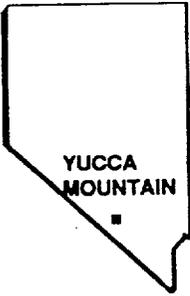


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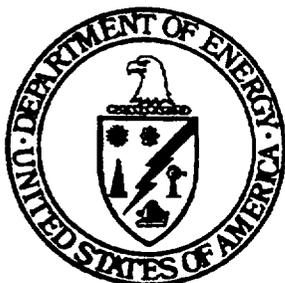
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YUCCA MOUNTAIN

SITE CHARACTERIZATION

PROJECT

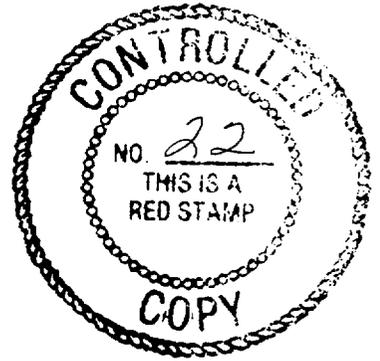
**YMP ACTIVITY PLAN
FOR DEVELOPMENT AND
IMPLEMENTATION OF A METHOD
FOR EARLY EVALUATION OF
SITE SUITABILITY**



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UNITED STATES DEPARTMENT OF ENERGY



TECHNICAL AND MANAGEMENT SUPPORT SERVICES
FOR THE
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

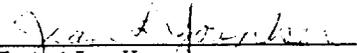
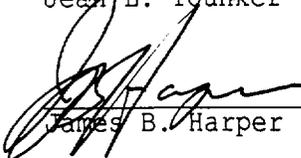
IMPLEMENTATION PLAN
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FOR EARLY EVALUATION OF SITE SUITABILITY

REVISION 2

JUNE 1991

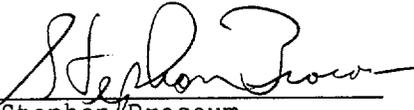
IMPLEMENTATION PLAN
FOR
DEVELOPING AND IMPLEMENTING A METHOD
FOR EARLY EVALUATION OF SITE SUITABILITY

PREPARED BY TECHNICAL AND MANAGEMENT SUPPORT SERVICES (T&MSS)

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Office of Geologic Disposal
Associate Director:

 Carl P. Gertz	<u>7/31/91</u> Effective Date
-------------------------------------------------------------------------------------------------------	----------------------------------

EXECUTIVE SUMMARY

This Implementation Plan, prepared in response to direction from Carl P. Gertz, Associate Director of the Office of Geologic Disposal, to John H. Nelson, T&MSS Project Manager, provides the scope, schedule, and funding needed to develop and implement a method for early evaluation of site suitability. The methodology developed will be based on the requirements and guidance provided in the Nuclear Waste Policy Act (NWPA) of 1982, as amended by the Nuclear Waste Policy Amendments Act of 1987. The NWPA, as implemented by 10 CFR Part 960, provides the general siting guidelines for the recommendation of sites for geologic repositories for the disposal of high-level radioactive waste and spent nuclear fuel. An Environmental Assessment (EA) was conducted (DOE, 1986) in which the qualifying and disqualifying conditions of these guidelines were evaluated. Available information was used to support findings that the Yucca Mountain site was not disqualified, and that all qualifying conditions were met. These findings, termed "lower level findings," were required for each guideline in order for the site to proceed into the site characterization phase. Stronger findings, termed "higher level findings," are required for the site to be recommended for repository development.

In 1989, the U.S. Secretary of Energy stated that early site characterization should be focused on information needed to evaluate site suitability. Because the general siting guidelines do not provide a specific methodology for these evaluations, which are to occur before completion of site characterization, this Early Site Suitability Evaluation (ESSE) effort is needed to develop a methodology and then to conduct an initial evaluation.

The general approach for this effort involves the following major steps:

- o A core team will evaluate the qualifying and disqualifying conditions of 10 CFR Part 960 to determine if information available since the EA suggests that a new unsuitability/suitability finding should be made. If such a finding cannot be made, the team will identify what information and analyses are needed to support such a finding.
- o An informal briefing package describing the general methodology for evaluation of site suitability will be provided to the OCRWM Director in May 1991.
- o Based on this methodology, information will be assembled and used in evaluations of the guidelines to determine if a new finding is appropriate. These individual guideline evaluations will be assembled into an ESSE Report.
- o This report will undergo DOE reviews and a peer review.
- o After resolution of review comments, the final ESSE Report will be transmitted to the OCRWM Director in January 1992.

This Implementation Plan identifies responsible organizations, interfaces between YMP participant organizations, requirements, schedules and

milestones, the approach to be followed, and deliverables. Section 2.0 provides the detail on how this effort will be (1) planned, including the scope, schedule and funding baseline and relationship within the Yucca Mountain Site Characterization Project (Section 2.1, Planning); (2) monitored (Section 2.2, Monitoring); and controlled (Section 2.3, Change Control). Section 3.0 provides the detail of the work structure. Section 4.0 provides the detail of the approach to be followed in developing the methodology and conducting the initial evaluation (Section 4.1, ESSE Approach) and the deliverables (Section 4.2, Deliverables).

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IMPLEMENTATION PLAN
FOR
DEVELOPING AND IMPLEMENTING A METHOD
FOR EARLY EVALUATION OF SITE SUITABILITY

1.0 INTRODUCTION

This Implementation Plan provides the scope, schedule, and funding needed to develop and implement a method for early evaluation of site suitability. The following is the sequence of events which resulted in the preparation of this implementation plan:

1. On December 24, 1990, John W. Bartlett, Director of the Office of Civilian Radioactive Waste Management (OCRWM), transmitted guidance to Carl P. Gertz, Associate Director of the Office of Geologic Disposal (OGD), to develop an OGD Plan for this effort.
2. The OGD Plan for Developing and Implementing a Method for Early Evaluation of Site Suitability, YMP-91/1, was prepared and approved.
3. On January 23, 1991, Carl P. Gertz transmitted guidance to John H. Nelson, T&MSS Project Manager, to develop a T&MSS Implementation Plan, based on the OGD Plan, for this effort.
4. This T&MSS Implementation Plan fulfills the above Carl P. Gertz request.

1.1 BACKGROUND

Pursuant to the Nuclear Waste Policy Act (NWPA) of 1982, the U.S. Department of Energy (DOE) developed general siting guidelines (10 CFR Part 960) for the recommendation of sites for geologic repositories for the disposal of high-level radioactive waste and spent nuclear fuel. According to the summary provided in 10 CFR Part 960, "the guidelines are compatible with the regulations issued by the Nuclear Regulatory Commission (NRC) in 10 CFR Part 60 and those proposed by the Environmental Protection Agency in 40 CFR Part 191." The guidelines were designed to be used in the various steps of the siting process, as required by the NWPA. The steps in the NWPA included nomination and recommendation of sites to be characterized, comparison of characterized sites, and recommendation of a site for repository development from among those that were characterized. With the passage of the Nuclear Waste Policy Amendments Act in 1987, the Yucca Mountain site in Nevada was selected as the only site to be characterized, thus eliminating the need to compare among sites. However, elimination of the need to compare sites did not relieve the DOE of responsibilities for evaluating the suitability of the Yucca Mountain site for repository development.

In his 1989 report to Congress, the Secretary of Energy announced that "the DOE has decided to focus on surface-based testing aimed specifically at evaluating whether the [Yucca Mountain] site has any features that would indicate that it is not suitable as a potential repository site....[T]hese investigations will provide early information about the suitability of the

site. This approach is in concert with a number of suggestions, particularly from the State of Nevada and the Edison Electric Institute, that scientific investigation activities focus on potentially adverse conditions and that effort be made to evaluate key suitability issues early in the process." The DOE siting guidelines provide general factors and an approach that DOE will use to determine the suitability of a site. The guidelines do not, however, provide detailed guidance for these early site evaluations, indicating only that "a site shall be disqualified at any time during the siting process if the evidence supports a finding by the DOE that disqualifying conditions exist or the qualifying conditions of any system or technical guideline cannot be met." Consequently, a method for making these findings is needed for early site suitability evaluations.

