Key VA Issue
Resolution Plan

1. **Issue #5:** Performance Confirmation Concept (monitoring system, sampling approach, etc.) November 6, 1996 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Richard Memory **Phone:** 4-7247
DOE Contact: William Boyle **Phone:** 4-5506

M&O Manager

M&O Responsible Individual

3. **Issue Description:**
Concepts and technology requirements driven by the need to conduct a performance confirmation program are not fully developed. The list of site and engineering parameters, together with related process models, which must be observed or monitored will evolve as our understanding of the natural and engineered barriers evolves. As this list evolves, so must the Performance Confirmation program. In addition, per 10 CFR 60 the performance confirmation program must begin during the site characterization period. An overall approach and plan for PC currently does not exist.

4. **Describe the current status and the significance of the issue:**
10 CFR 60 Subpart F mandates the requirement to conduct performance confirmation. The VA design and the LA design need to insure that performance confirmation is considered and included in the design. A Performance Confirmation Concepts Study Report was completed in FY96. This report recommended an initial set of design requirements and provided a draft Performance Conformation Plan. The Study also developed an initial set of concepts for use in the VA design as a point of departure. Specific requirements for the amount of sampling have not been developed. The types of parameters to be monitored and tested were identified in the study report. Performance Confirmation Follow-on work has been initiated to develop portions of a reference PC baseline, supplement and specify PC requirements on the amount of sampling necessary, and to develop the PC Plan. A PC Design activity has been initiated to develop a design (including the layout, alcoves and openings) that will address the initial set of design requirements. Remote equipment and development design may also be utilized. Interfaces: Resolution of this issue will require compiling input from the licensing, Performance Assessment, design groups, and scientific programs organizations.

5. **Indicate its importance and what effects it will have on a VA:**
Both the repository layout and surface facilities design and operational concepts can be impacted by the Performance Confirmation program requirements. Additionally, instrumentation development could be impacted by these requirements. This issue directly impacts VA in terms of the design presented for VA, the MGDS cost estimated for VA, and the license application plan for VA.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
As discussed above, the MGDS cost estimate and LA plan are directly influenced by resolution of the issue. Resolution of this issue will involve both technical and programmatic concerns. The programmatic concerns, e.g. what level of performance confirmation will the NRC require, will be addressed in the LA plan.

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7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
Conduct the performance confirmation follow-on work to develop PC requirements to a level of detail sufficient to develop concepts for conducting the PC program. Closure of this issue sufficient for VA will involve the development of a plan that provides enough detail to show that the objectives of the performance confirmation program can be met.

Closure of this issue sufficient for VA will involve:

(1) Development of a plan that provides enough detail to show that the objectives of the performance confirmation program can be met.

(2) Initial identification of parameters important to performance confirmation

(3) Update of important parameters based on updated performance assessment inputs

(4) Identification of location and number of data sets, detailing the time duration of interest.

(5) Initiation of Appendix 7 discussions with the NRC regarding performance confirmation

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Prepare Fleshed-out PC Plan (SE050720)	A Fleshed-out draft PC Plan will be prepared based on the draft PC Plan contained in the FY96 PC Concepts Study Report and readily available information. The draft Plan is expected to have incomplete areas (TBDs).	TR15FB1, TR241FA2, TR251FA1, TR39BFA1D, TR523FA1, TR541FA2
2	M&O Review and Approval of Draft PC Plan (SE050725)	The Draft PC Plan will be reviewed internal to the M&O prior to delivery to DOE for their Review and Comment.	TR15FB1
3	Support DOE Review and Comment Resolution of Draft PC Plan (SE050720)	DOE comments on the Draft PC Plan will be resolved and incorporated into a draft that meets with DOE concurrence.	TR15FB1, TR241FA2, TR251FA1, TR39BFA1D, TR523FA1, TR541FA2
4	Develop Prioritized List of TBDs To Be Resolved (SE050720)	A list of TBDs will be developed and prioritized. Criteria used to prioritize the list should be documented. For each TBD in the list, should contain what is needed to resolve the TBD, when is needs to be resolved, and the rationale for when it needs to be resolved.	TR15FB1, TR241FA2, TR251FA1, TR39BFA1D, TR523FA1, TR541FA2
5	Resolve Selected TBDs (SE050720)	Based on the prioritized list of TBDs, the areas that are selected for resolution in FY97 will be planned, analyzed, resolved, and documented.	TR15FB1, TR241FA2, TR251FA1, TR39BFA1D, TR523FA1, TR541FA2
6	Update the PC Plan with the Resolved Sections (SE050720)	Using the DOE concurrence draft of the PC Plan, those areas that have been resolved will be incorporated into the PC Plan. Those areas which are needed to provide enough detail to show that the objectives of the performance confirmation program can be met will be resolved. The list of TBDs will be updated, also.	TR15FB1, TR241FA2, TR251FA1, TR39BFA1D, TR523FA1, TR541FA2
7	Review the PC Plan and Deliver PC Plan to DOE (SE050725)	A review of the updated PC Plan will be conducted prior to delivery of the PC Plan to DOE.	TR15FB1
8	Review PC parameters based on PA updates	Utilize PA model updates to review existing list of important parameters and update (refine) as necessary	
9	NRC exchange	Initiate Appendix 7 discussions with the NRC regarding Performance Confirmation.	

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97												FY98											
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Brent Thomson/4-7708	12/13/97 - 02/21/97																								
2	Brent Thomson/4-7708	02/21/97 - 02/28/97																								
3	Brent Thomson/4-7708	03/03/97 - 04/30/97																								
4	Brent Thomson/4-7708	02/07/97 - 05/16/97																								
5	Brent Thomson/4-7708	03/03/97 - 08/14/97																								
6	Brent Thomson/4-7708	08/15/97 - 09/05/97																								
7	Brent Thomson/4-7708	09/08/97 - 09/30/97																								
8	Brent Thomson/4-7708	10/01/97 - 01/30/98																								
9	Brent Thomson/4-7708	02/01/98 - 02/28/98																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured by tracking to the schedule identified in item #9 above. As each of the activities is completed, the issue will be progressing toward closure sufficient for VA.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported monthly and as each activity is scheduled for completion. A number of deliverable documents will be produced documenting the outcome of this issue resolution activity with one at the end of February 1997, one in mid May 1997, and one at the end of FY 97.

Key VA Issue
Resolution Plan

1. **Issue #6:** Retrievability Concept February 6, 1997 Rev. # 01A

2. **Assigned to:** **M&O Responsible Individual:** Robert Saunders **Phone:** 5-4380
DOE Contact: Paul Harrington **Phone:** 5-5415

M&O Manager

Robert S. Saunders
M&O Responsible Individual

3. **Issue Description:**
   - A retrievability strategy to meet the 10CFR60 requirements has not yet been developed. At heart of this issue are questions on how easy retrieval needs to be and how to incorporate a retrieval strategy into the repository design. Questions regarding the proof-of-principle aspects of retrievability must also be addressed.
   - A retrieval strategy for recovery of resources has to be developed and incorporated into the design
   - Credible off-normal scenarios for retrieval have not yet been developed.
   - Retrieval equipment design, including associated remote systems, and concepts of operations have to be developed to meet normal and off-normal conditions.
   - The emplacement drift environment of high heat and radiation, and the size and weight of emplaced waste package add to the complexity of the retrievability issue.
   - The long retrievability period and associated complexities of providing access to the emplacement drifts are also part of this issue.

4. **Describe the current status and the significance of the issue:**
Current Status: Engineering studies to examine the retrievability period beyond the prescribed time of 50 years were performed during ACD. Conceptual designs for retrievability and operations were developed. The expected environment during retrieval period has also been examined. During the VA design, equipment concepts will be developed to meet the various off-normal scenarios postulated in the DBE study. The remote system control and communications systems for retrieval equipment are also being analyzed. The FY97 scope of work includes an engineering study to develop a retrieval strategy.

