

APR 11 1989

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MEMORANDUM FOR: Dade W. Moeller, Chairman
Advisory Committee on Nuclear Waste

FROM: Victor Stello, Jr.
Executive Director for Operations

SUBJECT: OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
ITEMS FROM THE SEVENTH MEETING OF THE ADVISORY
COMMITTEE ON NUCLEAR WASTE

I am responding to the March 14, 1989 memorandum that Raymond F. Fraley, Executive Director, Advisory Committee on Nuclear Waste (ACNW), sent to me. In that memorandum, Mr. Fraley summarized the Actions, Agreements, Assignments, and Requests that ACNW made during its seventh meeting, on February 21-23, 1989. As a result of that meeting, there were two action items identified for the Office of Nuclear Material Safety and Safeguards (NMSS) staff. Both were commitments by the NMSS staff to provide information to ACNW. The first dealt with information on the key technical issues in the detailed review guides of the staff's Site Characterization Plan (SCP) Review Plan. The second was to provide a copy of the meeting minutes of the 1986 level-of-detail meeting, between the NMSS staff and the U. S. Department of Energy, on the contents of the SCP and study plans.

The NMSS staff provided a list of the key technical issues to Mr. Richard Major, Project Review Branch No. 1, ACNW, shortly after the ACNW meeting. Note that these issues relate the SCP Review Plan, they should be useful to you soon in hearing staff comments on the SCP itself. In addition to those technical issues, the ACNW should be aware of the importance of resolving the approach to be used to conduct the performance assessment of the site. This is considered to be one of the more important technical issues currently being addressed by the staff. The NMSS staff gave a copy of the level-of-detail meeting minutes to Mr. Jack Parry, ACNW staff, on February 22, 1989. Therefore, all the NRC staff action items, in its area of responsibility, resulting from the February 21-23, 1989 meeting have been addressed. However, for your convenience, Enclosure 1 is a copy of the key technical issues and Enclosure 2 is a copy of the 1986 level-of-detail meeting minutes.

I trust this responds to ACNW's request.

Original signed by
Victor Stello, Jr.

Victor Stello, Jr.
Executive Director for Operations

Enclosures:
As stated

cc: Chairman Zech
Commissioner Roberts
Commissioner Carr
Commissioner Rogers
Commissioner Curtiss
SECY

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ENCLOSURE 1
KEY TECHNICAL ISSUES



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

MEMORANDUM FOR: Richard Major, Acting Chief
Project Review Branch No. 1
Advisory Committee on Nuclear Waste

FROM: George Lear, Assistant Director
Special Issues Group

SUBJECT: RESPONSE TO ACNW REQUEST FOR THE KEY TECHNICAL
TOPICS FOR THE YUCCA MOUNTAIN SITE DETAILED
REVIEW GUIDES IN THE NRC SCP REVIEW PLAN

In a February 21, 1989 briefing to the ACNW on the SCP Review Plan, Robert Johnson agreed to give the ACNW a list of the key technical topics which are listed in each detailed review guide of the SCP Review Plan. I have enclosed the list of requested key technical topics.

A handwritten signature in cursive script that reads "George Lear".

George Lear, Assistant Director
Special Issues Group

cc: Jack Parry

~~890323009T 10PM~~

LIST OF KEY TECHNICAL TOPICS FOR
THE YUCCA MOUNTAIN SITE
DETAILED REVIEW GUIDES IN THE NRC SCP REVIEW PLAN

Detailed Review Guide Number and Title

3.3.1 Geomorphology, Physiography and Topography

a. erosion

- (1) potential maximum rate of erosion in the vicinity of the exploratory shaft facility
- (2) potential maximum rate of erosion in the area of the waste handling facilities
- (3) potential maximum rate of erosion of repository overburden
- (4) potential maximum rate of erosion in adjacent or overlying wash areas

b. features resulting from geomorphic processes

- (1) locations and characteristics of paleo spring deposits
- (2) locations and characteristics of landslide areas

c. paleoclimate

- (1) Pleistocene climatic variations
- (2) effect of variations on
 - effective precipitation,
 - water table
 - springs
 - carbonate deposition

3.3.2 Stratigraphy and Lithology

a. identification of stratigraphic features

- (1) degree of welding

KEY TECHNICAL REPORTS

- 2 -

- (2) lithophysae content
- (3) content of lithic fragments
- (4) thinning and thickening of repository horizon
- (5) porosity and permeability

b. amount of offset of stratigraphic units by faulting

3.3.3 Seismology

- a. historic seismicity, including:
 - (1) representativeness of the historical pattern of seismicity in the vicinity of the site
 - (2) reconciliation of focal mechanisms for microearthquakes in vicinity of the site with apparent nature of tectonic activity
- b. relationship of seismicity to geologic and tectonic structures, including:
 - (1) regions of uniform earthquake potential in the southern Great Basin including, but not limited to, regions encompassing:
 - (a) the Walker Lane
 - (b) Owens Valley
 - (c) Death Valley
 - (d) the Las Vegas Shear Zone
 - (e) the Southern Nevada East-West Seismic Belt
 - (2) potential for seismic activity on faults in the immediate vicinity of Yucca Mountain
- c. earthquake generating potential of geologic structures and seismotectonic zones, including:
 - (1) faults in the Yucca Mountain vicinity
 - (2) maximum earthquake potentials
- d. seismic wave transmission characteristics, including:
 - (1) response at repository depth to nuclear tests and nearby natural earthquakes