1.2 OVERALL SCOPE

As indicated in the letter from Carl P. Gertz requesting this T&MSS Implementation Plan, the first goal of the Early Site Suitability Evaluation (ESSE) effort is for the OCRWM Director to present the general method for early site suitability evaluations in a public forum in mid-1991. A second goal establishes a milestone for completion of the first phase of the early suitability evaluation by January 1992. Therefore, the scope of this Implementation Plan includes the development of a method for early site-suitability evaluations and implementation of this method for the first phase of the evaluation.

The extent of application of the method to qualifying and disqualifying conditions will be limited by the use of existing data and information. Where evaluations cannot be performed due to insufficient information, a process (as described in Section 4.1.2.1) will be developed to provide the needed information.

1.3 PURPOSE OF IMPLEMENTATION PLAN

The purpose of this Implementation Plan is to identify the following:

1. The Yucca Mountain Site Characterization Project (YMP) participant organization responsible for this effort.
2. The responsibilities of, and organization interfaces between, the YMP participant organizations involved in this effort.
3. The quality assurance and other requirements applicable to this effort.
4. The proposed schedule for initiation and completion of this effort to meet the January 1992 milestone and other milestones.
5. The approach to be followed in conducting this effort.
6. The work steps to be followed.
7. The products of this effort.

2.0 PLAN MANAGEMENT AND IMPLEMENTATION

This section describes the overall management, coordination, and implementation process for performing the tasks identified in this plan.

Section 2.1, Planning, contains the elements of the ESSE effort that will constitute the ESSE scope, schedule, and budget baseline. Section 2.2, Monitoring, details how T&MSS will monitor the progress of this effort to the baseline, including identification of variances analysis of the variances and options for resolution. Section 2.3, Change Control, provides detail on how resolution of variances will be authorized, implemented, documented, and controlled.

2.1 PLANNING

The elements of this section constitute the ESSE baseline. This baseline will allow identification of impacts of conducting the ESSE effort relative to ongoing OGD programs and will also be used to monitor progress during performance of the ESSE effort.

2.1.1 ESSE SCOPE

2.1.1.1 Work Structure

The scope of the ESSE effort is described in Section 4.0, ESSE Approach and Deliverables.

This effort falls within Project Work Breakdown Structure element 1.2.5.2, Licensing.

2.1.1.2 Deliverables

The deliverables to be produced for specific activities are identified in Section 4.0, ESSE Approach and Deliverables.

2.1.2 ESSE SCHEDULE

2.1.2.1 Logic of Activities

Appendix A contains the time-phased logic that represents the scope as described in Section 4.0, ESSE Approach and Deliverables.

2.1.2.2 Milestones

Description	Date
Submit Informal Briefing Material on the ESSE Method to OCRWM Director	05/01/91
Submit ESSE Report (for review)	06/15/91
Complete Peer Review of the ESSE Report	11/01/91
Transmit Final ESSE Report to OCRWM Director	01/02/92

2.1.3 FUNDING AND RESOURCE ESTIMATES

2.1.3.1 T&MSS Funding and Resource Estimates

T&MSS funding and resource estimates are transmitted separately to the Yucca Mountain Site Characterization Project (YMPO). A summary estimate of T&MSS manpower requirements is as follows:

February to mid-July 1991 - 6.2 Staff Members*
 Mid-July to December 1991 - 6.0 Staff Members

2.1.3.2 Participant Resource Estimates

The following is an estimate of the manpower to be provided by the various YMP participants to perform the scope of work contained in the approved Interface Memoranda of Understanding (IMOU) with each participant. The IMOU contain guidance for the participant to estimate the resources needed to perform the noted scope, review the potential impacts of using these resources, and initiate change control actions as appropriate. These estimates include the effort defined in Section 2.1.5.2 and also the support to other lead participants.

	Feb. to Mid-July '91	Mid-July to Dec. '91
LANL	3.25 Staff Members*	1.25 Staff Members
LLNL	2.25 Staff Members	1.00 Staff Members
SNL	3.50 Staff Members	1.25 Staff Members
USGS	5.25 Staff Members	2.75 Staff Members
Weston Technical Associates	2.00 Staff Members	1.00 Staff Members

*The term Staff Member can refer to a mix of personnel whose availability may add to the number shown.

Other organizations may be identified for involvement during the effort. Formal change control actions will be used at those times.

2.1.4 QUALITY ASSURANCE AND REQUIREMENTS

2.1.4.1 Grading Report TESS-001

Quality Assurance requirements for this effort are established by Grading Report TESS-001 (see Appendix C). These requirements will ensure that documentation preparation, technical or peer review, document control, records, audits, corrective actions, training, and qualification of staff are performed in accordance with procedures established for each participant (i.e. T&MSS, SNL, LANL, LLNL, USGS, and Weston) under its particular quality assurance program, as clarified and detailed in revision 1 to Grading Report TESS-001 (Appendix C). Work performed at a participant organization at the direction of the ESSE Core Team will be in accordance with the participant's particular QA program. Activities completed by the ESSE Core Team will be conducted in compliance with the T&MSS QA Program. All references and data used to support the evaluation will be included in the formal records package and will be verified.

2.1.4.2 Methodology and Evaluation Requirements

The basis for the site suitability evaluations will be the siting guidelines of 10 CFR Part 960. These guidelines provide the general factors by which the DOE will judge the suitability of a site. The disqualifying and qualifying conditions of the guidelines define the site features and conditions to be evaluated in determining suitability or unsuitability. According to the guidelines, the site must be disqualified if the evidence supports a finding by the DOE that any of the disqualifying conditions exists, or if any of the qualifying conditions cannot be met.

The early evaluations of site suitability will address the disqualifying and qualifying conditions by considering the following:

- o Factors related to potentially unacceptable performance of the repository system
- o Site conditions or features that are potentially unacceptable, or which suggest that potentially unacceptable changes in conditions might be caused by future tectonic, volcanic, or extreme climatic change in the next 10,000 years
- o Significant uncertainties that are unlikely to be removed with any reasonable testing program
- o Site conditions that require facilities or designs which are beyond reasonably available technology

Key elements of these considerations will be the kind and level of uncertainties and the significance of these uncertainties relative to the qualifying and disqualifying conditions. To conduct these evaluations, it will be necessary to have adequate understanding of the information that is

already available and to specify the kind of additional information that is needed to reduce these uncertainties.

2.1.4.3 Implementation Plan Requirements

This Implementation Plan contains the scope of and complies with the requirements and guidance (1) contained in the OGD Plan for Developing and Implementing a Method for Early Evaluation of Site Suitability, YMP-91/1; and (2) provided by the Scope of Work attached to the Carl P. Gertz to John H. Nelson letter, dated January 23, 1991. This plan must be developed and approved in accordance with the requirements of T&MSS SP 1.35, Preparation, Review, and Approval of Non-Technical Documents.

2.1.4.4 Requirements for Implementation of This Plan

Implementation of this plan will occur when YMPO approves it. Performance of the tasks and activities contained in this plan will be in accordance with the requirements of the Quality Assurance Grading Report TESS-001, Rev. No. 1 (Appendix C). Activities completed by the ESSE Core Team will be conducted in compliance with the T&MSS QA program, as clarified and detailed in revision 1 to the Grading Report TESS-001 (Appendix C).

Figure 2-1 is a matrix of training requirements for all personnel associated with this plan. As shown on the matrix, the ESSE Task Manager is responsible for the overall management requirements of this effort. The ESSE Core Team is composed of members from T&MSS, SNL, LANL, LLNL, USGS, Weston, and other contractor personnel. Core Team members constitute the voting body of the ESSE effort. Alternate Core Team members have been appointed with voting authority only in the absence of the Core Team member. As designated on Figure 2, Participant Staff refers to all personnel in support of the ESSE Task Manager and the ESSE Core Team members.

Decision analysts (consultants) employed on the ESSE effort do not generate, manipulate, modify or output design data. This function is to assist individuals who may generate, manipulate, modify or output such information in the application of decision analysis techniques. As such, it is only required that they have sufficient credentials and related experience in the decision analysis discipline to be able to coach or facilitate core team members and their function is critical to the ESSE team product from this later perspective only. Decision analysts will perform their function according to the procedures indicated on Figure 2-1.