A number of changes to the ACD repository layout make retrievability more credible. Included in these changes is a provision for retrieval from both ends of the emplacement drifts, and an enhanced ventilation system with a central exhaust air main. The change from the ACD rail car emplacement concept to gantry emplacement of the waste packages onto pedestals also enhances the retrievability.

The retrievability issue is significant because it impacts wide areas of repository design including the subsurface layout, emplacement mode, emplacement and retrieval equipment, remote systems design, ground support systems, ventilation system, and surface facilities.

5. **Indicate its importance and what effects it will have on a VA:**
As indicated in section 4 above, the retrievability issue impacts virtually every aspect of subsurface design. The viability of retrieval has to be demonstrated by the completion of VA design, and will include a plan and strategy for retrieval, design of long term low maintenance ground support systems, and remote systems to operate retrieval equipment during normal and off-normal retrieval operations.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
The retrieval issue has no direct ties to the TSPA. The MGDS cost estimate will be greatly affected by the strategy and concept of the selected retrieval design. The retrieval issue is a "bin 3" product and as such must be substantially completed for LA. Therefore, LA planning will be affected by the extent of completion of this issue. If the LA strategy includes demonstrating a retrieval "proof-of-principle" concept, a larger impact on the LA planning may well occur.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
VA design during FY97 and FY98, will develop the strategy for retrieval, and retrieval equipment and remote handling systems. The VA design (currently in progress) revises the ACD layout configuration and waste emplacement method (now utilizing a gantry system in the emplacement drift rather than rail cars) and as a result better accommodates retrieval . Retrieval under normal conditions is essentially the reverse process of emplacement and will use the same equipment. VA design will also address retrieval under off-normal conditions, in such cases special recovery equipment may be required. Section 8 lists the tasks, including analyses and studies, that will be performed to develop a viable retrieval approach. The first task listed in Section 8, will be to document the assumptions for the retrieval baseline design in the CDA. The systems engineering study will describe the strategy for retrieval and analyses will provide a preliminary design of the waste package transportation system, the mechanism for loading and unloading waste packages, the emplacement gantry - also used for retrieval, and the subsurface layout and facilities design. Other analyses will address ventilation and retrieval scenarios.

   At VA we will have developed a preliminary design for retrieval of waste packages from the emplacement drift and their transportation and storage at surface. Subsequent design work will refine the retrieval strategy and approach, and add detail to the waste handling equipment and subsurface and surface layout and facilities design.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Controlled Design Assumptions Document (CDA)	Document assumptions relating to retrievability in the CDA section that describes the VA baselined design.	
2	Retrievability Strategy Report (SE502705, SE502710)	A Systems Engineering study to examine retrieval issues and develop a retrievability strategy with sufficient detail to support development of the License Application Plan. The study will provide input to the FY 97 repository retrieval design for Viability Assessment.	TR15FB31
3	Waste Package Transport and Emplacement Equipment Analysis (RP502700)	Develops system for transporting waste packages from surface to the subsurface emplacement horizon and emplacing in the emplacement drifts. Normal retrieval is considered a reversal of the emplacement process.	TR47FB6
4	Repository Subsurface Layout Configuration Analysis (RP120795)	Develop subsurface layout configuration for the emplacement drifts, access ramps and mains, and ventilation openings. Layout development addresses constructability, waste package transportation and emplacement, and retrieval.	TR47FB5
5	Equipment for Waste Package Retrieval (RP504705)	Develop preliminary equipment description for recovery of waste package, waste package transporter, and retrieval gantry involved in off-normal situations.	TR47FBA
6	Sub Surface HVAC Analysis (RP122725)	Perform analysis that establishes normal ventilation conditions and system capacities as they apply to normal operations and retrieval processes.	TR47FB9
7	Airflow Control Analysis (RP122720)	Determine the quantity and type of airflow control devices to be used under normal and retrieval conditions to allow for altered airflow scenarios.	TR47FB9
8	Near Field Design Analysis (RP510710)	Develop a description of the near field conditions that could be expected during the retrieval process. This provides input for equipment evaluation and performance.	TR47FB2
9	DBE/Scenario Analysis (RP123762)	Define the Design Basis Events and Scenarios that may impose special conditions on a retrieval process. Events may cause emergency or off-normal conditions under which retrieval must be performed	TR47FBD
10	Retrieval Scenario Analysis (RP47500)	Develop the scenarios under which retrieval would be performed. This includes evaluation of package spacing, waste type, temporary redistribution of waste packages, and logistics of the retrieval process.	TR47GB9

No.	Title	Description	Summary Account #
11	RH&C Description Document (RP502740)	Prepare a description of the Remote Handling and Controls equipment that is envisioned for the emplacement equipment. These same controls will be utilized in the retrieval equipment, and will serve as input to the retrieval equipment design	TR47FB6
12	Retrieval Drawings and Specifications (RP47504, RP47506)	Develop drawings and outline specifications that depict and describe the equipment to be utilized under the expected retrieval conditions and scenarios. These products are preliminary in nature, not to be used for procurement or fabrication, and will serve as input to detailed design for the following design phase.	TR47FBA TR47GB9
13	Refinement of Equipment Description (RP47502)	Enhance the design of the major retrieval equipment items to address remote handling and control, and special handling scenarios developed under RP47500.	TR47GB9

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97												FY98											
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	R. Saunders/5-4380	10/01/97 - 01/31/98																								
2	P. Gehner/4-7503	11/08/96 - 01/10/97																								
3	F. Bierich/5-9686	10/01/96 - 07/14/97																								
4	R. Saunders/4-1865	10/15/96 - 02/11/97																								
5	F. Bierich/5-9686	10/01/96 - 06/13/97																								
6	R. Saunders/4-1865	10/01/96 - 04/30/97																								
7	R. Saunders/4-1865	11/01/96 - 02/28/97																								
8	R. Nolting/4-1833	10/01/96 - 07/31/97																								
9	D. McAffee/5-9656	05/01/97 - 09/30/97																								
10	M. Haas/5-9631	10/01/96 - 09/30/97																								
11	F. Bierich/5-9686	10/01/97 - 02/27/98																								
12	F. Bierich/5-9686	12/15/97 - 09/30/98																								
13	F. Bierich/5-9686	12/01/97 - 05/29/98																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured in accordance with the process documented in the VA Monitoring Plan.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported in accordance with the process documented in the VA Monitoring Plan.

Key VA Issue
Resolution Plan

1. **Issue #7:** Confirmation of High Volume and Long Period Waste Handling Capability and DBE Consequence (wet vs dry) — March 11, 1997 — Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Steven Meyers **Phone:** 5-4392
DOE Contact: Bernie Verna **Phone:** 4-1374

M&O Manager

Steven J Meyers 3-12-97
M&O Responsible Individual

3. **Issue Description:**
The repository will annually package about 11,000 commercial spent nuclear fuel assemblies into about 420 large disposal containers. Fuel handling operations at commercial reactors are conducted wet, using pools and readily accessible equipment. It is expected that for the repository the disposal containers will not be loaded in a pool because the presence of water negatively impacts the design of the waste packages. As a result, the waste handling operations are expected to be performed dry in remotely operated hot cells. The technical challenge is designing reliable systems to remotely handle large containers (e.g., 60 tons), and large numbers of spent fuel assemblies.

4. **Describe the current status and the significance of the issue:**
The ACD included dry handling systems to transfer spent fuel assemblies from shipping casks to disposal containers. In this design, 98% of the assemblies remained within MPCs. The VA design will be based on transferring 100% fuel as individual uncanistered assemblies. This will require significantly more transfer operations and higher secondary waste generation rates than in the ACD. Design analyses have not been prepared to establish the type of handling system (i.e., wet or dry) or number of operating lines/stations; demonstrate that the dry design will be reliable, available, and maintainable; or determine the quantity of low-level waste generated from equipment/cell decontamination operations.

