

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: PROPOSED PROGRAM
 APPROACH**

PRESENTER: STEPHAN J. BROCOUM

**PRESENTER'S TITLE
AND ORGANIZATION: ASSISTANT MANAGER FOR SUITABILITY AND LICENSING
 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7971**

**JULY 12-13, 1994
DENVER, COLORADO**

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Presentation Outline

- **Background and overview**
- **Status of PPA development**
- **DOE Response to Board's questions in May 17, 1994 letter**
- **Summary**

Background and Overview

- **One of the foremost strategic goals of DOE:**
 - **Resolve the disconnect between the program's expectations and its ability to achieve them**
- **The PPA is an attempt to realign the program closer to the original intent of the legislative and regulatory framework**
- **Under the PPA, a set of goals and a schedule are being developed**
 - **That have a reasonable probability of being successful**
 - **That are consistent with the resources that can be allocated to the program**

Background and Overview

(Continued)

- **The PPA is consistent with some of the recommendations of the NAS report, “Rethinking High-Level Waste”**
- **A stepwise approach to decision-making is reflected in the PPA**
- **Many of the Board’s past recommendations are incorporated in the PPA**

Status of PPA Development

- **Overall PPA strategy developed**
- **Various stakeholder meetings held**
- **Tops-down OCRWM planning being finalized**
- **Issue guidance to initiate YMP Participant bottoms-up planning - July 1994**
- **Receive FY 95 appropriations - August 1994**
- **Complete Participant bottoms-up FY 95 planning - September 1994**

Status of PPA Development

(Continued)

- **Complete YMP Technical Implementation Plans - September 1994**
- **Approve FY 95 cost/schedule baseline - September 1994**
- **Complete Participant bottoms-up FY 96-01 planning - December 1994**
- **Approve FY 96-01 baseline - March 1995**
- **Modify affected documents - May 1995**

Status of PPA Development

(Continued)

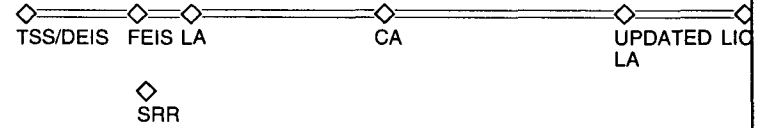
- **Conduct ICE evaluation/reconciliation - June 1995**
- **ESAAB presentation - August 1995**
- **ESAAB approval - September 1995**

SUMMARY ACTIVITY

FY94 | FY95 | FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10

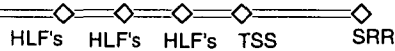
KEY MILESTONES

Project Summary Milestones



SITE SUITABILITY

Site Suitability Process



NEPA

Repository

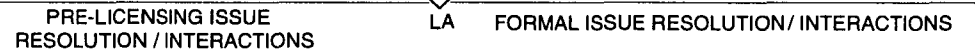


Rail Spur

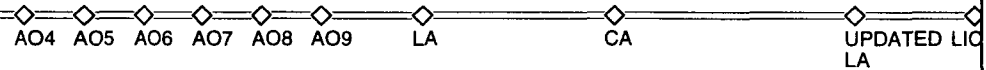


LICENSING

Issue Resolution

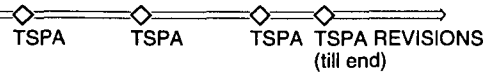


LA Annotated Outline

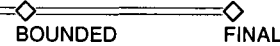


PERFORMANCE ASSESSMENT

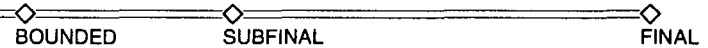
Total System PA



WP Subsystem PA



GWTT Subsystem PA



EBS Subsystem PA



Plot Date 16MAY94
Data Date 1OCT93
Project Start 1OCT93
Project Finish 20OCT10



Yucca Mountain Site Characterization Project
Proposed Program Approach
Master Schedule

Sheet 1 of 2

-----Project Schedule-----

Date	Revision	Checked	Approved

SUMMARY ACTIVITY

FY94 | FY95 | FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10

SITE INVESTIGATIONS

3-D Geologic Description

◇ SUBFINAL ◇ FINAL ◇ UPDATED

Climate Description

◇ CONSERVATIVE ◇ BOUNDED ◇ SUBFINAL

Postclosure Tectonics Description

◇ BOUNDED ◇ >BOUNDED ◇ SUBFINAL

UZ/SZ Geochemistry Description

◇ BOUNDED ◇ >BOUNDED ◇ SUBFINAL

UZ Hydrologic Description

◇ BOUNDED ◇ >BOUNDED ◇ SUBFINAL

SZ Hydrologic Description

◇ BOUNDED ◇ >BOUNDED ◇ SUBFINAL

Thermal Effects Description

◇ BOUNDED ◇ SUBFINAL ◇ FINAL

ESF CONSTRUCTION

7.8 Kilometer Loop

◇ ◇ COMPLETE 7.8K LOOP
COMPLETE ACCESSES
TO GDF

Calico Hills

◇ ◇ EVAL OPTS CH ◇ IMPLEMENT CH
ACCESS(SL DRL/EXC) DECISION (SL DRL/EXC)