- e. vibratory ground motion including:
 - (1) nature of vibratory motion at the site resulting from earthquakes on faults in the immediate vicinity of Yucca Mountain
- f. seismically induced phenomena, including:
 - (1) effect of earthquakes on ground water levels

3.3.4 Structural Geology and Tectonics

- a. tectonic framework and tectonic history
 - (1) role of pure and/or oblique extension in tectonic model
- b. volcanic history in the vicinity of the site
 - (1) volume of material associated with each cycle
 - (2) duration and character of each cycle
 - (3) interrelationships between faulting and volcanism
- c. faulting history in the vicinity of the site
 - (1) amount of vertical versus oblique displacement
 - (2) effect of detachment faults on site stability
 - (3) relationship between strike-slip, normal, and detachment faults
- d. active stress field in the vicinity of the site
 - (1) influence of nuclear tests on the state-of-stress
 - (2) relationship to microseismicity

3.3.5 Natural Resources

- a. the presence of mineral deposits and their association with
 - (1) stratigraphic units of volcanic origin
 - (2) veining
 - (3) fault zones
 - (4) alteration zones

KEY TECHNICAL REPORTS

- 4 -

(5) subsurface plutons

- b. the association of hydrocarbon resources with
 - (1) Paleozoic stratigraphic units underlying the site
 - (2) trap rocks

3.3.6 Geophysics (methods used to characterize the following features)

- a. volcanism
 - (1) potential magma chambers and magma sources
- b. structure
 - (1) fault characteristics with emphasis on detachment surfaces, if present
 - (2) fracture characteristics

3.3.7 Natural Analogs

- a. Natural Analogs
 - (1) use of analogs in the investigation of zeolite stability and in interpretation of the origin of the calcite-silica vein deposits
- b. Related Field Tests
 - (1) use of data from the nuclear weapons tests at the Nevada Test site for investigating radionuclide migration in tuff

3.3.8 Effects of Post-closure Changes on site Geochemistry

- a. Natural Changes
 - (1) climatic variations may affect the location of the unsaturated zone, and may result in changes in water chemistry and rock geochemistry

3.3.9 Geochemical concerns for Modeling

- a. the ability of models chosen to predict chemical processes in the unsaturated zone
- b. the appropriateness of solid solution models used in calculating the thermodynamic parameters of zeolites

3.3.10 Geochemical concerns for the Engineered Barrier System

- a. Geochemical Concerns for Leaching
 - (1) effects of successive wetting and drying cycles
- b. Geochemical Concerns for Corrosion
 - (1) effects of salt build-up, caused by the evaporation of infiltrating water

3.3.11 Geochemistry of the Host Rock

- a. petrology of the calcite-silica veins
 - (1) use of stable isotopes to determine temperature of formation
- b. petrographic studies of geopetal structures to support geologic investigations of tectonism
- c. formation and distribution of zeolites

3.3.12 Geochemistry of Groundwater

- a. evaluate the effect of water sample collection method on unsaturated zone water chemistry
- b. presence and effect of colloidal or particle-bound

radionuclides on matrix diffusion

3.3.13 Mineral and Glass Stability

- a. effect of silica phase stability on zeolite stability

3.3.14 Radionuclide Retardation

- a. Sorption of key radionuclides
 - (1) sorption of radionuclides on zeolites
 - (2) effect of wetting/drying cycles on sorption
- b. Solubility/precipitation of key radionuclides
 - (1) effects of successive wetting/drying cycles on radionuclide solubility
- c. Dispersion, diffusion, advection of key radionuclides
 - (1) effects of unsaturated conditions
- d. Vapor-phase transport
 - (1) consequences of vapor phase transport of gaseous radionuclides by-passing the unsaturated zone hydrologic barrier

3.3.15 Surface Water

- a. potential for flooding of surface locations of shafts and ramps during the preoperational, operational and post-closure periods for floods up to and including the PMF
- b. estimates of the potential for debris blockage of site ephemeral streams resulting in flooding
- c. estimate of recharge to the unsaturated zone from potential

flooding of surface openings or ponding in the vicinity of surface access location

- d. discussion of geomorphic changes which could affect drainage configurations
- e. measurements necessary for water balance estimates
 - (1) meteorological parameters; e.g., solar radiation, wind speed, rainfall, air temperature, potential evapotranspiration
 - (2) characterization of infiltration potential, e.g. infiltrometers, rainfall simulators, direct rainfall/runoff measurements in channels
- f. discussions of designs to preclude or minimize infiltration to the underground facility, particularly at shafts and ramps

3.3.16 Groundwater Flow

- a. possible methodologies for characterizing flow in unsaturated, fractured tuff formations, including:
 - (1) thermocouple psychrometer tests
 - (2) tensiometer tests
 - (3) soil moisture block tests
 - (4) neutron log tests
 - (5) permeameter tests
 - (6) fractured rock infiltrometer tests
 - (7) packer tests of fracture permeability
 - (8) pore water extraction by core squeezing
 - (9) pore water extraction by centrifuge and displacement
 - (10) pore water samples by lysimeter
 - (11) vacuum collection of vapor-phase isotopes