5. **Indicate its importance and what effects it will have on a VA:**
Resolution of this issue could significantly impact the size, configuration and operations of the waste handling and secondary waste treatment facilities. VA effects are described in Paragraph 6.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
TSPA is not impacted by this issue. The MGDS cost estimate may be significantly impacted by this issue as the waste handling and secondary waste treatment facilities are cost drivers. LA planning is impacted because the schedule may need to accommodate a dry handling prototype program. This program would be executed during detail design and would be required to lower program risk. The key products required to resolve this issue are design analyses (see Paragraph 7) and drawings (flow, equipment and general arrangement).

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
Design analyses will be performed in to establish a defendable basis for the waste handling and secondary waste treatment operations design. A key analysis in early FY97 will select the type of waste handling systems, establish the number operating lines, and size of the in-process staging areas. This analysis will be based on the Revision 4 of the CDA, which assumes: the repository must be capable of emplacing 70,000 MTHM of waste over 24 years starting in 2010, 100% of the

commercial SNF will at times be received as uncanistered fuel or in canisters that are not suitable for disposal, at other times a significant portion of the commercial SNF may be received in disposable canisters, other wastes (will be received in disposable canisters. Other key assumptions used for this analysis include: waste will be received in approximately the same order it is emplaced, empty DPCs will be packaged and shipped off-site for disposal/recycle, and uniformity of waste shipments will be similar to what is found with commercial transportation networks. A waste mix and throughput study will be conducted in mid FY97 by systems to confirm or update the assumptions related to waste receipt form and schedule. The impact of this study on the waste handling facility design will be assessed and if necessary updated. Other key analyses will address failed equipment recovery strategies, waste handling systems design, space allocation, and secondary waste generation and treatment.

This issue will be closed when general arrangements that describe the selected concept are issued.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Finalize Waste Handling Concept (RP2403A2)	Establish the basic concept for the waste handling operations including technology selections, the number of operating trains and capacity of in-process staging areas. Analysis deliverable is due January 30, 1997.	TR46FB2
2	Size Waste Handling Equipment/Areas (RP2403A3)	Prepare flow diagrams, selected equipment drawings, preliminary equipment layout drawings, supporting design analyses, and design description for the waste handling systems. Flow diagram deliverable is due May 30, 1977.	TR46FB2
3	Size Waste Treatment Equipment/Areas (RP2403A5)	Determine the quantity of secondary waste generated, and adjust/add features to minimize waste and the spread of contamination. Flow diagram deliverable with waste rates is due June 30, 1997.	TR46FB2
4	Develop Initial Integrated Facility Layout (RP2403A6)	Develop a preliminary general layout of the Waste Handling Building based on the space requirements and design concept.	TR46FB2
5	Complete Throughput Study (SE200M3)	Confirm or update the Revision 4 of the CDAs related to waste receipt form and schedule.	TR15FB2
6	Provide RAM Support to SRA/Design (SE724700)	Provide Reliability, Availability, and Maintainability (RAM) data and review input.	TR18FA1
7	Prepare Space Summaries and General Arrangements (RP2403A9)	Update the general arrangements, to incorporate revised support area room sizes, structural member sizes, HVAC space requirement, and the results of a RAMI review. GA deliverable is due September 30, 1997.	TR45FB2
8	Complete Design Descriptions (RP2403AA)	Prepare input to SDDs and a letter report that outlines the requirements for prototype testing.	TR46FB2
9	Prepare/Update Configuration Analyses (RP7402A1)	Prepare additional analyses to resolve lower tier issues that are required for LA and will provide additional credibility for VA.	TR46GB3
10	Provide RAM Support to SRA/Design (SE724A)	Provide additional RAMI data and review input.	TR18GA1

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97												FY98											
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Meyers/5-4392	10/12/96 - 01/30/97																								
2	Meyers/5-4392	11/18-96 - 04/11/97																								
3	Meyers/5-4392	04/14/97 - 06/13/97																								
4	Meyers/5-4392	06/16/97 - 07/11/97																								
5	Lev/5-4029	10/01/96 - 04/11/97																								
6	Robertson/4-7611	10/01/96 - 09/30/97																								
7	Meyers/5-4392	08/01/97 - 09/30/97																								
8	Meyers/5-4392	04/14/97 - 09/30/97																								
9	Meyers/5-4392	10/01/97 - 03/31/98																								
10	Robertson/4-7611	10/01/97 - 07/26/99																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured in accordance with the process documented in the VA Monitoring Plan.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported in accordance with the process documented in the VA Monitoring Plan.

Key VA Issue
Resolution Plan

1. **Issue #8:** Disposal of Site Generated Waste November 6, 1996 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Richard Memory **Phone:** 4-7247
DOE Contact: Bernie Verna **Phone:** 4-1374

M&O Manager

M&O Responsible Individual

3. **Issue Description:**
This issue deals with the types and quantities of waste expected to be generated during construction and operation of the repository as well as with the disposal location (on-site vs. off-site) of this waste. A feasible plan for disposing of the site-generated waste should be in place by the time of the VA.

4. **Describe the current status and the significance of the issue:**
A draft of REV 03 of the Civilian Radioactive Waste Management System Requirements Document, paragraph 3.2.2 D states that "site generated hazardous, low-level radioactive and mixed waste shall be transported to government-approved off-set facilities for disposal." However, at this time, the off-site location for the site generated waste has not been identified. This issue requires identification of feasible off-site disposal locations for this waste or identification of feasible on-site disposal options. Depending on the quantity of waste generated this issue could have significant impacts on cost, schedule, and/or repository licensing strategy. The resolution of this issue will require working with the licensing, PA, and environmental, safety, and health organizations. The resolution of this issue will support both VA and LA.

5. **Indicate its importance and what effects it will have on a VA:**
This issue is directly related to the cost, license application plan, and design portions of the VA. This is a question that must have a clear plan for resolution by the VA in order to provide closure to this unanswered question.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
The amount of waste generated and the disposal location both have the potential to significantly impact the MGDS cost. Cost may be impacted by waste packaging requirements as well as disposal and/or transportation requirements. If the waste is disposed of on-site, then a new section of the LA plan may be required to address LLW disposal regulations.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
Identify the types and quantify the amounts of wastes that will potentially be generated at the repository for several different waste stream scenarios, identify options for disposal of site-generated waste for each of the scenarios, and evaluating these scenarios in terms of licensing requirements, costs, local government review requirements, schedule, etc. Criteria for resolution closure sufficient for VA will identify viable options for the disposal of the site-generated waste and produce a plan for implementation of those options. This will be completed by October 1997.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Identify and quantify the types of wastes generated	Using the range of potential waste streams, including anticipated DPCs, identify the types of wastes generated, the quantities and its sources.	Waste Gen Study 97
2	Identify the Options available for disposal	Determine where the waste may be disposed, i.e. on-site, at the NTS, another DOE facility, or a commercial (non DOE) facility. Assess the likelihood of the availability of the off-site disposal options.	Waste Gen Study
3	Identify the regulatory issues associated with each waste type and disposal option	NRC regulates the disposal of LLW on-site per 10CFR60.135(d). DOE regulates the disposal LLW generated at DOE sites. The states are involved in the regulation of mixed and hazardous waste disposal. Document the roles and responsibilities of the potential regulators associated with each disposal option	Waste Gen Study
4	Assess Performance Assessment impacts	Given the potential interaction between the organics in the LLW, mixed, and hazardous wastes and the additional sources of RNs or chemical pollutants determine the feasibility and complexity of developing reasonable assurance arguments for each of the disposal options.	Waste Gen Study
5	Consider Impacts on the Repository EIS	Determine the impacts, in terms of cost, schedule, and content, on the repository EIS.	Waste Gen Study
6	Assess the costs of the disposal options	Determine costs to the repository and to society associated with each of the disposal options.	Waste Gen Study
7	Develop a recommendation	Utilize the information generated to recommend a viable approach for disposal of site generated wastes	Waste Gen Study
8	Develop a plan for implementation	Develop a plan which demonstrate the feasibility of the option(s) recommended.	Waste Gen Plan 98

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97 O	N	D	J	F	M	A	M	J	J	A	S	FY98 O	N	D	J	F	M	A	M	J	J	A	S
1	Kal Bhattacharryya	04/15/97 - 05/15/97																								
2	R. Memory	04/15/97 - 05/30/97																								
3	Ken Ashe	06/01/97 - 06/30/97																								
4	Bob Andrews	05/01/97 - 06/30/97																								
5	Ed Mc Cann (Environmental)	07/01/97 - 07/30/97																								
6	Kal Bhattacharryya	06/01/97 - 07/30/97																								
7	R. Memory	08/01/97 - 09/30/97																								
8	R. Memory	10/01/97 - 11/30/97																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured by tracking to the schedule identified in item #9 above. As each of the activities is completed the issue will be progressing toward closure sufficient for VA.

