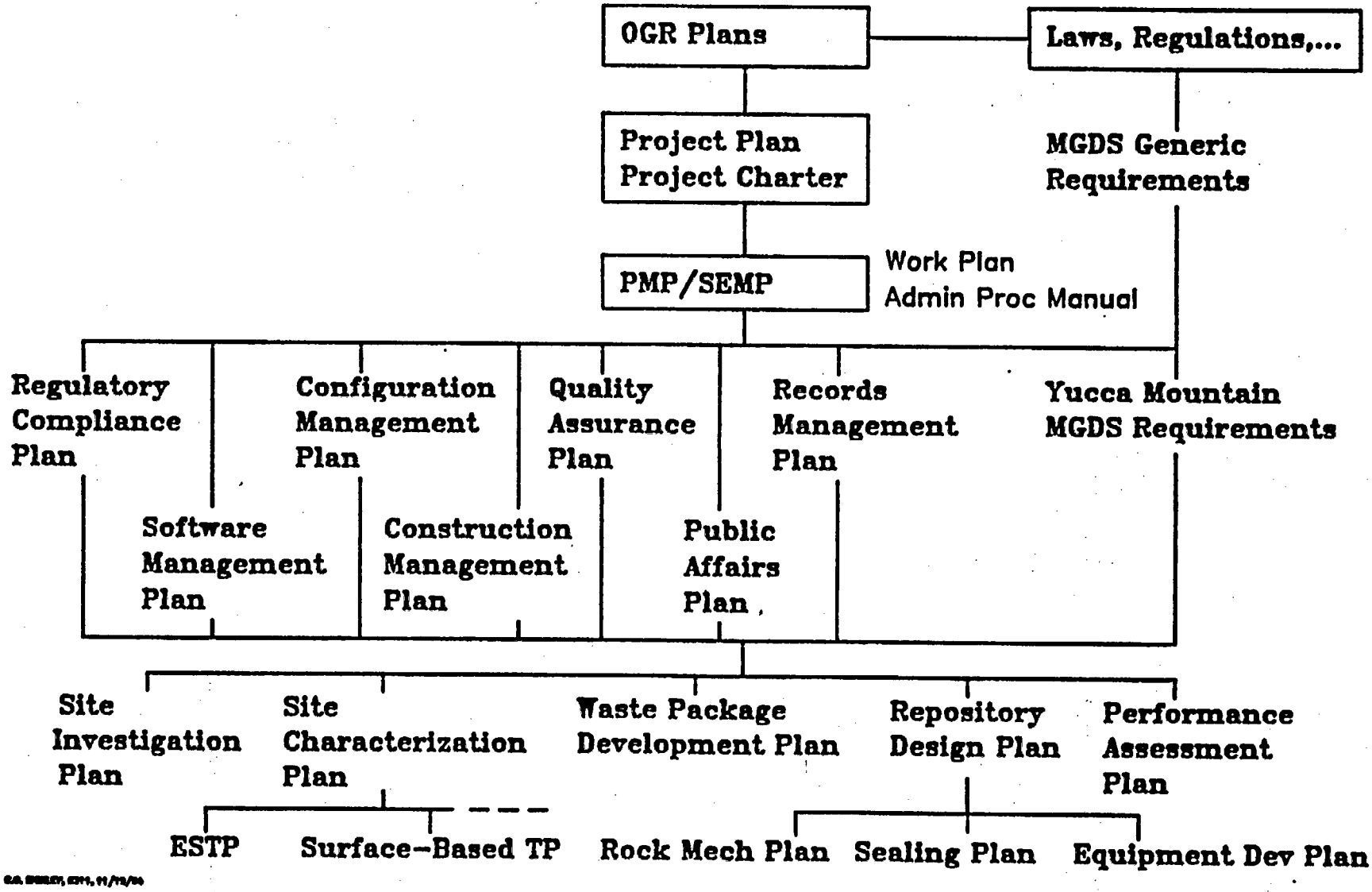
> "...compartmentalization of design efforts makes lateral communication very difficult. Unrestrained, the...groups proliferate design approaches...to suit their respective interests...As system design and development proceed under this kind of...management approach, belated system engineering effort must be devoted to "crisis management," in order to achieve integration of separate components and to make them "play together."
>
> — Chase, *Management of System Engineering*

(2) NNWSI can do the following to improve its situation:

- improve communications up, down, and across the project organization
- develop a basis for defining the appropriate level of detail for specifying system requirements and focus work plans on these requirements
- enhance the systems viewpoint of all individuals in the project

To Demonstrate Systems Engineering Management:

NNWSI PROJECT DOCUMENTATION SYSTEM



SEMP ALTERNATIVE #1

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

Project Level

SYSTEMS ENGINEERING MANAGEMENT PLAN

****
* BASED UPON WBS DICTIONARY *
****

1.0 Introduction

2.0 Objectives

3.0 Scope

4.0 System Engineering Process

- 4.1 Identification and Baseline Control of System Requirements and Project Information Needs
- 4.2 Development and Control of the Waste Isolation System Configuration, Subsystem Interrelationships, Function Allocation, and Performance Criteria
- 4.3 Methods for Evaluating Trade-offs and Alternatives
- 4.4 Models for System and Cost Effectiveness Evaluations
- 4.5 Methods for Estimating Total System Life-Cycle Costs
- 4.6 System Studies of Technical Issues that Affect the Total Waste Isolation System

SEMP ALTERNATIVE #2

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

Project Level

SYSTEMS ENGINEERING MANAGEMENT PLAN

****
* BASED UPON DRAFT ATTACHMENT III-2, "SYSTEMS ENGINEERING *
* MANAGEMENT PLAN GUIDELINES," OF DOE ORDER 5700.3B *
****

1.0 INTRODUCTION

2.0 OBJECTIVES

3.0 SCOPE

4.0 TECHNICAL PLANNING AND CONTROL

- 4.1 Organizational Responsibilities and Authority for Managing the Systems Engineering Process
- 4.2 Levels of Control and Control Method for Performance and Design Requirements
- 4.3 Technical Assurance Methods
- 4.4 Plans and Schedules for Design and Technical Reviews
- 4.5 Documentation Control

5.0 SYSTEM ENGINEERING PROCESS

- 5.1 Identification of System Requirements and Project Information Needs
- 5.2 Procedures for Developing Technical Work Plans
- 5.3 Technical Work Documentation Requirements
- 5.4 Trade-off Study and Alternative Postulation and Selection Methods
- 5.5 Models for System and Cost Effectiveness Evaluations
- 5.6 Iteration of the System Engineering Process and Generation of System Specifications

6.0 ENGINEERING INTEGRATION

- 6.1 Summary of Detailed Technical Plans
- 6.2 Interaction and Integration of Individual Technical Activities
- 6.3 Responsibility and Authority of Overlapping Science and/or Engineering Specialties within Specific Technical Activities

ATTACHMENT 1

NNWSI PROJECT MANAGEMENT PLAN CONTENTS

SECTION

1. Introduction
   - 1.1 Function of the Project Management Plan
   - 1.2 Support Documentation
   - 1.3 The Project Baseline
   - 1.4 Updating the Project Management Plan

2. OBJECTIVES
   - 2.1 Project Purpose and Scope
   - 2.2 Technical, Schedule and Cost Objectives
   - 2.3 Project Objectives and the WBS

3. ORGANIZATION AND RESPONSIBILITIES
   - 3.1 Management Organization and Plans
   - 3.2 Functional Support Requirements
   - 3.3 Participant Responsibilities
   - 3.4 Responsibility Assignment Matrix

4. WORK BREAKDOWN STRUCTURE
   - 4.1 Approach to the WBS
   - 4.2 WBS List and Element Descriptions

5. WORK PLANS
   - 5.1 Work Plan Summaries
   - 5.3 Technical-Performance Criteria
   - 5.4 Quality Assurance

6. PROJECT SCHEDULES
   - 6.1 Master Schedule Network
   - 6.2 Baseline Milestone Lists
   - 6.3 Summary Milestone Networks

7. COST AND MANPOWER ESTIMATES
   - 7.1 Cost Summaries
   - 7.2 Manpower Plans

8. PROJECT MANAGEMENT PLANNING & CONTROL SYSTEMS
   - 8.1 Project Management System (PMS)
   - 8.2 Baseline Management
   - 8.3 Project Documentation
   - 8.4 Project Reporting and Reviews