Involvement of YMP participants will be accomplished through the use of IMOU, per AP-5.19Q, Interface Control.

2.1.5 MANAGEMENT

The Associate Director of the OGD was given responsibility for conducting the task covered by this plan. Within the OGD, management of the task was delegated to and shared by the Directors of the Analysis and Verification Division Office, OGD, and the Regulatory and Site Evaluation Division (RSED), YMPO. Management assistance will be provided to the responsible Directors by the Directors of the Project and Operations Control Division, YMPO, and the Engineering and Development Division, YMPO, and the

Requirements	Personnel				
	Task Manager	All Core Team Members	All Participant Staff	Peer Reviewers	Decision Analysts
T&MSS SP 1.15, Cost Account Planning & Authorization	●				
T&MSS SP 1.16, Schedule Development, Control, & Maintenance	●				
T&MSS SP 1.17, Cost Accumulation & Sub-contractor Cost Accrual	●				
T&MSS SP 1.18, Status, Performance Reporting, & Variance Analysis	●				
T&MSS SP 1.25, Acceptance of Items & Services	●				
T&MSS SP 1.28, Control of Purchased Items & Services	●				
T&MSS SP 1.34, Document Control	●				
T&MSS SP 1.35, Prep., Review, & Approval of Non-Tech. Documents	●		● 2		
T&MSS SP 1.36, Records Management	●				
T&MSS SP 1.37, Deficiency Reporting System	●				
T&MSS SP 1.39, CMCS Change Control	●				
T&MSS SP 1.42, Job Assignment/Quality Assurance Classification	●				
T&MSS SP 1.62, Peer Review	●	●	● 1	●	
T&MSS SP 2.2, Scientific Investigation Control	●	●	● 2		● 1
T&MSS SP 2.3, Review of T&MSS Technical Documents	●	●	● 2		
YMP AP-1.3, Publication, Review and Approval	●				
YMP AP-3.3Q, Change Control Process	●				
YMP AP-3.7, Cost & Schedule Baseline Maint. & Change Control	●				
YMP AP-5.19Q, Interface Control	●				
YMP AP-5.36, Proj. Plng., Budgeting, Scheduling, & Work Auth. Sys.	●				
Implementation Plan	●	●	●	●	●
Peer Review Plan	●	●	●	●	●

¹ As appropriate.

² For Participant staff members who participate in review and comment resolution of T&MSS products.

Figure 2-1. Training Requirements Matrix.

Special Assistant for Institutional Affairs, YMPO. The responsibility for conducting this plan is assigned to the T&MSS contractor in accordance with the letter of January 23, 1991, Carl P. Gertz to John H. Nelson, T&MSS Project Manager.

2.1.5.1 Organization

The YMP participants will support the ESSE effort as shown in the Organization Structure, Appendix B. This organizational approach will allow interactive participant coverage of the activities required by each of the tasks described in this plan.

At various progress points, T&MSS may determine the need for additional technical support, either from OGD participants or from entities external to the OGD. As noted in Section 2.1.5.2, T&MSS will make appropriate selection and obtain agreements through use of IMOU.

2.1.5.2 Responsibilities

The responsibilities of the various organizations involved in the ESSE effort are as follows:

The YMPO is responsible for work authorization, budget allocation, review and acceptance of the implementation plan, review and acceptance of the effort deliverables, and acceptance of the final report. YMPO responsibilities such as resource and training requirements, work conduct, etc., are not covered in this plan.

T&MSS will be responsible for overall technical integration, monitoring, and coordination of the activities of the YMP participants involved in this effort. Included is the selection of the core team and other technical support. T&MSS will monitor the tasks and report their progress to the YMPO at periodic meetings.

Note: The following paragraphs provide detail on which participants have lead responsibility. The lead organizations are expected to request the support of other YMP participants as necessary to successfully complete the activities described in this plan.

On a technical level, T&MSS is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guidelines of 10 CFR 960:

Postclosure
960.4-2-8 Human Interference

Preclosure
System Guideline for Preclosure Radiological Safety
960.5-1(a) (1) System Guideline for Preclosure Radiological Safety

Preclosure Radiological Safety

- 960.5-2-1 Population Density and Distribution
- 960.5-2-2 Site Ownership and Control
- 960.5-2-3 Meteorology
- 960.5-2-4 Offsite Installations and Operations

System Guideline for Environment, Socioeconomics, and Transportation

- 960.5-1(a)(2) System Guideline for Environment, Socioeconomics, and Transportation

Environment, Socioeconomics, and Transportation

- 960.5-2-5 Environmental Quality
- 960.5-2-6 Socioeconomic Impacts
- 960.5-2-7 Transportation

Sandia National Laboratories (SNL) is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guidelines of 10 CFR Part 960:

Postclosure

- 960.4-2-1 Geohydrology

Preclosure

- Ease and Cost of Siting, Construction, Operation, and Closure
- 960.5-2-10 Hydrology
- 960.5-2-11 Tectonics

Los Alamos National Laboratory (LANL) is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guidelines of 10 CFR Part 960:

Postclosure

- 960.4-2-2 Geochemistry
- 960.4-2.6 Dissolution

Preclosure

- Ease and Cost of Siting, Construction, Operation, and Closure
- 960.5-2-9 Rock Characteristics

Lawrence Livermore National Laboratory (LLNL) is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guideline of 10 CFR Part 960:

Postclosure

- 960.4-2-3 Rock Characteristics

The United States Geological Survey (USGS) is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guidelines of 10 CFR Part 960:

Postclosure

- 960.4-2-4 Climatic changes
- 960.4-2-5 Erosion
- 960.4-2-7 Tectonics

Preclosure

Ease and Cost of Siting, Construction, Operation, and Closure
960.5-2-8 Surface Characteristics

Weston Technical Associates is responsible for providing the ESSE effort with lead technical expertise and input relative to the following guidelines of 10 CFR Part 960:

Postclosure

System Guideline for Total System Performance
960.4-1 System Guideline for Total System Performance

Preclosure

System Guideline for Ease and Cost of Siting, Construction, Operation and Closure
960.5-1 System Guideline for Ease and Cost of Siting, Construction, Operation and Closure

2.1.5.3 Organizational Interfaces

An IMOU will be developed and approved with each participant. The IMOU will contain the services, deliverables, schedules, and milestones to be provided by the participant and the quality assurance requirements under which the participant will manage its efforts. The IMOU content will be consistent with Section 2.1.5.2, Responsibilities, of this Implementation Plan. These IMOUs will be developed and processed per the requirements of AP-5.19Q, Interface Control.

2.1.5.4 Relationship with Other Plans

The testing program to address site suitability concerns and evaluation of the results of testing relative to site suitability are encompassed within the Test and Evaluation Plan (DOE, 1990). This plan defines (1) the general management responsibilities and process for testing and evaluating the Yucca Mountain site in the Exploratory Shaft Facility (ESF) and from the surface, (2) how the tests are identified and prioritized to address program needs, and (3) how data from those tests are evaluated and interpreted. The ESSE effort will be conducted in a manner consistent with the Test and Evaluation Plan, and the results will be evaluated using the process described in the Test and Evaluation Plan.

2.1.5.5 Relationship with Other Efforts

Information developed by other activities will be utilized in the ESSE effort. Other activities that are closely related include the following:

ESF Alternative Study
Calico Hills Risk/Benefit Analysis
Test Prioritization Task
Golder Associates Incorporated (GAI) performance assessment effort
Electric Power Research Institute (EPRI) performance assessment effort

Phase II of the Test Prioritization Task has been deferred, and staff have been reassigned to the ESSE.

The ESSE effort will be coordinated with the YMP Planning and Control System (PACSA) and the T&MSS Contract Management Control System (CMCS) regarding ESSE planning, monitoring, and control.

2.2 MONITORING

As indicated, Section 2.1, Planning, provided the baseline scope, schedule, and budget elements for the ESSE effort. This section will detail how T&MSS will monitor progress, including variances.

2.2.1 PERIODIC REVIEWS

T&MSS will conduct periodic reviews of progress to determine the status of activities. These reviews will occur approximately biweekly (associated with core team meetings or teleconference calls) and will involve status of the technical scope being accomplished by participants and status of the schedule for these activities. The reviews will also comply with the requirements noted in Section 2.1.4.4, Requirements for Implementation of this Plan (relative to baseline monitoring).