11. **Describe how status will be reported during the process of closing this issue.**
Status will be reported monthly and as each activity is scheduled for completion. A deliverable document will be produced documenting the outcome of this issue resolution activity at the end of FY97.

Key VA Issue
Resolution Plan

1. **Issue #9:** Strategy for Mapping Repository Subsurface December 18, 1996 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Richard Memory **Phone:** 4-7247
DOE Contact: William Boyle **Phone:** 4-5506

M&O Manager

M&O Responsible Individual

3. **Issue Description:**
The extent of geologic mapping of emplacement drift wall surfaces required for performance confirmation activities or for other reasons could significantly impact the design and emplacement method of the emplacement drift ground support system. At this time the amount of drift wall mapping required to satisfy scientific needs, repository construction needs, and regulatory needs has not been determined.

4. **Describe the current status and the significance of the issue:**
The Performance Confirmation Concepts Study made recommendations for the type of parameters that need to be collected during emplacement drift construction and that must be acquired through subsurface geologic mapping. The study recommended a requirement that states "Any ground support system (i.e., shotcrete or concrete) that covers the emplacement drift rock wall surface shall not be installed until after any necessary rock mapping is complete." The amount of mapping that is necessary has yet to be specified. A currently favored method for providing ground support is with the use of a reinforced precast concrete lining. This lining is most economically emplaced immediately after the drift is excavated, allowing no time for geologically mapping the drift walls. If a large portion of the drift walls must be mapped then the advantages of this type of ground support system is reduced and the overall cost of the ground support system could be significantly increased. Interfaces: Resolution of the mapping issue will require interfacing with the scientific programs, licensing, and Performance Assessment organizations.

5. **Indicate its importance and what effects it will have on a VA:**
The amount of mapping that is necessary prior to emplacement of the ground support system could affect the ground control system selected, its cost, its installation, and overall effectiveness. This unresolved issue could have significant impact on the VA MGDS cost estimate and as well as on the VA LA plan.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
This issue ties directly to cost and LA planning, however, it is not expected to affect the post closure performance of the repository.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
The strategy for achieving closure of this issue will be to identify the parameters and features that require observation through geologic mapping. In addition, the exact use to be made of this information will be identified in order to facilitate determination of the incremental value of mapping anywhere from a few drift walls, several drift walls, most of the drift walls, to all of the emplacement drift walls. Finally, a licensing analysis will be conducted in order to identify the anticipated regulatory based mapping requirements. The technical and programmatic requirements will then be considered in the development of a mapping implementation strategy. Closure of the issue deemed sufficient for VA will be the identification of the minimum amount of mapping required to support engineering, scientific, and licensing needs.

8. Describe the steps in a process that the project will use to bring closure on this issue:

No.	Title	Description	Summary Account #
1	Identify Data Needs To Be Acquired by Mapping (SE050710)	Identify those parameters or features which are needed that can be acquired through mapping. Requests for data needs from the following affected organizations will be solicited: Repository Subsurface Design, Site Evaluation, Performance Assessment, and Regulatory and Licensing.	TR15FB1, TR39BFA1D, TR523FA1, TR541FA2
2	Perform a Regulatory and Licensing Analysis to Develop Mapping Design Inputs	An regulatory and licensing analysis will be performed and documented to establish a regulatory and licensing position on mapping requirements as input to a broader analysis considering design, site evaluations, and model verification and performance confirmation.	TR523FA1
3	Establish Current Level of Significance or Confidence in Data Needs (SE050705)	Documentation will be identified or referenced which provide the existing information on the parameters or features to be acquire by mapping. Summaries this information on the parameters and features will be established. An assessment of the significance or level of confidence in the data will be developed.	TR15FB1, TR39BFA1D, TR523FA1, TR541FA2
4	Identify Assumptions and/or Establish Expected Values for Data Needed (SE050705)	Current assumptions or predicted distributions (e.g., expected values and uncertainties) used in design, process modeling, or performance assessments related to the parameters and features will be documented.	TR15FB1, TR39BFA1D, TR523FA1, TR541FA2
5	Establish Confidence Level Needed for Data (SE050710)	A level of confidence in the assumptions or predicted parameter distributions will be established based on sensitivity of the parameters to design or performance.	TR15FB1, TR39BFA1D, TR523FA1, TR541FA2
6	Develop Minimum Mapping Requirements (SE050710)	Establish the minimum mapping requirements based on the current information, assumptions, predictions, and confidence level needed. Consideration of the regulatory and licensing input will be assess to determine the driving requirements.	TR15FB1
7	Develop Mapping Strategy (SE050710)	Develop a strategy for mapping to meet the minimum mapping requirements.	TR15FB1, TR39BFA1D, TR47FB3, TR523FA1, TR541FA2
8	Document Analysis (SE050710)	Document the results.	TR15FB1

9. **Provide a rough schedule of when this issue will be resolved for VA:**

			FY97												FY98											
No	POC (Name/Phone)	Date	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Brent Thomson/4-7708	03/01/97 - 03/14/97																								
2	Ken Ashe/5-5563	03/01/97 - 03/14/97																								
3	Brent Thomson/4-7708	03/07/97 - 03/31/97																								
4	Brent Thomson/4-7708	03/15/97 - 04/07/97																								
5	Brent Thomson/4-7708	03/15/97 - 04/07/97																								
6	Brent Thomson/4-7708	04/07/97 - 04/21/97																								
7	Brent Thomson/4-7708	04/07/97 - 04/21/97																								
8	Brent Thomson/4-7708	04/15/97 - 04/30/97																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured by tracking to the schedule identified in item #9 above. As each of the activities is completed the issue will be progressing toward closure sufficient for VA.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported monthly and as each activity is scheduled for completion. The results of the analysis will be captured in a deliverable document will be produced documenting the outcome of this issue resolution activity at the end of FY97.

Key VA Issue
Resolution Plan

1. **Issue #11:** Viability of Underground Remote Control Concepts January 31, 1997 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Douglas McAffee **Phone:**
DOE Contact: Paul G. Harrington **Phone:** 5-9656

M&O Manager M&O Responsible Individual

3. **Issue Description:**
At issue is the feasibility of application of remote control and remote handling technology to subsurface repository operations, including emplacement, performance confirmation, and retrieval, which are characterized by an environment of elevated temperatures, high radiation, confined operating areas, and limited access for maintenance/repair.

4. **Describe the current status and the significance of the issue:**
(1) The repository design concept relies on the successful implementation of remote systems for WP emplacement, performance confirmation monitoring and WP retrieval. Due to elevated temperatures and high radiation, emplacement drifts will be off-limits to humans and all activities inside these drifts will need to be by remotely controlled systems. (2) Preliminary studies, technology reviews, and design analyses have been performed. (3) Initial design strategies and design concepts are being developed and investigated. (4) Key remote system technologies, such as remote communications and mobile power sources are being evaluated. (5) Current evaluations are seeking to determine the viability of developing remote systems that can be used in 200 °C performance confirmation environments.