REPOSITORY / WASTE PACKAGE

Repository

◇ ACD ◇ TITLE I ◇ TITLE II ◇ CONSTRUCTION
◇ START
◇ OPERATIONS

Waste Package

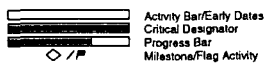
◇ ACD ◇ TITLE I ◇ TITLE II ◇ TITLE III /PROTOTYPE ◇ FABRICATION

RAIL SPUR

Rail Spur

◇ ROUTE ANALYSIS/CD ◇ START TITLE I ◇ TITLE I ◇ TITLE II ◇ CONST

Plot Date 16MAY94
Data Date 1OCT93
Project Start 1OCT93
Project Finish 20OCT10



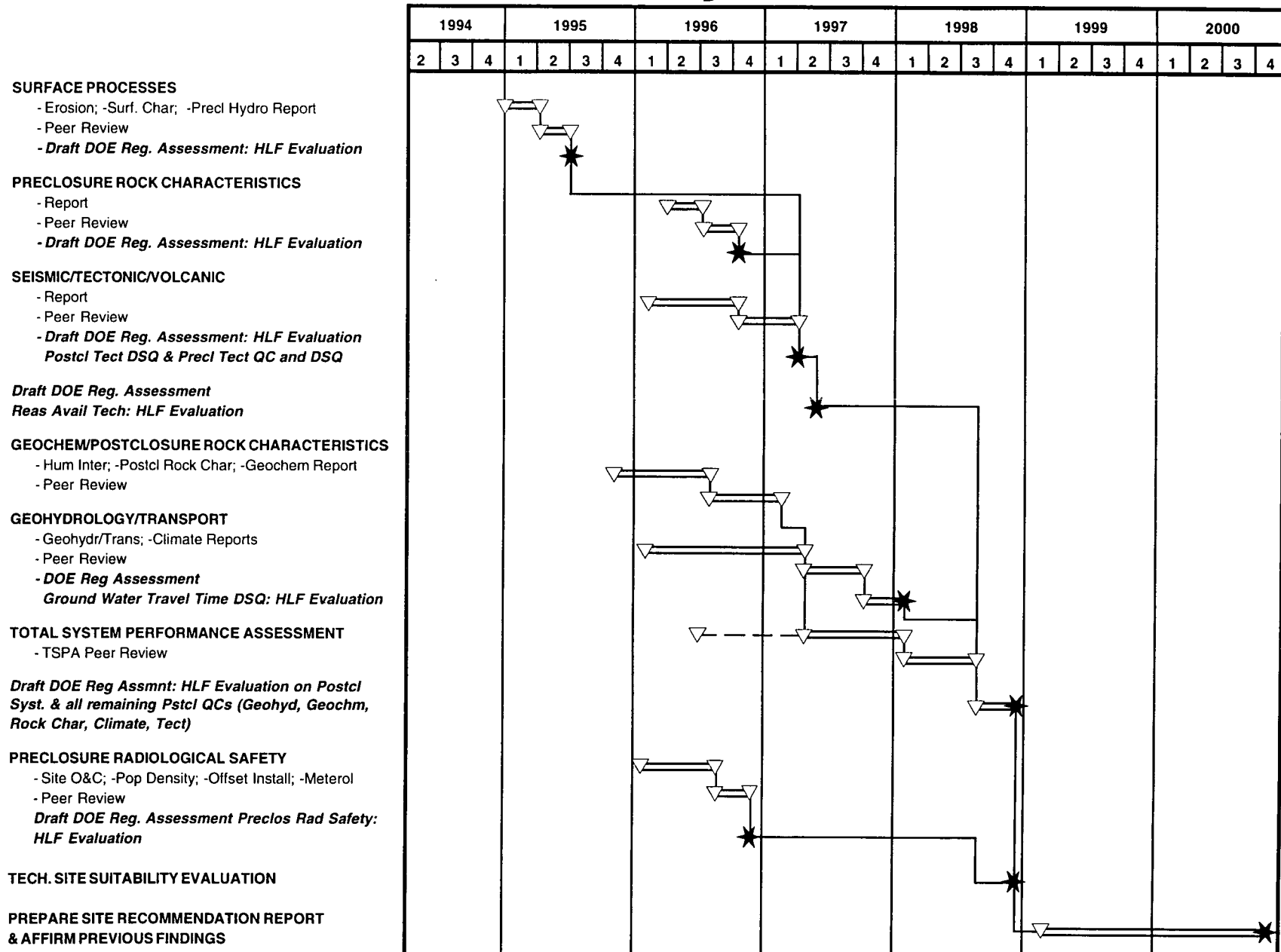
Yucca Mountain Site Characterization Project
Proposed Program Approach
Master Schedule