The progress reviews will be provided to the T&MSS Project Manager.

2.2.2 PERIODIC STATUS TO DOE

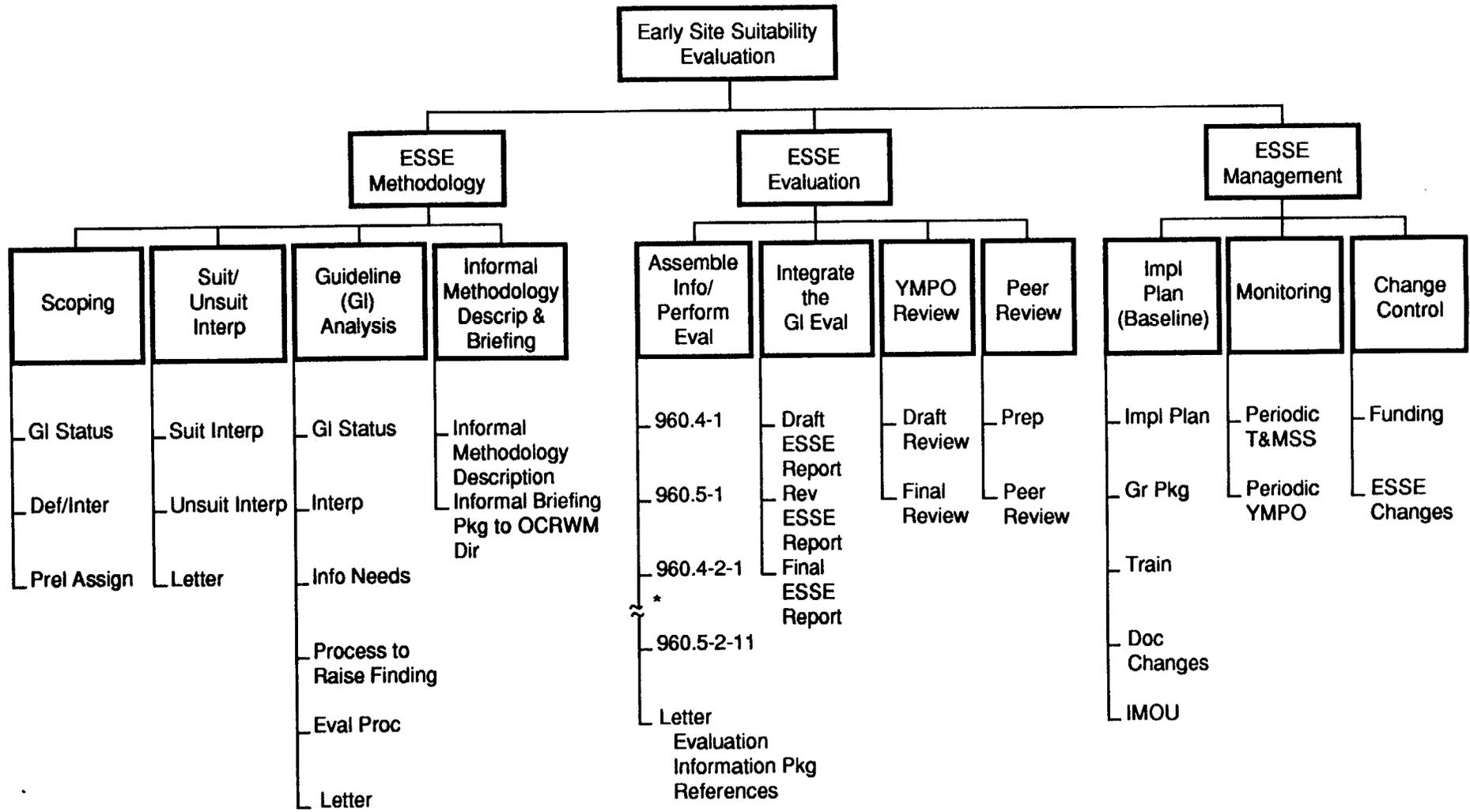
T&MSS will provide a periodic status briefing (targeted at monthly) to the YMPO. The briefing will involve a summary of the periodic reviews (Section 2.2.1) of scope, schedule, and budget progress. Included will be information generated during the PACS/CMCS variance analysis cycle.

2.3 CHANGE CONTROL

For variances identified by monitoring efforts, as indicated in Section 2.2, implementation of any proposed resolutions will involve approved change control actions. These actions will occur in compliance with the requirements noted in Section 2.1.4.4.

3.0 ESSE WORK STRUCTURE

Figure 3-1 provides a work structure for the major activities to be accomplished during performance of the ESSE. The time-phased logic diagram, as shown in Appendix A, represents this work structure. Section 4.0, ESSE Approach and Deliverables, provides detailed descriptions of the activities involved in each element and the products to be provided from the element.



* Break in diagram indicates 19 intervening guidelines of which 4 are shown.

Figure 3-1. Work Structure: Develop and Implement a Method for Early Evaluation of Site Suitability.

4.0 ESSE APPROACH AND DELIVERABLES

4.1 ESSE APPROACH

The scoping process described in the OGD Plan to Develop and Implement a Method for Early Evaluation of Site Suitability and guidance from the YMPO/OGD resulted in the scope described in the following sections. This section will describe the elements of the work structure (Figure 3-1) and the deliverables to result from this structure.

4.1.1 ESSE METHODOLOGY

4.1.1.1 Scoping

The scoping process involved preliminary selection of a core team of participants to be involved in this effort. Preliminary meetings of the ESSE Core Team (1) reviewed the status of each 10 CFR Part 960 guideline, (2) discussed the definitions and interpretations of the guidelines and the terms suitability/unsuitability, and (3) made preliminary assignments of guideline analysis responsibilities to the ESSE Core Team members.

Appropriate materials from the scoping phase of the activity will become part of the formal records package for this effort.

4.1.1.2 Suitability/Unsuitability Interpretation

ESSE Core Team members will be assigned the task to develop interpretations of suitability and unsuitability. The ESSE Core Team will review these interpretations and reach a consensus interpretation.

4.1.1.3 Guideline Analysis

ESSE Core Team members will be assigned the lead to perform an analysis of specific guidelines of 10 CFR Part 960. Other ESSE Core Team members will be assigned support roles to these specific guideline assignments. These assignments will be documented and approved through the use of IMOU described in Section 2.1.5.3.

The analysis to be performed will consist of the following:

- o Review of the current status of the findings of the guideline relative to the findings contained in the EA (DOE, 1986). This review will involve the current status of information to be used as the basis for the finding and potentially to support a higher-level finding.
- o Develop an interpretation of suitability and unsuitability for the specific guideline.
- o Determine data or analyses that could be used to support the evaluation, if available.

- o Establish whether formal expert elicitations or multi-attribute utility analysis will be recommended as part of the evaluation.

Note: Section 4.1.2, below, will detail the actual assembly of information and evaluation performance. However, some information assembly and evaluation will naturally occur as part of the above efforts.

The ESSE Core Team will meet periodically to review the status of these analyses and to develop a consensus on the evaluation results.

4.1.1.4 Informal Description of the Methodology and Informal Briefing Material

The ESSE Core Team will develop an informal description of the methodology to be followed to evaluate each of the 10 CFR Part 960 guidelines. This description will be based on the results of Section 4.1.1.3.

The core team will develop an informal briefing package of this methodology description. This informal briefing package is provided in response to the OCRWM Director's request indicated in the OGD Plan. This methodology description will be part of the evaluation package described in Section 4.1.2 and will be reviewed per SP 2.3, Review of T&MSS Technical Documents.

4.1.2 ESSE EVALUATION

4.1.2.1 Assemble Information/Determine Confidence/Perform Evaluation

The evaluation package will be prepared according to SP 2.2, Scientific Investigation Control.

Per the guideline assignments noted in Section 2.1.5.2, the responsible lead and support core team members will assemble the current information relative to the specific guideline. Included will be determinations of the level of confidence in the information being used.