5. **Indicate its importance and what effects it will have on a VA:**
Reliance on remotely controlled and operated systems will be an important aspect of the repository concept of operations. Emplacement drifts will eventually constitute over 90% of the subsurface area and no human entry is planned in emplacement drifts while waste packages are present. Developing viable and defendable conceptual designs for remote operation within the emplacement drifts is critical during the VA. Repository viability will consider the viability of design concepts for emplacement, monitoring and response to off-normal events.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
(1) TSPA - remote systems will be required to gather data parameters used to confirm short and long term performance of the repository and engineered barriers. (2) MGDS Cost Estimates - Development, fabrication, installation, testing and operation of robust and highly reliable remote systems for emplacement and performance confirmation activities will affect total costs by more than $250 M. (3) LA Planning - Due to the unique nature of the equipment, special consideration will likely be needed for approval of remote systems. Conceptual designs will need to adequately address issues such as: functionality, reliability, maintainability, survivability, and personnel safety.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
The strategy to resolve this issue is to: (1) Narrow and document design concepts to a single VA concept. (2) Evaluate and develop CDA assumptions to be used for the VA. The assumptions will clearly define the VA design basis and any alternatives that must not be precluded. The CDA assumptions will be developed using available data and documented and TBV'd as necessary. (3) Obtain E&I Management approval of the assumptions. (4) Work the issues and update the documentation. (5) Maintain flexibility throughout the design process. (6) To enhance confidence in design concepts, design analyses will be completed that address viability of key remote control technologies in elevated thermal and radiation environments. (7) Remote system concepts will be evaluated for maintainability, reliability, and recovery from off-normal scenarios.

Closure for VA will be demonstrated by an analytical basis for the remote control concepts chosen. A series of analysis will show feasibility of the concept by addressing the level of development and maturity of the technology for its intended application.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Develop Remote Monitoring Concepts for Performance Confirmation RP120M3F	Complete a review of available technology for PC environment. Establish the basic design concept for remote monitoring and data acquisition. Provide general equipment descriptions and performance characteristics. Analysis and drawings will be completed by April 1, 1997	TR47FBJ
2	Refine Remote Control Concepts for Emplacement Systems RP502M3	Refine remote control and communication concepts for emplacement systems such as the Emplacement Gantry, WP Transporter, and support equipment. Provide general equipment descriptions and performance characteristics. Analysis and drawings will be completed by Sept, 1997	TR47FB6
3	Develop Electrification Design Concepts of Subsurface Rail Vehicles RP502705	Analyze and establish electrification technology for mobile-remote systems. Analysis and drawings will be completed by April, 1997	TR47FB6
4	Refine Remote Control Concepts for Waste Package Retrieval Equipment RP504M3	Refine remote control concepts for normal and off-normal retrieval operations. Analysis and drawings will be completed by Aug 29, 1997	TR47FBA
5	Evaluations of Key Technologies RP170A	Focused technology evaluations to resolve lower tier design issues that are required for LA will be started in FY'98. Initial test results will be available by March, 1998 and will provide additional credibility for VA design issues.	TR47GBJ
6	Evaluate and Develop new CDA	Evaluate alternative remote control concepts for Performance Confirmation and Retrieval VA design basis. Develop and define new CDA.	TBD

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97 O	N	D	J	F	M	A	M	J	J	A	S	FY98 O	N	D	J	F	M	A	M	J	J	A	S
1	McAffee/5-4491	10/01/96 - 04/01/96																								
2	McAffee/5-4491	10/01/96 - 09/30/97																								
3	Fernandez/4310	10/01/96 - 06/31/97																								
4	McAffee/5-4491	10/01/96 - 09/01/97																								
5	McAffee/5-4491	10/01/97 - 03/01/98																								
6	McAffee/5-4491	02/01/97 - 04/30/97																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured in accordance with the process documented in the VA Monitoring Plan.

11. **Describe how status will be reported during the process of closing this issue.**
Status will be reported in accordance with the process documented in the VA Monitoring Plan.

Key VA Issue
Resolution Plan

1. **Issue #11:** Viability of Underground Remote Control Concepts January 31, 1997 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Douglas McAffee **Phone:**
DOE Contact: Paul G. Harrington **Phone:** 5-9656

M&O Manager M&O Responsible Individual

3. **Issue Description:**
At issue is the feasibility of application of remote control and remote handling technology to subsurface repository operations, including emplacement, performance confirmation, and retrieval, which are characterized by an environment of elevated temperatures, high radiation, confined operating areas, and limited access for maintenance/repair.

4. **Describe the current status and the significance of the issue:**
(1) The repository design concept relies on the successful implementation of remote systems for WP emplacement, performance confirmation monitoring and WP retrieval. Due to elevated temperatures and high radiation, emplacement drifts will be off-limits to humans and all activities inside these drifts will need to be by remotely controlled systems. (2) Preliminary studies, technology reviews, and design analyses have been performed. (3) Initial design strategies and design concepts are being developed and investigated. (4) Key remote system technologies, such as remote communications and mobile power sources are being evaluated. (5) Current evaluations are seeking to determine the viability of developing remote systems that can be used in 200 °C performance confirmation environments.

5. **Indicate its importance and what effects it will have on a VA:**
Reliance on remotely controlled and operated systems will be an important aspect of the repository concept of operations. Emplacement drifts will eventually constitute over 90% of the subsurface area and no human entry is planned in emplacement drifts while waste packages are present. Developing viable and defendable conceptual designs for remote operation within the emplacement drifts is critical during the VA. Repository viability will consider the viability of design concepts for emplacement, monitoring and response to off-normal events.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
(1) TSPA - remote systems will be required to gather data parameters used to confirm short and long term performance of the repository and engineered barriers. (2) MGDS Cost Estimates - Development, fabrication, installation, testing and operation of robust and highly reliable remote systems for emplacement and performance confirmation activities will affect total costs by more than $250 M. (3) LA Planning - Due to the unique nature of the equipment, special consideration will likely be needed for approval of remote systems. Conceptual designs will need to adequately address issues such as: functionality, reliability, maintainability, survivability, and personnel safety.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
The strategy to resolve this issue is to: (1) Narrow and document design concepts to a single VA concept. (2) Evaluate and develop CDA assumptions to be used for the VA. The assumptions will clearly define the VA design basis and any alternatives that must not be precluded. The CDA assumptions will be developed using available data and documented and TBV'd as necessary. (3) Obtain E&I Management approval of the assumptions. (4) Work the issues and update the documentation. (5) Maintain flexibility throughout the design process. (6) To enhance confidence in design concepts, design analyses will be completed that address viability of key remote control technologies in elevated thermal and radiation environments. (7) Remote system concepts will be evaluated for maintainability, reliability, and recovery from off-normal scenarios.