Sheet 2 of 2

.....Project Schedule.....

Date	Revision	Checked	Approved

Preliminary Site Suitability Decision Schedule



**DOE Response to Questions in
Board's May 17, 1994 Letter**

NWTRB Question 1

(a) What are the specific technical bases for the decisions that led to the development of Scenario A?
(b) Will the *Site Characterization Plan* be modified to reflect the new program design? **(c) If so, what process will be used to modify it?** **(d) If not, what will be the status of the existing *Site Characterization Plan* in structuring the technical investigations at Yucca Mountain?**

DOE Response to Question 1

- **Basis for PPA development**
 - Program expectations could not be achieved with historical funding levels
 - Science could not meet unrealistic expectations regarding level of knowledge for long-term performance
 - PPA strategy will realign program with original intent of legislative/regulatory framework
- **Changes to the site characterization program**
 - Reported in Semiannual Site Characterization Progress Reports
 - Controlled through revisions of Site Characterization Program Baseline (SCPB), Site Design & Test Requirements Document (SD&TRD), and study plans

NWTRB Question 2

At the January 1994 Board meeting, you said that “institutionalizing stakeholder interaction” was one of the OCRWM program’s important short-term goals.

(a) How does the DOE decide which decisions are “key decisions,” requiring stakeholder input?

(b) How and to what extent did the DOE obtain stakeholder and public input prior to formulating Scenario A? (c) Which stakeholders were involved?

(d) What specific mechanisms is the DOE using to obtain stakeholder and public input?

DOE Response to Question 2

- **DOE's draft public participation policy directs program managers to identify "key decisions"**

Examples:

- **DOE higher-level findings on site suitability**
- **Technical site suitability determination**
- **DOE decision to recommend site**
- **Initiation of scoping under NEPA**
- **Preparation of EIS**

DOE Response to Question 2

(Continued)

- **Process used to develop the PPA**
 - **Initial assumptions made by DOE, consistent with FY 1995 budget request**
 - **Assumptions considered stakeholder positions previously communicated to DOE**
 - **In refining the strategy, DOE managers interacted with stakeholders and Congressional staff**
 - **State, Tribal, and local governments**
 - **Industry groups and trade associations**
 - **Regulatory agencies**
 - **Professional societies**
 - **Environmental organizations**
 - **Labor organizations**
 - **Stakeholder meetings hosted in February and May**

DOE Response to Question 2

(Continued)

- **Stakeholder input will continue to be considered in further PPA development**
 - **Mechanism for additional stakeholder interactions is the OCRWM Strategic Plan**
 - **Draft Plan scheduled for August 1994**
 - **Final Plan scheduled for December 1994**

NWTRB Question 3

Scenario A calls for increased budgets, a decreased scope of near-term site characterization activities (e.g., potentially less tunneling), and a demanding schedule. (a) What specific studies previously planned under the SCP and in the study plans (i) will be completed before application for a license to begin repository construction, (ii) will be deferred until after repository construction, (iii) will be deferred until after repository operation begins, and (iv) will be deleted? (b) What criteria were used to assign particular studies to one of the four categories?

DOE Response to Question 3

- **Decisions regarding timing of activities will be consistent with PPA strategy**
 - **Early focus on studies needed to determine site suitability**
 - **For initial license application for construction authorization**
 - **Primary focus on operational safety and waste package containment**
 - **Lower priority given to tests that support demonstration of long-term performance**
 - **Further testing deferred to performance confirmation program**

DOE Response to Question 3

(Continued)

- **Focus of near-term site characterization activities**
 - **Excavation into potential host rock (Topopah Spring unit) to support suitability finding on preclosure rock characteristics**
 - **Determination of seismic design basis to support suitability finding on reasonably available technology**
 - **Characterization of near-field environment to gain sufficient understanding of coupled processes**
 - **Determination of potential fast flow paths through Ghost Dance Fault**
 - **Excavation in Topopah Spring unit**
 - **Potential need to excavate into Calico Hills unit**
 - **Also supported by surface drilling program**

- **Additional details will be available when bottoms-up planning is completed later this year**

NWTRB Question 4

The OCRWM has asked for increased program funding because it believes that the scientific work has been under funded. (a) If Congress provides the requested funding for Scenario A, specifically how much will allocations to underground excavation, waste package and materials research, and other site-suitability activities be increased? (b) How much will be allocated to overhead and infrastructure? (c) Will these allocation priorities change if funding to the program is not increased to the level requested?