KEY TECHNICAL REPORTS

- 8 -

3.3.17 Water Resources

None

3.3.18 Climatology and Meterology

None

3.3.19 Disturbed Zone

a. vibratory ground motion (underground nuclear explosions and earthquakes)

b. thermal decomposition of zeolites

3.3.20 Geomechanics Testing

a. geomechanics characteristics of lithophysal zone

b. feasibility testing of long horizontal emplacement technology

3.3.21 Borehole and Shaft Seals

a. sealing-design strategy

(1) free drainage strategy

(a) reliability of free drainage for 10,000 years

(b) site characterization investigations for free drainage

(2) seal performance in unsaturated medium (geochemical)

b. sealing of major faults

c. sealing of excavation below the repository horizon

3.3.22 Retrievability

a. long horizontal holes emplacement option

3.3.23 Conceptual Design of the Repository

- a. limits on vertical and lateral flexibility imposed by:
 - (1) faulting
 - (2) thickness of target horizon
 - (3) heterogeneities such as lithophysae
 - (4) overburden requirement

- b. defense-related activities
 - (1) effects of proximity to bombing range on surface facilities
 - (2) effect of underground nuclear explosions on the repository
 - (3) potential for aircraft crashes on surface facilities

- c. long horizontal emplacement holes
 - (1) retrieval (see "Retrievability" Review Guide 3.3.22)
 - (2) deleterious rock movements
 - (3) construction equipment technology

3.3.24 Substantially Complete Containment

- a. the consequences of uncertainties on the analyses of waste package lifetime and radionuclide release rate

- b. assumptions regarding waste package failure modes and the uncertainties associated with these assumptions

- c. the susceptibility of the austenitic stainless steels to stress-assisted cracking in chloride/oxygen/water (steam) environments

3.3.25 Waste Package Design

None

3.3.26 Engineered Barrier System Release Rates

Same as 3.3.24

ENCLOSURE 2

1986 LEVEL-OF-DETAIL MEETING MINUTES

SUMMARY OF THE NRC/DOE MEETING
ON THE LEVEL OF DETAIL FOR
SITE CHARACTERIZATION PLANS
AND STUDY PLANS

DATE AND LOCATION OF MEETING:

May 7-8, 1986
Room 4A-104
Forrestal Building
Washington, D. C.

LIST OF ATTENDEES:

See Attachment 1

BACKGROUND

The purpose of the meeting was for the NRC and the DOE to reach agreement on the level of detail to be presented by the DOE in the SCP and separate study plans. The DOE's approach to level of detail was described in advance materials provided by the DOE ten working days prior to the meeting (Attachment 2). The DOE presented additional explanatory information in materials distributed at the meeting (Attachment 3).

NRC presented and discussed their comments on the advance materials provided by the DOE. NRC's comments are summarized below under observations. Representatives from the States and Indian Tribes also participated in discussions on selected topics. Agreement was reached concerning revisions to the advance materials, as noted under the DOE/NRC agreements listed below and in Attachment 4.

Representatives from the States of Washington, Utah, Mississippi, Texas, Nevada, and Louisiana, and from the Yakima and Nez Perce Indian Tribes attended the meeting. They interacted extensively in the meeting and provided comments and questions which were considered in revising the advance materials. Agreements were achieved between the Department of Energy, and the States and Indian Tribes as noted in the DOE-States/Indian Tribes agreements listed below.

A rough draft of the revised advance materials was given to the States and Indian Tribes for their information and comment during the meeting with the understanding that word changes might still be needed. The States and Indian Tribes were given the opportunity to submit their own written observations, agreements, and open items to be included in the meeting summary. None was submitted.

NRC OBSERVATIONS

The NRC had the following observations:

1. The revised and agreed-to approach to the level of detail in the SCP, the "Content Requirements" for both studies and investigations and the defined terms documented in Attachment 4 should provide sufficient guidance, along with DOE's "Annotated Outline for SCPs" for the DOE to prepare Section 8.3 of the SCPs and separate study plans.

The NRC staff considers that the revised and agreed to approach in Attachment 4 is consistent with previous NRC staff positions and agreements regarding the SCP in NUREG-960, Regulatory Guide 4.17, and DOE's Annotated Outline for SCPs, the October 29-30, 1985 meeting on site characterization plans in Section 9.3, and NRC's December 12, 1985 letter to the DOE on the subject. In these documents the NRC staff has stated that it is the DOE's decision to determine the location of study plans, i.e., within Section 8.3 of the SCP or as references to Section 8.3. In addition, while the SCP should be comprehensive to some level of detail, plans may be more defined and detailed for early phases and less defined and detailed for later phases.

2. NRC believes that the quality, completeness, and consistency of the SCPs will be significantly improved by using the guidance agreed to in this meeting. This was a result of effective and constructive discussion among the DOE, NRC, and participants from the States and Indian Tribes.

In order for NRC to complete its SCP review in the six month review period, numerous pre-SCP consultations are needed to allow NRC to provide early feedback to the DOE on development of investigations and study plans for resolution of issues and collection of data. In order to plan such consultations, the NRC repeats its earlier request for the DOE to identify milestones and schedules for pre-exploratory shaft activities to allow agreement on appropriate points for consultation with NRC.