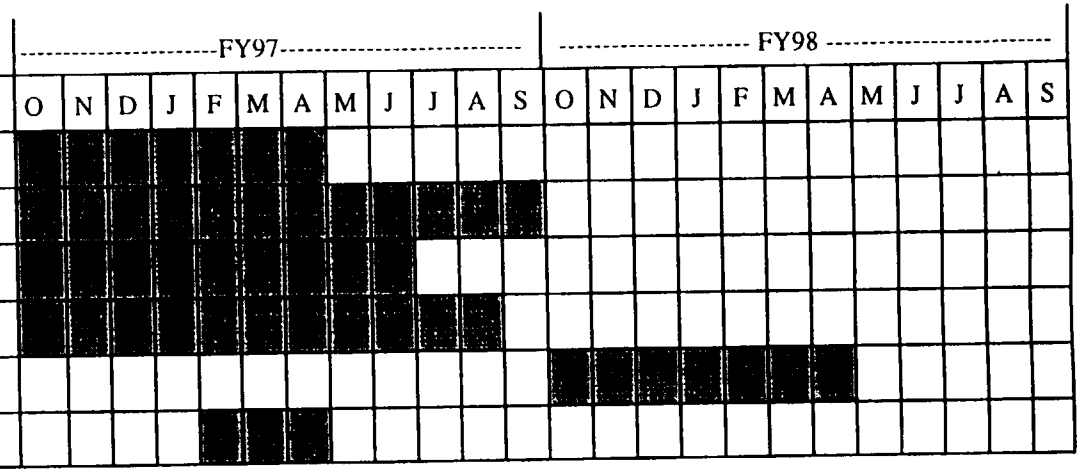
Closure for VA will be demonstrated by an analytical basis for the remote control concepts chosen. A series of analysis will show feasibility of the concept by addressing the level of development and maturity of the technology for its intended application.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Develop Remote Monitoring Concepts for Performance Confirmation RP120M3F	Complete a review of available technology for PC environment. Establish the basic design concept for remote monitoring and data acquisition. Provide general equipment descriptions and performance characteristics. Analysis and drawings will be completed by April 1, 1997	TR47FBJ
2	Refine Remote Control Concepts for Emplacement Systems RP502M3	Refine remote control and communication concepts for emplacement systems such as the Emplacement Gantry, WP Transporter, and support equipment. Provide general equipment descriptions and performance characteristics. Analysis and drawings will be completed by Sept, 1997	TR47FB6
3	Develop Electrification Design Concepts of Subsurface Rail Vehicles RP502705	Analyze and establish electrification technology for mobile-remote systems. Analysis and drawings will be completed by April, 1997	TR47FB6
4	Refine Remote Control Concepts for Waste Package Retrieval Equipment RP504M3	Refine remote control concepts for normal and off-normal retrieval operations. Analysis and drawings will be completed by Aug 29, 1997	TR47FBA
5	Evaluations of Key Technologies RP170A	Focused technology evaluations to resolve lower tier design issues that are required for LA will be started in FY'98. Initial test results will be available by March, 1998 and will provide additional credibility for VA design issues.	TR47GBJ
6	Evaluate and Develop new CDA	Evaluate alternative remote control concepts for Performance Confirmation and Retrieval VA design basis. Develop and define new CDA.	TBD

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date
1	McAffee/5-4491	10/01/96 - 04/01/96
2	McAffee/5-4491	10/01/96 - 09/30/97
3	Fernandez/4310	10/01/96 - 06/31/97
4	McAffee/5-4491	10/01/96 - 09/01/97
5	McAffee/5-4491	10/01/97 - 03/01/98
6	McAffee/5-4491	02/01/97 - 04/30/97



10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured in accordance with the process documented in the VA Monitoring Plan.

11. **Describe how status will be reported during the process of closing this issue.**
Status will be reported in accordance with the process documented in the VA Monitoring Plan.

Key VA Issue
Resolution Plan

1. **Issue #12:** Burnup Credit December 14, 1996 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Peter Hastings **Phone:** 4-1946
DOE Contact: Paige Russell **Phone:** 4-1315

M&O Manager M&O Responsible Individual

3. **Issue Description:**
NRC has not approved methodologies for burnup credit (i.e., accounting for reduced reactivity of spent fuel as compared with fresh fuel). It is not clear that the OCRWM program has a consistent position on requesting consideration of burnup credit as part of a license application from NRC.

4. **Describe the current status and the significance of the issue:**
MGDS has developed the *Disposal Criticality Analysis Technical Report* (September 1996); OWAST has developed a similar report that describes a different methodology. Issue has potential to create competing licenses between OWAST (for storage and transportation) and MGDS.

5. **Indicate its importance and what effects it will have on a VA:**
Without an approved burnup credit methodology, waste packages may be limited to fewer assemblies, thereby requiring more packages and a larger emplacement area. In addition, different methodologies (i.e., between OWAST and MGDS) could result in confusion between licenses, or impacts to allowable reactivity margin on the "less conservative" of the two approaches (i.e., potential for less credit at MGDS for disposal). Potential impact on VA is primarily associated with cost of disposal.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
Issue is not closely associated with TSPA, except inasmuch as postclosure performance assumes a given reactivity inventory. MGDS cost estimate will be potentially impacted by number of required waste packages (via waste package utilization as a function of allowed burnup credit). LA planning is affected by interactions with NRC on technical exchanges, Topical Reports and SERs, and extent of agreement with methodology in advance of LA submittal.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
   - Outline schedules and links for (1) submittal, NRC review, and resolution of comments for the OWAST Topical Report on Actinide-Only (AO) burnup credit for storage and transportation, (2) preparation and submittal of follow-on OWAST Topical Report for Principal Isotope (PI) burnup credit, and (3) preparation of an MGDS Topical Report on PI burnup credit.

   - Summarize key technical differences between OWAST and MGDS approaches, describe interface issues between methodologies, and propose approach for integration of methods (may range from combining methods in common approach for single NRC submittal to complete separation of approaches and addressing interface only between license/certification applications), including assessment of cost impact and licensing risk.

The specific criteria for determining the sufficiency of the methodology for viability assessment is:

1) NRC staff has not identified any major technical topic that would preclude acceptance of the methodology, including risk-based approach.

2) NRC does not indicate that burnup credit is infeasible.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	M&O/DOE concurrence	Confirm extent of design and TSPA impact (i.e., concurrence with issue resolution) and link with VA issue #3 (criticality control), and document potential impact on criticality control methods and VA-level design	TR11FA2
2	Evaluate commercial status	Identify commercial analogs for burnup credit and status of utility efforts	TR11FA2
3	Identify schedule links	Identify and summarize related activities and links from FY97/98 schedule; include identification of anticipated milestones associated with NRC review and comment	TR11FA2
4	Evaluate technical differences in approaches	Develop executive summary of technical differences between approaches; analytical interfaces or disconnects between methodologies; and impacts of use of one methodology versus another, including impacts to physical interfaces or regulatory risk (i.e., one regulator reviewing different methods for dealing with the same issue from the same licensee)	TR11FA2
5	Implementation	Implement strategy as part of criticality control issue	TR11FA2, TR233FB9

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97												FY98											
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Hastings/5-3961	12/05/96 - 12/20/96			■																					
2	Hastings/5-3961	01/06/97 - 01/31/97				■																				
3	Hastings/5-3961	04/01/97 - 04/04/97							■																	
4	Hastings/5-3961	04/01/97 - 05/16/97							■	■																
5	Benton/4-1891	10/01/96 - 09/04/97	■	■	■	■	■	■	■	■	■	■	■	■												

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured in accordance with the process documented in the VA Monitoring Plan.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported in accordance with the process documented in the VA Monitoring Plan.

Key VA Issue
Resolution Plan

1. **Issue #13:** Repository Seals Requirements and Concepts February 3, 1997 Rev. #01A

2. **Assigned to:** **M&O Responsible Individual:** Richard Memory **Phone:** 5-3938
DOE Contact: Paul Harrington **Phone:** 4-5415

M&O Manager

M&O Responsible Individual

3. **Issue Description:**
Establish requirements for permanent sealing of boreholes, ramps, and shafts. The challenge of this is issue is to identify the proper requirements for the repository seals. The objective of sealing these openings is to prevent the creation of preferential pathways allowing significant amounts of surface or ground water from reaching emplaced waste, and to prevent significant amounts of gaseous radionuclides from escaping through these artificially created preferential pathways to the accessible environment. The seals need not provide any greater performance than would have been provided by the mountain had the boreholes, ramps, and shafts not been created.