The information assembled will then be evaluated per the methodology described in Section 4.1.1.4. Periodic meetings of the ESSE Core Team will assess the status of efforts being performed to develop consensus on pending results.

The evaluation will include a package of information used and also hard copies of all references.

Note: This will be completion of the evaluation noted to begin in Section 4.1.1.4.

4.1.2.2 Integrate the Guideline Evaluations

The ESSE Core Team will compile an integrated package of the individual guideline evaluations and review this package per SP 2.3, Review of T&MSS Technical Documents. This will constitute the Draft ESSE Report.

The Draft ESSE Report will undergo the following to result in the final package:

- o Review by the YMPO, comment resolution, and revision in preparation for a peer review
- o Peer review, comment resolution, and revision
- o Final review by the YMPO, comment resolution, revision, and approval in preparation for transmittal to the OCRWM Director

4.1.2.3 YMPO Review

As the pre-peer review package will be an initial result of the ESSE effort, a programmatic review under the requirements of YMPO Administrative Procedure AP-1.3, Publications Review and Approval, will be conducted on the ESSE Report prior to the external peer review. Based on this programmatic review, YMPO will approve the release of the ESSE Report for submittal to the peer review.

Subsequent to the Peer Review, a second YMPO review, also in accordance with AP-1.3, will be conducted on the ESSE Report and associated Peer Review Report. The second review will determine actions for YMPO to take, to be tracked per the requirements of YMPO AP-1.14, Disposition of Comments on the Site Characterization Program. The activities associated with actions tracked per AP-1.14 are not part of the scope of this Implementation Plan.

4.1.2.4 Peer Review

The ESSE Core Team will recommend a panel with the expertise required to review the technical content of the ESSE Report relative to the requirements of 10 CFR Part 960. The peer review panel is approved by the ESSE Task Manager under authority delegated by the T&MSS Project Manager, according to SP 1.62, Peer Review Plan. T&MSS will place these experts under subcontract to perform this review. The ESSE Report, which has undergone YMPO management review, will be the basis for the peer review. The ESSE Core Team will meet with the peer review panel periodically to provide background information and any additional information the peer review may request.

The peer review panel will provide the ESSE Core Team with comments on the ESSE Report. The ESSE Core Team will resolve these comments and revise the report. This revised report will then undergo T&MSS review prior to transmittal to YMPO for a second review, as described in Section 4.1.2.3.

4.1.3 ESSE MANAGEMENT

Note: Implementation, monitoring, and change control are described in greater detail in Section 2 of this Implementation Plan.

4.1.3.1 Implementation Plan

T&MSS will develop this Implementation Plan to form the baseline of the scope, schedule, and funding/budget for performance of the noted scope.

The Implementation Plan will contain the Grading Package (TESS-001), which will contain the requirements for performance of this effort, including training.

T&MSS will determine the required training, implement this training, verify its completion, and document it.

T&MSS will develop and obtain approval for documentation required for T&MSS to perform as the lead YMP participant for the ESSE effort.

T&MSS will develop and obtain approval on IMOU to contain the agreed performance by other YMP participants in the ESSE effort.

4.1.3.2 Monitoring

T&MSS will perform periodic monitoring of ESSE progress and provide the results of this statusing to the T&MSS Project Manager and to the YMPO.

4.1.3.3 Change Control

T&MSS will comply with T&MSS and YMPO requirements relative to change control of documentation associated with the ESSE effort.

4.2 DELIVERABLES

Note: Deliverables will be described and detailed relative to the scope sequence described in Section 4.1 above. The following information will also indicate whether the deliverable meets a T&MSS or YMPO milestone.

4.2.1 ESSE METHODOLOGY DELIVERABLES

4.2.1.1 Scoping

Deliverable: N/A

4.2.1.2 Suitability/Unsuitability Interpretation

Deliverable: Letter to the T&MSS Task Manager from responsible ESSE Core Team member containing consensus interpretation.

| Responsible Organization: N/A

Due: 2/18/91

4.2.1.3 Guideline Analysis

Deliverable: Letter to the T&MSS Task Manager from each lead ESSE Core Team member for the assigned guideline analysis. Contents per Section 4.1.1.4.

| Responsible Organization: N/A

Due: 2/18/91

4.2.1.4 Informal Description of the Methodology and Informal Briefing Material

Deliverable #1: Letter to the T&MSS Task Manager containing the methodology as described in Section 4.1.1.4.

| Responsible Organization: T&MSS

Due: 3/29/91

Deliverable #2: Informal package of briefing material to transmit to YMPO for subsequent transmittal to OCRWM Director.

| Responsible Organization: T&MSS

Due: 5/1/91

4.2.2 ESSE EVALUATION DELIVERABLES

4.2.2.1 Assemble Information/Determine Confidence/Perform Evaluation

Deliverable: Letter from responsible ESSE Core Team member to the T&MSS Task Manager containing the evaluation of the assigned guideline, information used, and all references (hard copies).

| Responsible Organization: T&MSS

Due: 5/6/91

4.2.2.2 Integrate the Guideline Evaluations

Deliverable #1: First draft of ESSE Report for T&MSS review

Responsible Organization: T&MSS

Due: 7/1/91

Deliverable #2: First draft of ESSE Report for YMPO review

Responsible Organization: T&MSS

Due: 7/29/91

Deliverable #3: Revised ESSE Report (incorporate peer review)

Responsible Organization: T&MSS

Due: 12/16/92

4.2.2.3 YMPO Review

Deliverable #1: Management review of draft report to approve for release to peer review panel

Responsible Organization: YMPO

Due: 8/15/91

Deliverable #2: Followup review of peer-reviewed report

Responsible Organization: YMPO

Due: 1/2/92

4.2.2.4 Peer Review

Deliverable: Peer Review of ESSE Report

Responsible Organization: T&MSS

Due: 11/26/91

4.2.3 ESSE MANAGEMENT DELIVERABLES

4.2.3.1 Implementation Plan

Deliverable: ESSE Implementation Plan

| Responsible Organization: T&MSS

Due: 1/28/91 (submittal for YMPO approval)

4.2.3.2 Monitoring

Deliverable: Per YMPO direction

4.2.3.3 Change Control

Deliverable: Per YMPO Direction

LIST OF REFERENCED DOCUMENTS

- AP-1.3, "Publication, Review, and Approval"
- AP-1.14, "Disposition of Comments on the Site Characterization Program"
- AP-3.3Q, "Change Control Process"
- AP-3.7, "Cost and Schedule Baseline Maintenance and Change Control"
- AP-5.19Q, "Interface Control"
- AP-5.36, "Project Planning, Budgeting, Scheduling and Work Authorization System"
- DOE (U.S. Department of Energy), 1986. Final Environmental Assessment: Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0073, Washington, D.C.
- Letter, Bartlett to Gertz, REVISED GUIDANCE FOR ACTIONS TO ADDRESS EARLY EVALUATION OF SITE SUITABILITY, December 24, 1990.
- Letter, Gertz to Nelson, SCOPE OF WORK (SOW) TO PREPARE THE TECHNICAL AND MANAGEMENT SUPPORT SERVICES (T&MSS) PLAN FOR DEVELOPMENT OF SITE SUITABILITY METHODOLOGY, January 23, 1991.
- NWPA (Nuclear Waste Policy Act), 1983. "Nuclear Waste Policy Act of 1982," Public Law 97-425, 42 USC 10101-10226, Washington, D.C.
- NWPAA (Nuclear Waste Policy Act Amendments), 1987. Amendments to the Nuclear Waste Policy Act of 1982 - Public Law 100-203 - December 22, 1987, 100th Congress, Title V, pp 236-266.
- OGD Plan for Developing and Implementing a Method for Early Evaluation of Site Suitability, YMP-91/1.
- RSE-006 Grading Package
- RSE-XXX Grading Package
- T&MSS SP 1.1, "Preparation, Review and Approval of T&MSS Standard Practice and Organization Procedures"
- T&MSS SP 1.14, "Preparation and Control of the Contract Work Breakdown Structure (CWBS), the CWBS Dictionary, and the Responsibility Assignment Matrix"
- T&MSS SP 1.15, "Cost Account Planning, Budgeting, and Authorization"
- T&MSS SP 1.16, "Schedule Development, Control, and Maintenance"
- T&MSS SP 1.17, Cost Accumulation and Subcontractor Cost Accrual"

T&MSS SP 1.18, "Status, Performance Reporting, and Variance Analysis"

T&MSS SP 1.25, "Acceptance of Items and Services"

|T&MSS Sp 1.28, "Control of Purchased Items & Services"

T&MSS SP 1.34, "Document Control"

T&MSS SP 1.35, "Preparation, Review, and Approval of Non-Technical Documents"

T&MSS SP 1.36, "Records Management"

T&MSS SP 1.37, "Deficiency Reporting System (QFRs and MCARs)"

T&MSS SP 1.39, "CMCS Change Control"

T&MSS SP 1.42, "Job Assignment/Quality Assurance Classification"

T&MSS SP 1.62, "Peer Review"

T&MSS SP 2.2, "Scientific Investigation Control (to be revised)"

T&MSS SP 2.3, "Review of T&MSS Technical Documents"

|TESS-001, "Quality Assurance Grading Report," (Rev. 1, April 1991).