3. NRC asked how off-site studies would be included in the SCP (e.g., studies conducted by SRPO at the Avery Island mine and the Asse mine). The DOE stated that off-site studies which provide information for licensing would be included; however, studies such as those which are used for improving instrumentation or testing methods would not be included. An agreement on this item was included in Attachment 4.
4. NRC observed that study plans concerning the exploratory shaft testing (that would be available at the same time

as the SCP) should include studies from the exploratory shaft, studies that might be affected by the exploratory shaft construction (e.g., large-scale pump tests at the Hanford Site) and studies that might affect shaft design and construction. The DOE expressed concern that this could be interpreted to include all studies in or from the underground facility. NRC indicated that information on studies in the underground facility that might significantly affect the exploratory shaft would be needed (e.g., the extent of drifts needed for testing affects the size of the shafts). NRC also asked that the DOE identify which studies would be available at the time of SCP issuance. An agreement on this topic is given in Agreement 2, Action Item 1, and in Attachment 4.

5. NRC asked if the DOE was preparing an exploratory shaft design report that would be a reference to Section 8.4 of the SCP. The DOE stated that such a report is being prepared and that it might be available at the time of SCP issuance. As NRC has stated before, all SCP references must be available at the time of SCP issuance.
6. NRC observed that a commitment from the DOE was needed for making available study plans after those provided at the time of SCP issuance. NRC proposed that study plans be available for review six months before studies are initiated using the mechanism of the semi-annual progress reports. The DOE asked NRC to notify them of major concerns during the first three months of review. This was agreed to and incorporated into Attachment 4.
7. NRC observed that DOE's proposal of releasing nonstandard procedures 30 days before the test is initiated is not enough time for review. Sixty days is more appropriate to allow for review by NRC staff and contractors. The DOE asked that NRC notify DOE of major concerns during the first 30 days. NRC also noted that for selected, non-standard procedures specific early review and consultation with the DOE and other parties will be needed. This was agreed to and incorporated into Attachment 4.
8. NRC repeated the suggestion made in NRC's December 12, 1985, letter to the DOE to include in the content requirements for studies (Attachment B) rationales for the selected number, location, duration, and timing of tests. The DOE expressed concern that NRC wanted advantages and limitations written up for all alternative numbers, locations, durations and timings considered. NRC responded by stating that the DOE should identify reasonable alternatives and summarize reasons for not selecting them. An agreement on this topic was incorporated into Attachment 4.
9. NRC expressed the need for having information on interrelationships and interferences among tests and among tests and exploratory shaft facility design and construction

both in the SCP at the investigation level and in the study plans. Such attention is needed to show how tests fit into the overall testing program and how tests have been chosen, designed or sequenced such that adverse interferences with other tests have been minimized or avoided. An agreement on this topic was incorporated into Attachment 4.

10. The DOE indicated that it will use various Quality Assurance (QA) levels for conducting tests and analyses described in Section 8.3 (see pages 10-11 of advance materials). The DOE QA level I includes 10 CFR Part 60 Subpart G requirements which are applicable to items important to safety, barriers important to waste isolation and related activities (such as site characterization). The NRC staff believes most activities conducted during site characterization should be subject to QA level I, especially at this stage of the program when the importance of individual items and activities (including research and preliminary testing) to demonstration of compliance with licensing requirements is uncertain (reference June 25, 1985, letter from Miller to Vieth and February 12, 1986, letter from Linehan to Purcell). Assuming most tests and analyses in SCP Chapter 8.3 relate to demonstrating a site's ability to protect public radiological health and safety and the environment and therefore will potentially be utilized in the license application, the staff believes they should meet QA level I requirements.

In addition, the NRC staff believes that new data collection, interpretation, and analyses to be conducted prior to and during site characterization should be covered by an appropriate level of quality assurance. All on-going activities should be evaluated as soon as practicable (prior to the SCP) to determine the level of QA which is appropriate, implement the measures associated with the appropriate level, and determine what is needed to qualify, if possible, the information obtained prior to implementation of the appropriate QA measures. The NRC staff believes that the DOE should not rely on qualifying licensing-related information collected by the DOE and DOE contractors/subcontractors for any work conducted under a non-Subpart G QA program for new work initiated prior to issuance of the SCP. An agreement on this topic is given in Action Item 3 and incorporated into Attachment 4.

DOE OBSERVATIONS

The DOE had the following observations:

1. The DOE has agreed to provide extensive details of plans for site characterization activities through the SCP, study plans, and procedures. The DOE will provide this information to

the NRC in a way that allows the NRC to review and comment on the plans sufficiently in advance of starting the activities. Although the DOE believes that this level of detail is not required at this stage of pre-licensing consultation, the DOE has agreed to provide this information to the extent practicable in the agreed-to timeframes, consistent with the requirements of the Nuclear Waste Policy Act.

2. An unapproved, working draft of the DOE/NRC SCP level of detail meeting was distributed among the meeting participants to facilitate discussion. This draft was revised by DOE and NRC, and additional materials were added to reflect additional agreements and concerns of the meeting participants.
3. The DOE intends to provide the NRC with an issues hierarchy document for NRC review. The DOE requested that NRC schedule a meeting in mid-June to discuss the issues hierarchy.

OPEN ITEMS

There were no open items remaining at the close of the meeting.