9. ANNEXES
   - 9.1 WBS Dictionary
   - 9.2 Administrative Procedures Manual
   - 9.3 Support Plans
   - 9.4 Glossary

SEMP ALTERNATIVE #3

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS

PROJECT MANAGEMENT PLAN OUTLINE

****
* ANNOTATION ILLUSTRATES HOW THE PROJECT LEVEL SYSTEMS ENGINEERING *
* MANAGEMENT PLAN CAN BE INCORPORATED INTO THE NNWSI PROJECT *
* MANAGEMENT PLAN *
****

*
* SOURCES *
*
* 1. PMP Outline is taken from memorandum from Vieth to TPOs, *
* "PROJECT DOCUMENTATION," dated October 11, 1984, which was *
* developed by WMPO from DOE Order 5700.4A, "PROJECT MANAGEMENT*
* SYSTEM," and the other DOE Orders in the 5700 series. *
*
*2. Contents of the SEMP, that are here incorporated into the PMP *
* contents, are based upon the 1.2.1 Systems Work Element that *
* is described in the WBS Dictionary and upon the draft *
* Attachment III-1, "SYSTEMS ENGINEERING PROCESS," and *
* Attachment III-2, "SYSTEMS ENGINEERING MANAGEMENT PLAN *
* GUIDELINES," that have been prepared by DOE/HQ for DOE Order *
* 5700.3B, "MAJOR SYSTEM ACQUISITION PROCEDURES." *
****

OUTLINE

1.0 INTRODUCTION

1.1 Function of the Project Management Plan
1.2 Support Documentation
1.3 The Project Baseline
1.4 Updating the Project Management Plan

2.0 OBJECTIVES

2.1 Project Purpose and Scope
2.2 Technical, Schedule, and Cost Objectives
2.3 Project Objectives and the WBS

3.0 ORGANIZATION AND RESPONSIBILITIES

3.1 Management Organization and Plans

****
* THE SYSTEMS ENGINEERING MANAGEMENT ORGANIZATION *
*
* In addition to describing the DOE organizational *
* responsibilities and authority for managing each and all *
* of the WBS elements, this section establishes the *
* assignment of responsibility and authority within DOE for*
* managing the systems activities that are explicitly *

```
*   defined in the WBS Dictionary under WBS #1.2.1 (Note:    *
*   These activities are correlatable with those prescribed  *
*   in draft DOE Order 5700.3B, Attachment III-1 and III-2.) *
*   Also, the DOE organizational responsibilities within each*
*   WBS element are assigned in this section, as necessary to*
*   assure the integration of all WBS elements into the total*
*   system addressed by WBS #1.2.1.                          *
************************************************************

3.2 Functional Support Requirements
3.3 Participant Responsibilities

************************************************************
*        THE SYSTEMS ENGINEERING MANAGEMENT ORGANIZATION   *
*                                                          *
*   In addition to describing the Participant organizational *
*   responsibilities and authority for managing each and all *
*   of the WBS elements, this section establishes the        *
*   assignment of responsibility and authority within each   *
*   Participant organization, where applicable, for managing *
*   the systems activities that are explicitly defined in the*
*   WBS Dictionary under WBS #1.2.1. Also, the Participants' *
*   organizational responsibilities within each WBS element  *
*   are assigned in this section, as necessary to assure the *
*   integration of all WBS elements into the total system    *
*   addressed by WBS #1.2.1.                                 *
************************************************************

3.4 Responsibility Assignment Matrix

************************************************************
*4.0  SYSTEMS ENGINEERING PROCESS                          *
*                                                          *
*            Introduce the process with a description of the *
*            iterative process by which project activities and *
*            information are integrated as the work progresses *
*            by repeated application of the system engineering *
*            methods described in the following subsections.   *
*                                                          *
*     4.1 Identification of System Requirements and Project *
*         Information Needs                                *
*                                                          *
*            This section generally describes the methods and *
*            procedures by which (1) function analysis is  *
*            performed to progressively analyze system functions *
*            and develop subfunctions to establish a subsystem *
*            hierarchy for the system, (2) functions and   *
*            subfunctions are allocated to requirements imposed *
*            by law, regulation, program guidance, or other *
*            controls, (3) inter-, intra-, and and extrasystem *
*            interactions and interfaces are identified, and (4) *
*            project information needs are identified -- NOTE: *
*            project information needs are the information that *
*            that must be gathered or developed in order for the *
```

system to be established that will perform all the functions and subfunctions in compliance with all the requirements in an internally and externally efficient and cost-effective manner, i.e. this is the work that must be performed by the project to provide reasonable assurance that waste can be disposed at Yucca Mountain, at an acceptable cost, in a way that will protect the public and the environment from the waste for a very long time.