DOE Response to Question 4

- **Preliminary estimate of budget allocation**
 - For a 3 shift/day TBM operation, ESF budget would double from FY 94 allocation
 - Most of the remainder of YM budget increase would be allocated to site characterization and design activities
 - Current management costs would not increase
- **If funding is not consistent with FY 1995 budget request, and prognosis for future funding is similar to past levels, program will be re-evaluated**
 - Program may be done sequentially, rather than parallel
 - Budget allocations will depend on nature of resulting program
 - A full program, including licensing activities, will probably not be conducted

NWTRB Question 5

Scenario A calls for the completion of a five-mile main loop with additional drifting *only if necessary*. (a) What is the technical basis that supports this change from the current program design? (b) What technical criteria will the DOE use to decide whether the five-mile loop is sufficient for a decision on site suitability? (c) If a five-mile loop is insufficient, how will the DOE decide how much additional underground excavation will be needed?

DOE Response to Question 5

- **Technical basis for reduced underground excavation is consistent with underlying rationale for the PPA (see response to Question 1)**
- **In the PPA, focus of ESF construction is twofold:**
 - **Obtain access to the Ghost Dance Fault in the Topopah Spring Level**
 - **Develop heater test area in North Ramp Extension**
- **Because of this twofold focus, completion of the five-mile (7.8 km) loop is not the emphasis in the PPA**
 - **Rate of TBM advance after the second Ghost Dance Fault access will be dependent on resources needed for other ESF excavation activities**

DOE Response to Question 5

(Continued)

- **The appropriate amount of Calico Hills exploration is dependent on what is found in the Topopah Spring Ghost Dance Fault accesses**
- **Systems study on Calico Hills access to be conducted in FY95**
- **As site suitability evaluations proceed, additional ESF excavation may be identified**

NWTRB Question 6

Thermal-loading is a key parameter associated with various waste isolation strategies and repository/waste package designs. (a) Under Scenario A, when will a preliminary decision about thermal-loading be made? (b) When will a final decision be made? (c) What specific information does the DOE believe will be required to make sound technical decisions on (i) repository design and (ii) a waste package design that is compatible with the MPC? (d) How will the timing of the DOE's application to the NRC for a construction license affect the DOE's thermal-loading decision?

DOE Response to Question 6

- **The range or ranges of thermal loadings will be initially bounded in 1998**
- **These ranges will be further evaluated prior to submittal of the initial license application in 2001**
- **An initial thermal loading decision will be made prior to submittal of the updated license application (2008) for the license to receive and possess waste**
- **The thermal loading will be confirmed using data obtained during performance confirmation**
- **Thermal loading systems study to be conducted in FY95**

DOE Response to Question 6

(Continued)

- **Information being developed to adequately understand mechanisms influencing thermal-mechanical-hydrologic-chemical interaction:**
 - **Description of thermal mechanisms for heat transfer**
 - **Hydrologic model to bound hydrologic performance of natural barriers**
 - **Model for thermal-mechanical response of the host rock**
 - **Geochemical model of the response of the near-field environment and natural barriers**
 - **Hydrologic and geochemical impacts to the waste package environment**
 - **Metallurgical, mechanical, and corrosion behavior of containment barriers**
 - **Thermal stability of engineered barrier system**

NWTRB Question 7

Under Scenario A, the waste will “remain retrievable” for 100 years. (a) What contingency plans for retrieving the waste will be developed before deciding whether to adopt Scenario A? (b) When will retrieval plans be developed? (c) How will these plans affect the total system life cycle cost (TSLCC) and the adequacy of the 1-mil-per-kilowatt-hour fee?