YMP Test and Evaluation Plan, YMP/90-22, DOE, August 1990.

| YMP Peer Review Plan (Rev. 0, June 1991)

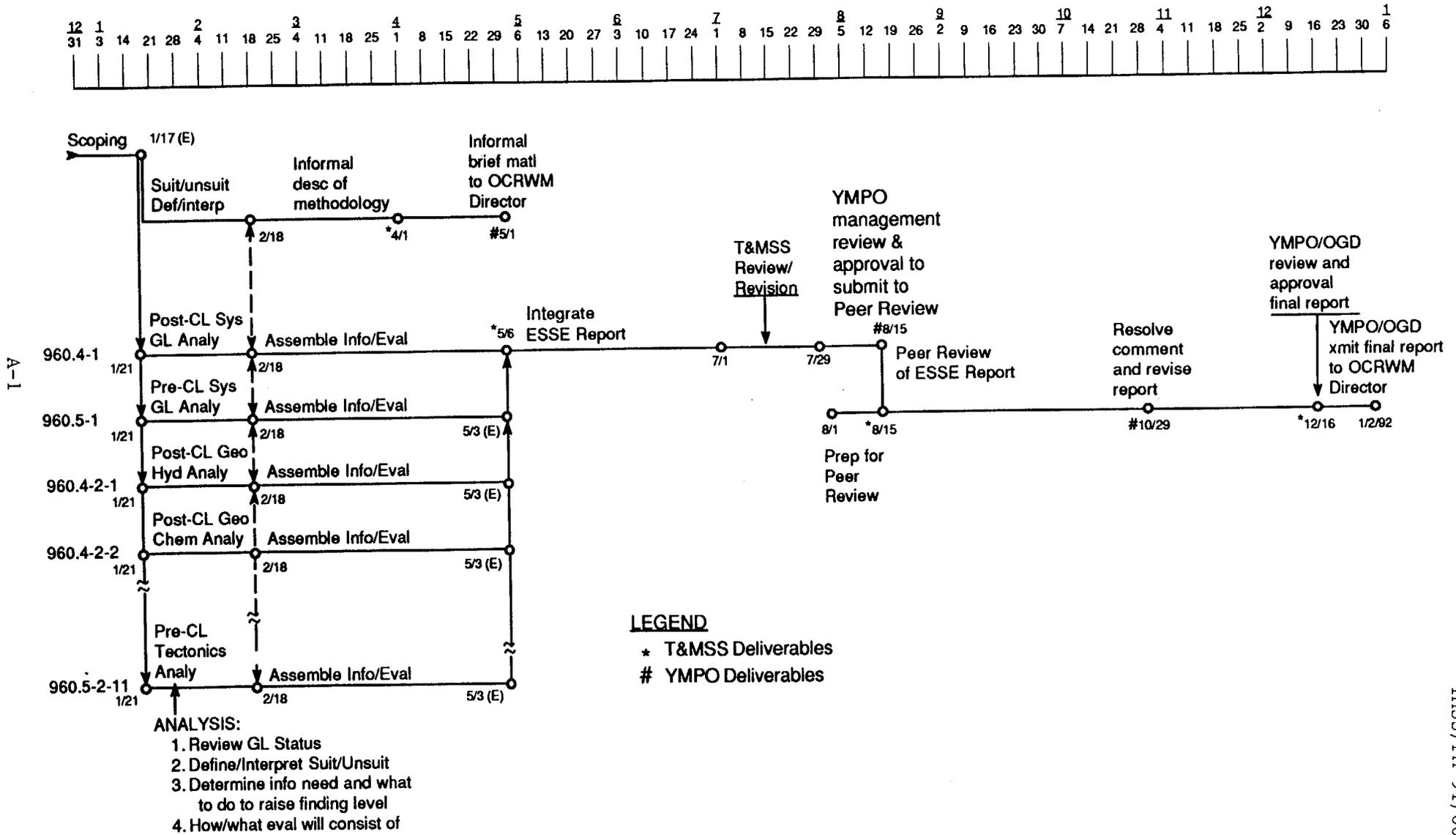
CODES AND REGULATIONS

- 10 CFR Part 60 (Code of Federal Regulations), 1987. Title 10, "Energy," Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," U.S. Government Printing Office, Washington, D.C., pp. 627-658.
- 10 CFR Part 960 (Code of Federal Regulations), 1987. Title 10, "Energy," Part 960, "General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories," U.S. Government Printing Office, Washington, D.C., pp. 518-551.
- 40 CFR Part 191 (Code of Federal Regulations), 1986. Title 40, "Protection of Environment," Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," U.S. Government Printing Office, Washington, D.C., pp. 7-16.

APPENDIX A

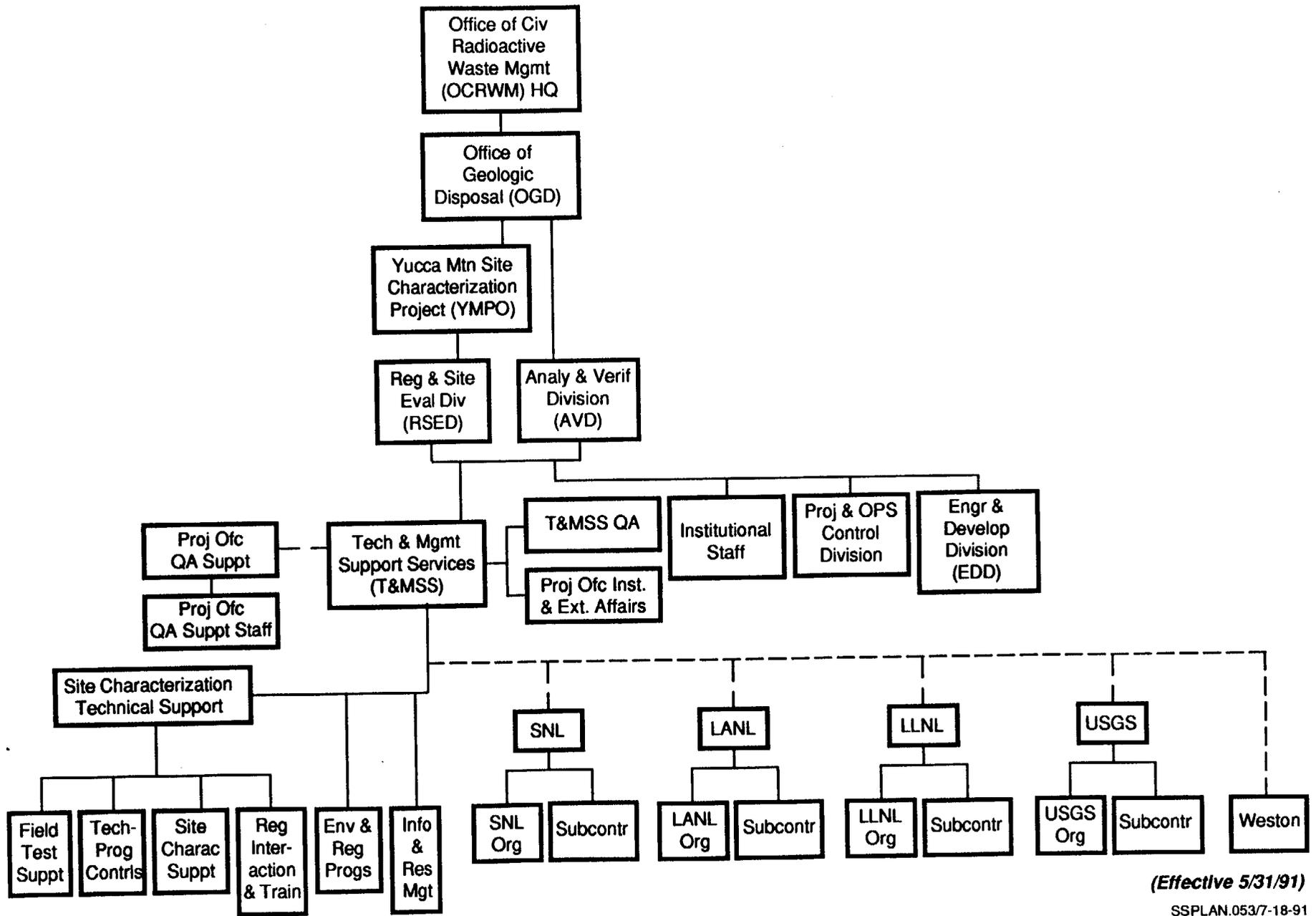
SCHEDULE (TIME-PHASED LOGIC DIAGRAM)