DOE-NRC AGREEMENTS AND ACTION ITEMS

The DOE and NRC made the following agreements:

1. During the course of the meeting NRC presented numerous comments on the DOE's approach to the level of detail in the SCP and the "Content Requirements" for both the study plans and investigations described in the advance materials (Attachment 2). These comments are summarized in the preceding NRC observations. The comments were discussed and changes agreed to were incorporated into the advance materials. Attachment 4 includes all of the changes and represents an agreed upon approach for presentation of site characterization plans and study plans.
2. During the course of the meeting NRC staff and various representatives of the States and Indian Tribes discussed at length the need for the availability of information from on-going studies, new studies started before SCP issuance and studies that might be started immediately after SCP issuance.

In accordance with pre-consultation agreements in the NRC-DOE Procedural Agreement, NRC expressed concern that plans for the above studies be made available for review and consultation in a timely manner.

For studies conducted prior to SCP issuance at the salt

site(s), NRC requested study plans before studies are initiated. For studies to be initiated within six months after issuance of the SCP, study plans should be given to NRC before the SCP issuance in time for NRC review. These study plans should follow the "Content Requirements for Studies" in Attachment 4-B agreed to in this meeting. Consultations with the DOE during the development of these studies need to be planned to discuss NRC concerns with such items as complete study rationales, adequacy of test/analysis methods, interference among tests, and adequacy of study-specific QA programs.

A list of on-going studies at the Federal sites will be given to NRC to assist them in requesting specific procedures for review. Study plans for those on-going studies which will continue past SCP issuance should accompany the SCP. The DOE will provide specific procedures, plans, test and QA information from the list upon NRC request, if available. Study plans for new studies initiated before SCP issuance should be provided before studies are initiated and consultations scheduled during development of these plans as described above for the salt site(s). The study plans should follow the "Content Requirements for Studies" in Attachment 4-B agreed to in this meeting.

While the NRC did not request a letter report summarizing all on-going and new pre-SCP studies such as the one agreed to by DOE, States and Indian Tribes, the NRC staff will make use of this report when it becomes available.

In addition, if the DOE determines that data from studies conducted before the SCP issuance precludes the need for further studies in a particular area, the basis for this conclusion in the SCP should include specific reference to the study or test plans for collection of the data.

The DOE agreed to provide the NRC the requested information identified above.

The DOE and the NRC agreed to the following DOE action items:

1. In the December 12, 1985 the NRC letter to DOE which provided comments on the level of detail in Section 8.3 of the SCP, NRC expressed an interest in receiving an hierarchal listing of the names of programs, investigations, studies, tests and analyses which will be conducted for each project during site characterization. This information would be useful early in NRC SCP review preparations to understand the integrated framework of each overall program. During the meeting, the NRC asked for this information and the DOE agreed to provide it when it is developed.

Furthermore, in response to another NRC request, the DOE

agreed to use the above hierarchy to identify to the NRC those study plans that would be available at the time of SCP issuance and study plans for studies that would be initiated between the Presidential approval of site recommendation and SCP issuance.

2. The DOE agreed with NRCs request to revise the comparison of content requirements in Attachment D of the advance material to make it consistent with the agreed to revisions of the content requirements for studies and investigations as specified in Attachment 4.
3. Based on concerns in NRC Observation 10, the DOE and NRC staff agreed that a meeting is necessary to discuss the methodology, implementation, and schedule for implementation of the DOE's quality assurance level assignments. The DOE will schedule this meeting in the next three months and provide NRC with the information necessary to support discussions (e.g., the current OGR and Projects procedures for quality level assignments).
4. The DOE agreed to provide a description of the QA program for development of the SCP. This description should include the rationale for assigning the SCP and related preparation activities to QA level II. The description will include the approach for assuring that internal reviews consider the rationale and integration of the SCP, and the control of changes associated with site characterization plans, studies, and individual investigations.
5. In the minutes from the December, 1985, meeting with the DOE on QA, the NRC staff expressed concern "that the traceability of QA requirements from the administrative procedures to the detailed technical procedures could be hindered by an insufficient level of detail in the QA administrative procedures referenced in the SCP." The NRC requested examples be provided prior to submittal of the SCP showing the hierarchy of documents which define and implement QA measures. The DOE agreed to provide this information by September 30, 1986.

DOE-STATES/INDIAN TRIBES AGREEMENTS

1. For Federal site(s) the DOE will prepare:
 - a. A 15-20 page letter report to describe the following items, for on-going activities and planned site characterization activities to be initiated between Presidential approval of site recommendation and SCP issuance:
 1. List of on-going tests;
 2. List of planned tests;

3. Rationale for activities; and

4. Tie-in to SCP's.

b. Meetings will be arranged between the DOE Project Office(s) and States and Indian Tribes to discuss the letter report and identify workshops to cover tests in more detail.

2. For non-Federal site(s) the DOE will provide:

Copies of plans for studies to be conducted at a candidate site(s) prior to issuance of the SCP for review prior to implementation. These study plans will follow the content requirement per this meeting agreement, and include:

1. Rationale for each study and

2. Relationship of the study to the SCP.

The review period for these plans will be negotiated between the affected States, Indian Tribes, and the DOE Salt Repository Project Office.