DOE Response to Question 7

- **The criteria for retrievability are under development**
- **A draft Concept of Retrieval Operations has been developed**
 - **Addresses both normal and abnormal retrieval conditions**
- **A Retrievability Period System Study is underway**
 - **Scheduled for completion in September 1994**
 - **50-, 100-, and 200-year retrievability periods being evaluated**

DOE Response to Question 7

(Continued)

- **Increase of 50 years in retrievability period increases TSLCC by \$1.2B**
 - **Based on same cost model and assumptions for caretaker period in May 1989 TSLCC**
 - **Retrieval costs not included**
 - **Includes removal of a small number of waste packages for performance confirmation**

- **The fee adequacy issue will be addressed when a revision of the TSLCC is done**
 - **TSLCC revision scheduled for end of FY 1995**
 - **Dependent on additional engineering design to be completed in early FY 1995**

NWTRB Question 8

Descriptions of Scenario A refer to a “site suitability evaluation,” “technical site suitability,” and a “site recommendation report.” (a) When and how will the DOE identify the specific tests and data necessary to support these site-suitability determinations? (b) Does the DOE believe the siting guidelines of 10 CFR Part 960 are adequate for determining site suitability under Scenario A? (c) If not, what amendments are envisioned and what process will be used to adopt them?

DOE Response to Question 8

- **The PPA allows DOE to make earlier decisions by evaluating specific guidelines or groups of guidelines in a phased manner**
- **The specific tests and data needed to support the site suitability evaluations in the PPA are being identified**
 - **FY 1995 Technical Implementation Plan to be completed by September 1995**
 - **Long Range Plan to be developed by mid-1995**

DOE Response to Question 8

(Continued)

- **DOE elected to elicit public comments on the evaluation of site suitability including the role of the siting guidelines in that evaluation**
 - **Federal Register Notice of Inquiry issued on April 25, 1994**
 - **Stakeholders meeting held on May 21, 1994**
- **Proposed next steps:**
 - **Federal Register Notice on proposed process for site suitability evaluation**
 - **Interpretation of 10 CFR 960 published in Federal Register**
 - **Two public meetings in August 1994 to discuss proposed process**

NWTRB Question 9

The NRC's regulation (10 CFR Part 60) requires the DOE to demonstrate, prior to repository construction, that there is "reasonable assurance" that the facility will perform safely. The SCP outlines a testing plan that implies an agreement between the NRC and the DOE about how "reasonable assurance" will be demonstrated. Under Scenario A, some of the tests will be postponed until after repository operation begins. (a) How will the DOE demonstrate the level of assurance in the performance of the repository that would have been obtained under the SCP? (b) Will it be necessary to reinterpret or change the level of assurance? (c) If so, how will it change?

DOE Response to Question 9

- The program outlined in the SCP, including subsequent changes, reflects expectations that go beyond what is needed to comply with the regulations**
- The PPA strategy will provide sufficient information to enable NRC to make a reasonable assurance finding**
- The PPA strategy is consistent with both the letter and intent of 10 CFR Part 60**
- 10 CFR 60.24(a): “The application shall be as complete as possible in the light of information that is reasonably available at the time of docketing.”**

DOE Response to Question 9

(Continued)

- **10 CFR 60.101(a)(2): “...Proof of the future performance...over time periods of many hundreds or many thousands of years is not to be had in the ordinary sense of the word. ...what is required is reasonable assurance, making allowance for the time period, hazards, and uncertainties involved....”**
- **Information will be provided to NRC through various mechanisms**
 - **LA Annotated Outline**
 - **Semiannual Site Characterization Progress Reports**
 - **Topical Reports**
 - **Management meetings and technical exchanges**

NWTRB Question 10

According to presentations made at the panel meeting on March 22, 1994, by representatives of the Council on Environmental Quality and the DOE's General Counsel Office, the Yucca Mountain Environmental Impact Statement should include a discussion of various repository and waste package design alternatives. (a) Under Scenario A, what alternatives will be sufficiently well understood to be evaluated? (b) Will separate impact statements be prepared for MPC procurement, repository development, and transportation? (c) How will the interdependencies among those activities be analyzed?

DOE Response to Question 10

- **OCRWM is currently reviewing its NEPA strategy**
 - **In response to Secretary of Energy's June 1994 Policy on NEPA**
 - **Suggestions made by interested parties being considered**
- **The review will include alternative NEPA approaches and interdependencies among program activities**
- **Issues raised by the Board will be addressed in NEPA scoping activities**

Summary

- **DOE must resolve the disconnect between program expectations and our ability to achieve them**
- **The PPA is an attempt to realign the program closer to the original intent of the legislative and regulatory framework**
- **The majority of the details supporting the implementation of the PPA will be finalized by the end of the year**
 - **DOE will continue interactions with stakeholders**
- **The PPA activities have to be reconciled with the level of Congressional appropriations**