Time-Phased Logic: Develop and Implement a Method for Early Evaluation of Site Suitability



Note: Breaks in diagram indicate 19 intervening guidelines of which 4 are shown.

APPENDIX B
ORGANIZATION STRUCTURE



(Effective 5/31/91)

SSPLAN.053/7-18-91

Figure B-1. Organization Structure: Develop and Implement a Method for Early Evaluation of Site Suitability.

APPENDIX C

GRADING REPORT: TESS-001
FOR IMPLEMENTATION PLAN

QUALITY ASSURANCE GRADING REPORT

II QA 095
7/90

PART I. IDENTIFICATION AND DEFINITION: ITEM ACTIVITY PAGE 1 OF 6
TITLE/DESCRIPTION Early Evaluation of Site Suitability - See Attachment 1 **REPORT NO.** TESS-001 **REV. NO.** 1

RESPONSIBLE ORGANIZATION T&MSS

REVISION(S) OF Q-LIST, QUALITY ACTIVITIES LIST, PROJECT REQUIREMENTS LIST, AND SUPPORTING DOCUMENTATION USED:
Quality Activities List, Rev. 2 dated 3/13/91 and Project Requirements List, Rev. 2 dated 3/13/91 for WBS Elements (Att. I)
(Attach additional definitive information as necessary to fully define the subject item or activity and support the position expressed in this QAG report)

PART II. STATEMENT OF IMPORTANCE

Section A: (Check the appropriate areas) Public Radiological Safety (Q List) Waste Isolation (Q List)
 Performance Assessment (QAI) Site Characterization (QAI) Potential Adverse Impact on Natural Barrier(s) (QAI) N/A (Complete Section B)

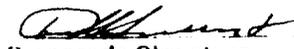
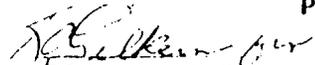
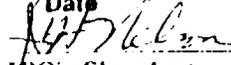
Section B: (Check the appropriate areas) Worker Radiological Safety (All:) Operational Reliability (All:)
 Other (Provide explanation) (All: I) Programmatic Importance N/A (Provide explanation) (All:)

PART III. GRADING

QA CRITERIA	APPLICABLE (YES OR NO)	JUSTIFICATION IF NOT APPLICABLE (REFERENCE)*	EXCEPTION(S) TO CRITERIA SUBPARTS (REFERENCE)*
1. ORGANIZATION	Yes	N/A	No Exception
2. QA PROGRAM	Yes	N/A	No Exception
3. DESIGN CONTROL	No	Attachment II	N/A
4. PROCUREMENT DOCUMENT CONTROL	Yes	N/A	No Exception
5. PLANS, PROCEDURES, INSTRUCTIONS, AND DRAWINGS	Yes	N/A	No Exception
6. DOCUMENT CONTROL	Yes	N/A	No Exception
7. CONTROL OF PURCHASED ITEMS AND SERVICES	Yes	N/A	No Exception
8. IDENT. & CONTROL OF MTRLS, PARTS, CMPNTS, & SMPLS	No	Attachment II	N/A
9. CONTROL OF PROCESSES	No	Attachment II	N/A
10. INSPECTION	No	Attachment II	N/A
11. TEST CONTROL	No	Attachment II	N/A
12. CONTROL OF MEASURING AND TESTING EQUIPMENT	No	Attachment II	N/A
13. HANDLING, STORAGE, AND SHIPPING	No	Attachment II	N/A
14. INSPECTION, TEST, AND OPERATING STATUS	No	Attachment II	N/A
15. CONTROL OF NONCONFORMING CONDITIONS	No	Attachment II	N/A
16. CORRECTIVE ACTION	Yes	N/A	No Exception
17. QA RECORDS	Yes	N/A	No Exception
18. AUDITS	Yes	N/A	No Exception
19. COMPUTER SOFTWARE	Yes	N/A	See Attachment II
20. SCIENTIFIC INVESTIGATION CONTROL	Yes	N/A	No Exception

*Reference attached justification or explanations

PART IV. APPROVALS:

 4/10/91
 Preparer's Signature Date
 4/10/91
 QA Manager's Signature Date
 4/10/91
 WFO's Signature Date

QRB ACCEPTANCE:

 4/10/91
 QRB Chairman's Signature Date

Attachment I

Reference: USDOE Letter Carl P. Gertz to John H. Nelson dated 1/23/91, Scope of Work (SOW) to Prepare the Technical and Management Support Services (T&MSS) Plan for Development of Site Suitability Methodology (attached).

Part I - Identification and Definition

The scope of this grading package covers the development and implementation of the Plan for Development of Site Suitability which in turn is requested in the above reference. The effort will be integrated, coordinated and participated in by the T&MSS. The overall effort will be conducted under the T&MSS QAPD N-QA-093.

Part II - Statement of Importance

This effort involves planning the early determination of site suitability and performance of the first phase thereof. The effort includes a management directed evaluation of site characteristics in consonance with 10CFR960 to determine, based on available data, whether disqualifying conditions exist or if any of the qualifying conditions cannot be met. In addition, the effort will identify 1) data which must be obtained in those instances where such does not exist to enable a disqualifying or qualifying determination and 2) that data which has been used in the determination(s) which might require qualification per NUREG-1298. It may be viewed as a dry run for the eventual official performance of the tasks which will be performed with the necessary degree of vigor to be used in the licensing process.

Even though some of the WBS elements (Attachment III) appear at a higher level on the QAL and PRL the effort described here has been determined to be non-quality affecting at this time, however, since the approach and results are: 1) intended to be employed in a public interaction process, 2) will be used by OGD to assess future program action plans including licensability of the site for those conditions evaluated, and 3) some of the results may be useable directly in the licensing process without need for reperformance (but, if so will have to be qualified in accordance with applicable quality program requirements) it is concluded that application of all criteria appropriate to the task effort should be employed.

A major purpose of this Revision 1 to the grading package is to clarify that this effort is non "quality affecting" because it is a management directed "screening" effort.

Worker Radiological Safety is not affected by this activity.

Operational Reliability is not affected by this activity.

Attachment II

Part III - Grading

Criterion 3:

No design control provisions are required to implement this activity. The requirements of Criterion 20 for Scientific Investigation will be observed.

Criterion 8:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 9:

This criterion is applicable to items and processes performed as a part of scientific investigations. No items or scientific investigations processes are a part of this activity.

Criterion 10:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 11:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 12:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 13:

This criterion is applicable to items and samples collected for site characterization. No items or sample collection is a part of this activity.

Criterion 14:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 15:

This criterion is applicable to items only and there are no items included in this activity.

Criterion 19:

Approved software QA programs and procedures do not exist at this time. To assure that the products of this effort can be qualified at some future point to meet this criteria copies and versions of all software employed in these efforts, including input and output data, shall be retained to enable reperformance of associated analyses at a future date should management so direct.