John J. Linehan 5/14/86

John J. Linehan
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ATTACHMENT 4
LEVEL OF DETAIL TO BE PROVIDED IN THE SCP

This attachment provides additional guidance to the Annotated Outline which provides DOE's standard format and guidance for the preparation of the SCPs. The hierarchal terms to be used in the SCP, have been defined in the November 8, 1985 D. Alexander (DOE) letter to J. Linehan (NRC). The terms, defined in Attachment A, are:

<u>Hierarchal Terms</u>	<u>Level of Detail</u>	<u>Planning Document</u>
Program (generic)		
Program (specific)	higher level	SCP
Investigation		

Study		
Test, Analysis	lower level	Study Plans
Procedure		Test Procedures

The SCP will contain a complete discussion of the information associated with the higher-level terms, and a summary discussion of the information associated with the lower-level terms, by relying on other documents that will be referred to as "study plans" and "test procedures". Specifically, the SCP will provide an extensive discussion of the programs (both generic and specific) and investigations to be conducted during site characterization which include those initiated between Presidential approval of site recommendation and SCP issuance as well as any off-site investigations which result in data that will be used in licensing (refer to NRC Observation 3 and Agreement 2). The level of detail provided for programs and investigations will be generally consistent among SCPs. Studies, analyses, and tests will be described in matrix or table format in the SCP. Subsequently, details of the studies, analyses, and tests will be presented in the study plans. Applicable test procedures to be used will be referenced if available or identified for further development if not available. The DOE will adopt standard procedures if applicable, but it is expected that some standard test procedures will have to be modified for site specific tests and in some cases new test procedures will have to be developed. Modifications and development of new test procedures will be provided in test procedures that will be issued in project technical reports.

The site characterization program will be described in the SCP, as required by the NWPAs, and in semi-annual progress reports issued every six months during site characterization. The SCP will be supported as appropriate by separate documents consisting of references, study plans, and test procedures. Although details of studies, tests, and analyses will not be presented in the SCP, they will be presented in study plans that will be referenced by semi-annual progress reports throughout site characterization. Therefore, no changes are needed in Section 8.3 of the Annotated Outline (AO) to reflect a change in the level of detail to be presented in the SCP.

It is the DOE's intention to provide study plans at the same time as the SCP for exploratory shaft studies and site characterization studies to be conducted within one year of the issuance of the SCP. Exploratory shaft studies include studies in or from the shaft, but do not include studies conducted in or from the underground facility at the bottom of the shaft. In addition, the DOE will identify, at the time of SCP issuance, any additional studies that have a significant adverse affect on shaft design and construction, or might be significantly adversely affected by shaft construction. Information needed to evaluate the effects of these additional studies will be included in the SCP, or provided in another more detailed form, depending on the extent of such information required. This also includes any studies initiated between Presidential approval of site recommendation and SCP issuance as well as off-site investigations which result in data that will be used in licensing (refer to NRC Observation 4 and Agreement 2). In cases where such study plans are not available at the same time as the SCP, a schedule for their completion will be provided in Section 8.5 of the SCP. While it is DOE's intention to provide, at the same time as the SCP, all study plans for studies that will begin within one year of SCP issuance, it is possible that some of those study plans may not be available at that time. Any such study plans will be made available as soon as possible following SCP issuance and, in any case, will be available sufficiently in advance of the start of the study to allow for review. Furthermore, study plans for studies to be conducted beyond one year of SCP issuance will be available at least six months before the start of the study. The availability of these study plans will be indicated in the semi-annual progress reports that precedes the studies by at least six months (refer to NRC Observation 6). NRC will notify the DOE of major concerns in the study plans during the first three months of availability.

Non-standard procedures for individual tests will be released for information at least 60 days before the test is initiated. NRC will notify the DOE of major concerns in the procedures during the first 30 days of availability. Selected procedures (e.g. non-standard, one-of-a-kind types) will be identified by NRC for specific review and consultation with the DOE well in advance of release (refer to NRC Observation 7). The above NRC review times assume some on-going and open preconsultation, as appropriate, with the DOE during the early development of study or test plans. These test procedures will contain a level of detail consistent with standard procedures applied to a given technical area and will identify each of the technical steps to be carried out during the test. The test procedures will indicate the specific steps that will be taken for quality assurance purposes.

The "Content Requirements" document for studies has been modified to accomodate the information requested by the NRC in the December 12, 1985 letter from Linehan to Alexander (NRC mark-up of DOE Content Requirements of Studies in Chapter 8 of the SCP) and further modified to accomodate information requested by

NRC, States, and Indian Tribes during the May 7-8, 1986 meeting. The revised "Content Requirements for Descriptions of Studies" is included as Attachment B.

In addition, the DOE has written "Content Requirements for Descriptions of Investigations in Chapter 8 of the SCP" which also has been modified to include information requested by NRC, States, and Indian Tribes (Attachment C). Both "Content Requirements" descriptions (Attachments B and C) serve as an expansion of information listed in Table 2 of the AO and are consistent with Section 8.3 of the AO. For completeness, both the "Content Requirements" for studies and investigations and the guidance given in Section 8.3 of the AO will be used together in preparing the specific information in the SCP and the separate study plans. It should be noted that neither "Content Requirements" documents prescribe a format for presenting the required information, either in the SCP or in study plans. In the SCP the information will be formatted according to the AO. A common format has not been established for the study plans.

DOE CONTENT REQUIREMENTS FOR DESCRIPTIONS OF STUDIES
IN STUDY PLANS

The test program presented in Chapter 8 of the SCP will be subdivided into a hierarchy of increasing detail. The SCP test program hierarchy will include (in increasing detail): generic program; specific program; investigation; study; tests and analyses; and test procedures. Details for studies and tests and analyses, listed in Chapter 8 of the SCP, will be presented in study plans. Study plans will be separate from the SCP proper and will be issued periodically throughout site characterization. Individual test procedures will be referenced in the study plans.