4. **Describe the current status and the significance of the issue:**
Sealing of abandoned boreholes and shafts is required by state of Nevada laws. The federal regulations (10 CFR 60 with further guidance in NUREG-1373) requires that sealing be done so that the ability to isolate radioactive wastes will not be degraded. A significant amount of effort was done on this problem in the 1984 to 1991 time frame to evaluate the technical aspects of sealing and sealing material performance. The results of these studies indicate that available technology exists to seal boreholes and a variety of materials can be used. The sealing methodology and evaluation of performance will be an important issue in License Application and it needs to be incorporated into the designs. Interfaces: Resolution of this issue will require interfacing with the Performance Assessment and scientific programs organizations.

5. **Indicate its importance and what effects it will have on a VA:**
The VA design will need to incorporate a sealing plan as part of the overall design of the subsurface system and the license application plan. In order to develop this sealing plan requirements on which to base this design must be developed.

6. **Describe how the issue ties to the TSPA, MGDS cost estimate, and LA planning:**
The presence and type of seals must be considered in the TSPA work. The MGDS cost estimate will need this information since the costs will depend on whether or not a fairly costly sealing methodology is needed or whether much less costly methodologies would be adequate. In addition to the above, it will be necessary to define what set of testing is needed to support the sealing methods in LA and this will need to be incorporated in the LA planning.

7. **Describe the strategy and criteria for achieving a degree of closure sufficient for VA:**
A study is underway to evaluate the issues related to seals and to develop recommendations for sealing requirements. This study will first examine performance issues to determine what performance the seals must achieve. The latest site information will be used in this evaluation. Secondly the study will examine whether or not the sealing methodology recommended meets the expectations in the regulatory guidance. Seals should not need to be any more sophisticated than what is necessary to achieve the desired performance, including longevity. If the recommended

methodology is not in keeping with the regulatory expectations then it may be necessary to conduct discussions with the NRC. Additionally, there will likely need to be some testing prior to LA and some testing during performance confirmation. Closure of this issue sufficient for VA will be the identification of what the seals need to do (considering technical and regulatory concerns) and recommendations produced in the study (completion April 30, 1997) for requirements as to what to seal, how to seal, and when to seal. Based on the requirements established, design will produce sealing designs which will be completed in February 1988 to support VA. Any testing recommendations to support LA will be incorporated in test plans.

8. **Describe the steps in a process that the project will use to bring closure on this issue:**

No.	Title	Description	Summary Account #
1	Identify sealing options	Using previous studies and current information, the options for sealing boreholes, shafts, and ramps will be identified.	97 Seals Study SE506705
2	Establish evaluation criteria	The evaluation criteria that will be used to evaluate the various sealing options will be established.	97 Seals study SE506715
3	Conduct performance analysis	Performance assessments will be done to evaluate the need for seals and the performance that those seals must have.	97 Seals Study SLSE5061
4	Evaluate sealing requirements options	Utilize the performance assessments and the criteria established to identify the sealing performance that must be achieved.	97 Seals Study SE506720
5	Develop recommendation for sealing	The study will develop a recommendation for requirements to seal the boreholes, shafts, and ramps.	97 Seals Study SE506M3
6	Establish requirements	Establish requirements in the Controlled Design Assumptions Document.	Requirements SE530800
7	Produce VA sealing design	Preliminary designs will be developed for VA for sealing the boreholes, shafts, and ramps which meet the criteria established.	Seals/decom-missioning RP47954

9. **Provide a rough schedule of when this issue will be resolved for VA:**

No	POC (Name/Phone)	Date	FY97												FY98											
			O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	J. Fernandez	11/15/96-12/30/96																								
2	S. Saterlie	12/31/96-2/13/97																								
3	J. Fernandez	12/21/96-3/30/97																								
4	S. Saterlie	2/14/96-4/30/97																								
5	S. Saterlie	4/1/97-5/30/97																								
6	B. Thom	6/1/97-9/30/97																								
7	K. Bhattacharyya	10/1/97-2/27/98																								

10. **Describe a process that will be used to measure performance towards closure:**
Performance will be measured by tracking to the schedule identified in item #9 above. As each of the activities is completed the issue will be progressing toward closure sufficient for VA.

11. **Describe how status will be reported during the process of closing this issue:**
Status will be reported monthly and as each activity is scheduled for completion. A deliverable document will be produced documenting the outcome of the system study in May 1997, the CDA will be updated in September 1997, and designs will be included in the VA design in 1998.

APPENDIX C

WASTE PACKAGE DEVELOPMENT AND MATERIALS PRODUCTS

The data contained in this appendix reflects the status of the Yucca Mountain Site Characterization Project as of 12/16/96. Because of the evolving conditions of the Yucca Mountain Site Characterization Project, data in this appendix is changed or updated as necessary. However, this VA Design and Review Plan will not be revised or reissued as a result of data updates. For a current status of the data in this appendix and/or a copy of the current version, contact C. Chagnon. For suggested changes to the contents, contact A. Segrest.

WASTE PACKAGE DEVELOPMENT AND MATERIALS PRODUCTS

A list of products to be developed by the Waste Package Development and Materials Products organization is provided. The planning and summary account number, summary account number, work breakdown structure, and activity number are provided for each product. If the product is part of a deliverable, the deliverable number is provided. The product type and the estimated end date are also provided. If the product is directly related to any of the four VA components, that information is also provided.

WBS 1.2.2 Waste Package Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.1	TR21FA5	WP21702	12-Sep-97	Statement that the EBS/WP Phase I design work is done	WP21704	Ltr				
1.2.2.2	TR22FA1	WP22FA1	30-Sep-97	Initial engineering file for Waste Package and EBS		IOC				
				Final engineering file for Waste Package and EBS		IOC				
	TR22FA5	WP22FA5	30-Dec-97	WP Heat Evaluation Large Scale Thermal Analysis		Anal	X			
				Engineering sketches for WP heat evaluation large scale thermal analysis		IOC	X			
				Design input sheets for WP heat evaluation large scale thermal analysis		IOC	X			
	TR22FB2	WP220724	31-Mar-97	Documentation of available data and models for cladding degredation		IOC		X		
		WP220728	31-Jul-97	Statement of design basis cladding		IOC		X		
	TR22FB3	WP220733	17-Mar-97	Revised WP Off-Normal and Accident Scenario Report		Tech Doc	X	X		
		WP220731	01-Apr-97	Estimate of frequency of MGDS DBEs		Ltr Rept	X	X		
		WP220735	01-Jul-97	Identification of which WPs need DBE design analysis		Ltr Rept	X			
		WP220737	30-Sep-97	Definition of WP DBE parameters evaluation		Ltr Rept	X	X		
	TR22FB4	WP220756	01-Apr-97	Documentation of candidate materials and reference materials for EBS		IOC	X	X		X
		WP220752	15-Aug-97	EBS/WP Materials Selection Analysis	WP220754	Anal	X	X		X
	TR22FB5	WP220764	29-Jul-96	Description of effects of near field environment on degredation of EBS		IOC		X		
	TR22FB6	WP220701	30-Sep-97	WBS 1.2.2 WPD writeups for PR #16		IOC				
				WBS 1.2.2 WPD writeups for PR #17		IOC				
		WP220711	30-Sep-97	Comments on issues raised during reviews of PR #15		IOC				
				Comments on issues raised during reviews of PR #16		IOC				
1.2.2.3.3	TR233FB1	WP233703	13-Dec-96	Parts List for 21 PWR UCF Disposal Container	WP233735	Ltr	X			
				Parts List for 12 PWR UCF Disposal Container	WP233735	Ltr	X			
				Parts List for 44 BWR UCF Disposal Container	WP233735	Ltr	X			