This section references the Yucca Mountain Mined Geologic Disposal System Requirements document for (1) more detail on the methods and procedures for identifying system requirements and project information needs and (2) the description of the system hierarchy, requirements, and information needs.

4.2 Methods for Evaluating System and Subsystem Trade-offs

This section describes the methods and criteria for evaluating system and subsystem trade-offs to postulate alternatives that will satisfy the functional requirements.

4.3 Models for Evaluating System and Subsystem Effectiveness and Cost

This section summarizes the models to be used for selecting system and subsystem alternatives that result in an optimum system configuration that can be acquired at an acceptable cost. For more detail, reference is made to subordinate plans, such as the Performance Assessment Plan for system and subsystem safety evaluations and the Conceptual Design Plan for system and subsystem efficiency evaluations. In addition, this section describes the process for defining the support needs of the system and the methods and criteria for analyzing the cost, schedule, and technical risks associated with the system acquisition.

5.0 WORK BREAKDOWN STRUCTURE

5.1 Approach to WBS
5.2 WBS List and Element Descriptions

5.3 Procedures for Preparing and Approving Work Plans

To facilitate the integration of individual technical activities, formal systems engineering procedures are established in this section to assure that the work described in individual work plans is

consistent with the total system and subsystem requirements and project information needs.

6.0 WORK PLANS

6.1 Work Plan Summaries
6.2 Technical-Performance Criteria
6.3 Quality Assurance

Project technical documentation requirements and controls are described in this section.

7.0 PROJECT SCHEDULES

The schedule control criteria required by draft Attachment III-7 to DOE Order 5700.3B are established in this section.

7.1 Master Schedule Network
7.2 Baseline Milestone Lists
7.3 Summary Milestone Networks

7.4 Design and Technical Review Schedule

A schedule is described for formal technical reviews performed jointly among DOE and the project participants. The number and type of reviews are determined by the DOE project office. Normally, the following reviews are utilized:

(1) System Requirements Review
(2) Conceptual Design Review
(3) Title I Design Review
(4) Title II Design Review

Other reviews for the NNWSI project may include the EA, SCP, Site Characterization Analysis Report, EIS, SAR, and/or others.

8.0 COST AND MANPOWER ESTIMATES

The cost control criteria required by draft Attachment III-7 to DOE Order 5700.3B are established in this section.

8.1 Cost Summaries
8.2 Manpower Plans

9.0 PROJECT MANAGEMENT PLANNING AND CONTROL SYSTEMS

9.1 Project Management System (PMS)

****
* The PMS shall include procedures for controlling the*
* interaction among individual work elements and the *
* integration of information obtained by each element *
* into each iteration of the system engineering *
* process described in Section 4.0, above. The *
* responsibilities for carrying out these procedures *
* are described in Sections 3.1 and 3.3, above. *
* Methods for assuring that these procedures are *
* effective are also established in the PMS. *
****

9.2 Baseline Management

****
* This section includes, in addition to other baseline*
* controls, a description of the system engineering *
* procedures to be used for baselining and controlling*
* changes to the system requirements and information *
* needs that are developed according to the procedure *
* established in Section 4.1, above, and for baseline *
* and change control of the technical data and *
* information developed in the project. This section *
* will either establish the configuration management *
* plans and procedures, in accordance with the draft *
* Attachments III-4, -5, and -6 to DOE Order 5700.3B, *
* or it will summarize these plans and procedures and *
* reference a Configuration Management Plan for the *
* necessary detail. *
****

9.3 Project Documentation
9.4 Project Reporting and Reviews

****
* This section describes the plans and objectives of *
* each of the technical reviews that are scheduled in *
* Section 7.4, above. *
****

10.0 ANNEXES

10.1 WBS Dictionary
10.2 Administrative Procedures Manual
10.3 Support Plans

****
* This section may need to be renamed something like "Technical*
* Plans" or another section with such a title is needed which *
* summarizes and references project technical plans, including *

* the SCP, ESTP, and others. This section also establishes *
* either directly or by reference to the subordinate plans the *
* test and evaluation plans and procedures required in draft *
* Attachment III-3 of DOE Order 5700.3B. *
****

10.4 Glossary