The following outline describes the information on studies, tests and analyses that will be presented in the study plans. A study may involve a single test or a set of tests and analyses, as appropriate. The tests include those measurements of physical parameters, or observations of physical phenomena, that are performed in the field or in the laboratory. Test activities include preparation of procedures, test set-up, conduct of the test, data acquisition, and data reduction. The analyses include those calculations or other evaluations needed to assess site characteristics and support design activities.

The items listed in the outline will be addressed for studies and tests and analyses to the extent that each item applies. Not all items will be applicable in all studies.

In some cases, tests and analyses may be planned for later stages in the study for which the detailed plans depend on the results of earlier tests and analyses. Under these circumstances, it will not be possible to provide the same level of detail for all tests and analyses at the time the study plan is first issued. In such cases, the initial study plans will present complete descriptions of the tests and analyses that occur early in the study and less detailed information for tests and analyses that occur later.

I. Purpose and Objectives of Studies:

- o Describe the information that will be obtained in this study. Briefly discuss how this information will be used; and
- o Provide the rationale and justification for the information to be obtained by the study. It can be justified by: 1.) a performance goal and a confidence level in that goal (developed via the performance allocation process and results that will be described elsewhere in the SCP); 2.) a design goal and a confidence level in that goal (design goals beyond those related to performance issues); 3.) a direct Federal, State, and other regulatory requirements for specific studies. Where relevant

performance or design goals actually apply at a higher level than the study (e.g. where the goals apply to a group of studies), describe the relationship between this study and that higher level goal.

II. Rationale for Selected Study:

- o Provide the rationale and justification for the selected tests and analyses (including standard tests). Indicate the alternative test and analytical methods from which they were selected, including options for type of test, instrumentation, data collection and recording, and alternative analytical approaches. Describe the advantages and limitations of the various options; and
- o Provide the rationale for the selected number, location, duration, and timing of tests with consideration to various sources of uncertainty (e.g. test method, interference with other tests, and estimated parameter variability). This rationale should also identify reasonable alternatives, summarize reasons for not selecting these alternatives and reference, if available, reports which evaluate alternatives considered (refer to NRC Observation 8).
- o Describe the constraints that exist for the study, and explain how these constraints affect selection of test methods and analytical approaches. Factors to be considered include:
 - Potential impacts on the site from testing;
 - Whether the study needs to simulate repository conditions;
 - Required accuracy and precision of parameters to be measured with test instrumentation;
 - Limits of analytical methods that will use the information from the tests;
 - Capability of analytical methods to support the study; and
 - Time required versus time available to complete the study.
 - The scale of the phenomena, especially the limitations of the equipment relative to the scale of the phenomena to be measured and the applicability of studies conducted in the laboratory to the scale of the phenomena in the field.
 - Interrelationships of tests involving significant interference with other tests and how plans have been designed or sequenced to address such interference.
 - Interrelationships involving significant interference

among tests and exploratory shaft facility design and construction (as appropriate, refer to Section 8.4 of the SCP or its references for specific exploratory shaft facility design information such as design drawings or specifications) (refer to NRC Observation 4).

III. Description of Tests and Analyses:

- o Since studies are comprised of tests and analyses, provide for each type of test:
 - Describe the general approach that will be used in the test. Describe key parameters that will be measured in the test and the experimental conditions under which the test will be conducted. Indicate the number of tests and their locations (e.g. spatial location relative to the site, exploratory shaft facility elements, repository layout, stratigraphic units, depth, and test location);
 - Summarize the test methods. Reference any standard procedures (e.g., ASTM, API) to be used. If any of the procedures to be used are not standard, or if a standard procedure will be modified, summarize the steps of the test, how it will be modified, and reference the technical procedures that will be followed during the test. If procedures are not yet available, indicate when they will be available. Indicate the level of quality assurance and provide a rationale for any tests which are not judged to be QA level 1. Reference the applicable specific QA requirements that will be applied to the test;
 - Specify the tolerance, accuracy, and precision required in the test, where appropriate;
 - Indicate the range of expected results of the test and the basis for those expected results;
 - List the equipment required for the test and describe briefly any such equipment that is special;
 - Describe techniques to be used for data reduction and analysis of the results;
 - Discuss the representativeness of the test including why the test results are considered representative of future conditions or the spatial variability of existing conditions. Also indicate limitations and uncertainties that will apply to the use of the results; and
 - Provide illustrations such as maps, cross sections, and facility design drawings to show the locations of tests and schematic layouts of tests.

- Relationship of the test to the set performance goals and confidence levels.

- o For each type of analysis:

- State the purpose of the analysis, indicating the testing or design activity being supported. Indicate what conditions or environments will be evaluated and any sensitivity or uncertainty analyses that will be performed. Discuss the relationship of the analysis to the set performance goals and confidence levels;
- Describe the methods of analysis, including any analytical expressions and numerical models that will be employed;
- Reference the technical procedures document that will be followed during the analysis. If procedures are not yet available, indicate when they will be available. Indicate the level of quality assurance that will be applied to the analysis and provide a rationale for any analyses which are not judged to be QA level 1. Reference the applicable QA requirements;
- Identify the data input requirements of the analysis;
- Describe the expected output and accuracy of the analysis; and
- Describe the representativeness of the analytical approach (e.g., with respect to spatial variability of existing conditions and future conditions) and indicate limitations and uncertainties that will apply to the results.