Attachment III

WBS Elements:

1.2.1.4.1, 1.2.3.2, 1.2.3.3.1, 1.2.3.3.2, 1.2.3.4, 1.2.3.6.1, 1.2.3.6.2,
1.2.5.2.1, 1.2.5.2.2, 1.2.3.7, 1.2.5.4.2, 1.2.5.4.5, 1.2.5.4.6, 1.2.5.4.7,
1.2.5.4.8, 1.2.5.5.1

WORKSHEET FOR EVALUATION OF CHARACTERISTICS

N-QA-094
290

TITLE OF ITEM [] OR ACTIVITY [x]
Early Evaluation of Site Suitability

PAGE 6 OF 6

REPORT NO.: TESS-001 REV. NO.: 1

RESPONSIBLE ORGANIZATION: T&MSS

NAME OF PREPARER: Dewey Hulbert

CHARACTERISTICS

EVALUATION STATEMENT

1. REPRODUCIBILITY OR EASE OF REPLACEMENT:

This activity could be reproduced, but this may have an adverse effect on schedule or budget. Standard controls on documentation are required to ensure successful completion within the context.

2. COMPLEXITY:

The technical activities are state-of-the-art. The approach shall be produced by personnel knowledgeable of the state of the art and controlled through the use of procedures.

3. QUALITY HISTORY:

Similar activities have been performed within the Project with and without procedures. Difficulties have been encountered in documentation and reproducibility. Procedures will be used to control activities.

4. STANDARDIZATION:

Standard procedures, methodologies, and expert services will be employed.

5. AVAILABLE CODES AND STANDARDS:

Not applicable to this activity.

6. NEED FOR PROCESS CONTROL:

No special processes are associated with this activity.

7. SPECIAL HANDLING, SHIPPING, AND STORAGE:

It is anticipated that any items, equipment, or samples are associated with this activity. Should they be required, they will be controlled in accordance with applicable procedures.

PREPARER: [Signature] 4/3/91
(Signature and Date)

Unpublished letter from U.S. Geological Survey Scientists to the Editor of the New York Times Magazine regarding William J. Broads' November 18, 1990 article on Yucca Mountain.

By W.W. Dudley, Jr., and others

U.S. Geological Survey

Open-file Report 91-58



U.S. Department of the Interior

Manuel Lujan Jr., Secretary

U.S. Geological Survey

Dallas L. Peck, Director

For additional information
write to:

Director, U.S. Geological Survey
106 National Center
Reston, Virginia 22092

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Denver, Colorado 80225



United States Department of the Interior



GEOLOGICAL SURVEY
BOX 25046 M.S. 425
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY REFER TO:

November 28, 1990

Editor
New York Times
310 West 42 Street
New York, NY 10036

Dear Sir:

We write to express our collective concern about William J. Broad's article on Yucca Mountain (New York Times Magazine, November 18, 1990). Scientists and laymen unfamiliar with details of the Yucca Mountain Project, and with the long controversy surrounding Jerry S. Szymanski's hypothesis, can only conclude from the article: (1) that Yucca Mountain is a disaster waiting to happen, (2) that the U.S. Department of Energy (USDOE) has ignored a credible and crucial issue, and (3) that earth scientists of the U.S. Geological Survey (USGS) and the National Laboratories either are incompetent or have compromised their integrity because of fear of losing their jobs. None of these conclusions are true. We believe that, if your reporter had more thoroughly examined the complex issues and available data, he would have learned the following:

I. Szymanski was hardly the first to point out that along with the concept of placing high-level radioactive wastes (HLW) "high and dry" above a deep desert water table came the responsibility to ascertain the magnitude of past water-table fluctuations. These concerns were, in fact, expressed in print by USGS scientists in 1974, 1980, 1981 and 1983. Our concerns were prompted by possible water-table fluctuations caused mainly by climate change, whereas Szymanski's concerns were driven by postulated changes due to tectonism. The USDOE's 1984 guidelines for siting HLW repositories (10CFR960), which some of us helped prepare, address the possible effects of both climate change and tectonism on ground-water systems.

II. There are -- as known to any student of earth science -- several types of calcite deposits, with or without associated opal (silica). In desert environments, most are the residue left as infiltrating moisture dries in the soil or in cracks; some were deposited from the flow of cold springs; and still others are clearly of hot spring origin, though probably not by the mechanism advocated by Szymanski. All of these types occur in southern Nevada as well as throughout the southwestern U.S., although no documented and confirmed fossil spring deposits have been identified within about 10 miles of the proposed repository site at Yucca Mountain. Moreover, the calcite-silica deposits in Trenches 8 and 14, as well as the calcite fracture fillings that are ubiquitous in the area, almost certainly have resulted from surficial processes, not from upwelling hot ground water as maintained by Szymanski. Our confidence in these conclusions comes from the convergence of evidence from topically diverse and independent studies involving USGS, Los Alamos National Laboratory, and independent experts.

III. That those who initially discounted Szymanski's findings are "now, ... not quite so sure" is a misunderstanding of the original and current positions, admittedly quite diverse, of those who reviewed Szymanski's 1987 draft. Neither Dudley nor others of the 25 scientists who contributed directly to that review have

"softened" or become unsure about their positions, and their ranks have been increased several-fold by other scientists both within and outside of the Yucca Mountain Project. In his letter transmitting the July 1989 version of his manuscript, Szymanski himself acknowledged that he had privately been given comments on his earlier draft by "over 10" State of Nevada scientists and contractors and that "it would be fair to declare that these comments expressed similar reservations as those developed by the Yucca Mountain Project participants". So far, the State has not released its own scientists' comments.

IV. Despite the assertion in the article to the contrary, the jobs of the USGS scientists (and others) working on the Yucca Mountain Project do not depend on the outcome of the site suitability studies. From the outset, the role of the USGS in the Yucca Mountain Project has been to obtain an unbiased knowledge of the geology, tectonics, hydrology, and paleoclimatology of this region. Collectively and individually, we will not be party to the endorsement of a questionable site nor the condemnation of an acceptable one.

V. The doomsday scenario provided to your reporter by Szymanski and Archambeau - - namely that a water table rising to contact the waste would flash to steam, causing Yucca Mountain to blow its top -- has little credibility and, to our knowledge, is not supported by scientific analysis. Sites being proposed in other countries, and alternative sites in the U.S., require waste emplacement beneath the water table. For such sites, the USGS recommended in 1978 that consideration be given to cooling the wastes for several decades. That recommendation may be overly conservative in many geologic environments, particularly above the water table. Nonetheless, the USDOE is examining the liabilities that may offset the advantages of emplacing high-temperature waste in the unsaturated zone.

Finally, scientists working on the Yucca Mountain Project submit their draft papers for extensive review, regularly by colleagues and commonly by outside peers, as required by the USDOE and independently by the scientists' own organizations. Satisfactory resolution of the comments received must be documented and reviewed also. In contrast, Szymanski has dismissed honest criticisms of his ideas as "banality of thought", instead seeking scientific legitimacy from the press on the basis of claiming that his hypothesis has been ignored. We are well aware that, in the history of science, the outsider sometimes brings to the fore crucial new insights that were missed by the "scientific establishment". Yet, it does not follow that all new notions are ordained to be correct and that traditional science is in error. When the press fails to remember the latter, but rather manufactures a folk hero from little substance, the public is not well served. Therefore, we encourage the Times to publish an unbiased scientific sequel to the article of November 18. Until such a sequel appears, the Times will be on record as having likened Yucca Mountain to a disaster on the order of Chernobyl or even nuclear war. This is hardly unbiased journalism befitting the Times or Mr. Broad.

Sincerely,

W.W. Dudley, Jr.

for Anthony Buono; Michael D. Carr; Joe S. Downey; William W. Dudley, Jr.; Elisabeth M. Ervin; Kenneth F. Fox, Jr.; Edwin D. Gutentag; Larry R. Hayes; Blair F. Jones; Richard R. Luckey; Daniel R. Muhs; Zell E. Peterman; Marith Reheis; Richard W. Spengler; John S. Stuckless; Emily M. Taylor; John W. Whitney; William E. Wilson; Isaac J. Winograd.

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