- IV. Application of Results:

- o Briefly discuss where the results from the study will be used for the support of other studies (performance assessment, design, and characterization studies);
- o For performance assessment uses, refer to specific performance assessment analyses (described in Section 8.3.5 of the SCP) which will use the information produced from the studies described above, and refer to any use of the results for model validation;
- o For design uses, refer to, or describe, where the information from the study described above will be used in construction equipment design and development and engineering system design and development (e.g., waste package, repository engineered barriers, and shafts and borehole seals); and
- o For characterization uses, refer to, or describe, where the

information from the study described above will be used in planning other characterization activities.

V. Schedule and Milestones:

- o Provide the durations of and interrelationships among the principal activities associated with conducting the study (e.g., preparation of test procedures, test set-ups, testing, data analyses, preparation of reports), and indicate the key milestones including decision points associated with the study activities;
- o Describe the timing of this study relative to other studies and other program activities that will affect, or will be affected by, the schedule for completion of the subject study; and
- o Dates for activities or milestones, including durations and interrelationships, for the study plans will be provided. These should reference the master schedules provided in Section 8.5. of the SCP.

DOE CONTENT REQUIREMENTS FOR DESCRIPTIONS OF INVESTIGATIONS
IN CHAPTER 8.3 OF THE SITE CHARACTERIZATION PLANS

The test program presented in Chapter 8.3 of the Site Characterization Plans (SCPs) will be subdivided into a hierarchy of increasing detail. The SCP test program hierarchy will include (in increasing detail): generic program; specific program; investigation; study; and test and analysis. Generic programs, specific programs, and investigations will be described in Chapter 8.3 of the SCP. Details for studies, tests, and analyses will be presented in study plans separate from the SCP (see Attachment B).

The following outline describes the content requirements for investigations that will be presented in Chapter 8.3 of the SCP. An investigation may involve a single study or a set of studies, as appropriate.

I. Purpose and Objectives of Investigations:

- o Describe the information that will be obtained in this investigation. Briefly discuss how this information will be used; and
- o Provide the rationale and justification for the information to be obtained by the investigation. It can be justified by: 1.) a performance goal and a confidence level in that goal (developed via the performance allocation process and results that will be described elsewhere in the SCP); 2.) a design goal and a confidence level in that goal (design goals beyond those related to performance issues); 3.) a direct Federal, State, and other regulatory requirements for specific studies. Where relevant performance or design goals actually apply at a higher level than the investigation (e.g. where the goals apply to a group of investigations), describe the relationship between this investigation and that higher level goal.

II. Rationale for Selected Investigation:

- o Provide the rationale and technical basis for why the investigation will be conducted. Identify relevant technical issues;
- o Describe the constraints that exist for the investigation, explain how these constraints affect selection of studies, include a summary of the interrelationships involving significant interference among studies and investigations

and how plans have been designed or sequenced to address such interferences, and include a summary of the interrelationships involving significant interferences among studies and exploratory shaft facility design and construction (refer to NRC Observation 4); and

- o Discuss the strategy, including how the planned studies, tests and analyses will be collectively used, for resolving the relevant technical issues.

III. Description of Studies:

- o Since investigations are comprised of one or more studies, for each study:
 - State the objectives of the study, incorporating the tests and analyses that make up the study;
 - Indicate if the study is to provide information for the development of conceptual models (e.g., the collection of water level data will provide input to the development of the conceptual and numerical ground-water flow models);
 - Indicate if the study is being performed to guide the development of subsequent characterization, performance assessment and/or design activities (e.g., simulations with ground-water flow models will be performed to determine where additional drilling will be required);
 - List the tests, the test methods to be used, the data/parameters that are to be collected and/or evaluated for each test, the locations, numbers, and duration of tests and the technical procedures that will be used for the test. Reference the study plans, as appropriate; and
 - For each analysis that the study will support, list the method of analysis and the information that will result from the analysis.

IV. Application of Results:

- o Briefly discuss where the results from the investigation will be used for the support of other investigations (performance assessment, design, and characterization investigations);
- o For performance assessment uses, refer to specific performance assessment studies (described in Section 8.3.5 of the SCP) which will use the information produced from the studies described above, and refer to any use of the results

for model validation;

- o For design uses, refer to, or describe, where the information from the studies described above will be used in construction equipment design and development and engineering system design and development (e.g., waste package, repository engineered barriers, and shafts and borehole seals); and
- o For characterization uses, refer to, or describe, where the information from the studies described above will be used in planning other characterization activities.

V. Schedule and Milestones:

- o List in tabular form, major milestones which will result from the studies that comprise the investigation. Proposed titles, expected delivery dates, and milestones are to be included;
- o Present the schedule for the studies supporting the investigation, providing beginning and end dates for tests and analyses, or groups thereof; and
- o Show the interrelationships and sequencing of the tests, analyses, or groups, with particular attention to those that will affect or be affected by the scheduled completion of other activities. Dependencies on data derived from other investigations also should be indicated on the schedule as well as the major milestones and decision points associated with the studies. A simple PERT chart should be used to illustrate these relationships.