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.3.3 Cont'd	TR233FB3 Cont'd	WP233703 Cont'd		Parts List for 4 Pack DHLW Disposal Container	WP233735	Ltr	X			
				Parts List for 5 Pack DHLW Disposal Container	WP233735	Ltr	X			
		WP233738	20-Sep-97	Sketch for closure weld mockup		IOC	X			
		WP233730	30-Jun-97	21 PWR UCF disposal container overall drawing		Dwg	X	X		X
				21 PWR UCF disposal container outer barrier drawing		Dwg	X	X		X
				21 PWR UCF disposal container inner barrier drawing		Dwg	X	X		X
				21 PWR UCF disposal container internals drawing		Dwg	X	X		X
				12 PWR UCF disposal container overall drawing		Dwg	X	X		X
				12 PWR UCF disposal container outer barrier drawing		Dwg	X	X		X
				12 PWR UCF disposal container inner barrier drawing		Dwg	X	X		X
				12 PWR UCF disposal container internals drawing		Dwg	X	X		X
				44 BWR UCF disposal container overall drawing		Dwg	X	X		X
				44 BWR UCF disposal container outer barrier drawing		Dwg	X	X		X
				44 BWR UCF disposal container inner barrier drawing		Dwg	X	X		X
				44 BWR UCF disposal container internals drawing		Dwg	X	X		X
				4 Pack DHLW disposal container overall drawing		Dwg	X	X		X
				4 Pack DHLW disposal container outer barrier drawing		Dwg	X	X		X
				4 Pack DHLW disposal container inner barrier drawing		Dwg	X	X		X
				4 Pack DHLW disposal container internals drawing		Dwg	X	X		X
				5 Pack DHLW disposal container overall drawing		Dwg	X	X		X
				5 Pack DHLW disposal container outer barrier drawing		Dwg	X	X		X
				5 Pack DHLW disposal container inner barrier drawing		Dwg	X	X		X

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.3.3 Cont'd	TR233FB3 Cont'd	WP233730 Cont'd		5 Pack DHLW disposal container internals drawing		Dwg	X	X		X
	TR233FB2	WP233745	28-Feb-97	Identification of prior analyses/configurations needing refinement/update		Ltr Rept	X	X		
		WP233746	06-Jun-97	Internal WP Criticality 3rd Probabilistic Analysis		Anal	X	X		
		WP233753	16-Sep-97	WP Probabilistic Criticality Analysis	WP233755	Anal	X	X		
		WP233752	06-Jun-97	External Criticality 2nd Probabilistic Analysis		Anal	X	X		
	TR233FB3	WP233756	31-Mar-97	Draft design sections for the non-fuel components waste container SDD		IOC	X			
				Draft design sections for the waste package supports SDD		IOC	X			
				Draft design sections for the UCF waste container SDD		IOC	X			
		WP233758	30-Sep-97	Final design sections for the non-fuel components waste container SDD		IOC	X			
				Final design sections for the UCF waste container SDD		IOC	X			
				Final design sections for the waste package supports SDD		IOC	X			
	TR233FB5	WP233712	30-Sep-97	Study of benefits of additional barriers and material selection recommendations		Ltr Rept	X			X
		WP233714	30-Sep-97	Engineering sketch package for additional barriers evaluations		IOC	X			X
	TR233FB6	WP233702	28-Mar-97	WP Support and Pier Static Analysis		Anal	X	X		
				WP Support and Pier Seismic/Vibration Loading Analysis		Anal	X	X		
				WP Support and Pier 21 PWR Drop Onto Support Analysis		Anal	X	X		
				Design Input sheets for WP support and pier design analyses		IOC	X			
				EBS Temperature Distributions Thermal Analysis		Anal	X	X		
				EBS Emplacement Scale Thermal Update Analysis		Anal	X	X		
				Design Input sheets for EBS thermal analyses analyses		IOC	X			
				Primary PWR Waste Package Thermal Analysis		Anal	X	X		
				Primary BWR Waste Package Thermal Analysis		Anal	X	X		

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT: PRELIMINARY DESIGN CONCEPT	VA COMPONENT: TSPA-VA	VA COMPONENT: LA PLAN	VA COMPONENT: ESTIMATE OF COST
1.2.2.3.3 Cont'd	TR233FB6 Cont'd	WP233710	30-Sep-97	Engineering sketches for WP support and pier design analyses		IOC	X			X
				Engineering sketches for EBS thermal analyses		IOC	X			X
	TR233FB7	WP233A29	01-Jul-97	Secondary PWR Waste Package Thermal Analysis		Anal	X	X		
				Multiple WP Emplacement Scale Thermal Analysis		Anal	X	X		
		WP233A30	30-Sep-97	UCF WP Static Loads, Thermal Expansion Loads, and Internal Pressure Analysis		Anal	X	X		
				UCF Waste Package 2-meter Drop Analysis		Anal	X	X		
				WP Handling/Lifting Analysis		Anal	X	X		
				UCF WP Slap Down Related Events Analysis		Anal	X	X		
				UCF WP 21 PWR Response to Slap Down Analysis		Anal	X	X		
				Statement of WP residual stresses for welding		Ltr Rept	X	X		
				UCF WP Basket Assembly Analysis		Anal	X	X		
				Missile from Failure of Pressurized Component DBE Analysis		Anal	X	X		
		WP233A32	09-Apr-97	WP Design Basis Fuel Analysis		Anal	X	X		
				Waste Package Design Basis Fuel Analyses		Anal	X	X		
				UCF WP Criticality Analysis		Anal	X	X		
				UCF WP PWR, BWR and DHLW Source Term Analysis		Anal	X	X		
				WP Radiolysis /Shielding Analysis		Anal	X	X		
		WP23A34	09-Apr-97	Design input sheets for UCF WP slap down evaluations		IOC	X			
				Design Input sheets for primary and secondary WP thermal analyses analyses		IOC	X			
				Design input sheets for WP DBE static evaluations		IOC	X			
				Design input sheets for UCF WP static evaluations		IOC	X			
				Design input sheets for UCF WP drop evaluations		IOC	X			

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.3.3 Cont'd	TR233FB7 Cont'd	WP23A34 Cont'd		Design input sheets for UCF WP miscellaneous components evaluations		IOC	X			
		WP233A36	30-Sep-97	Engineering sketches for primary and secondary WP thermal analyses		IOC	X			
				Engineering sketches for UCF WP drop evaluations		IOC	X			
				Engineering sketches for UCF WP miscellaneous component evaluations		IOC	X			
				Engineering sketches for UCF WP slap down evaluations		IOC	X			
				Engineering sketches for UCF WP static evaluations		IOC	X			
				Engineering sketches for WP DBE evaluations		IOC	X			
	TR233FB8	WP233782	13-Dec-96	List of available computer codes acquired		IOC	X			
		WP233766	12-Mar-97	Consequence model algorithms & codes		Ltr Rept	X	X		
		WP233764	14-May-97	Criticality consequence model		Ltr Rept	X	X		
	TR233FB9	WP233784	04-Sep-97	Disposal Criticality Technical Report, Rev. 1	WP150A3	Tech Doc	X	X	X	
	TR233FBC	WP233790	19-Dec-96	Algorithms and codes for identifying critical configurations		Ltr Rept	X	X		
		WP233792	01-May-97	Probabilistic criticality methodology		Ltr Rept	X	X		
	TR233FBE	WP233A02	28-Mar-97	PWR CRC Reactivity Analysis		Anal	X	X		
				BWR CRC Isotopic Analysis		Anal	X	X		
				PWR Isotopic Concentration Analysis		Anal	X	X		
				BWR CRC Reactivity Analysis		Anal	X	X		
				BWR Isotopic Concentration Analysis		Anal	X	X		
				PWR CRC Isotopic Analysis		Anal	X	X		
		WP233A06	28-Mar-97	Results of benchmark critical evaluations		Tech Doc	X	X		
				Benchmark Critical Analysis		Anal	X	X		
		WP233A18	13-Dec-97	Summary of BWR CRC data		Tech Doc	X	X		

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.3.3 Cont'd	TR233FBE Cont'd	WP233A18 Cont'd		Summary of PWR CRC data		Tech Doc	X	X		
1.2.2.3.4	TR234FB1	WP234702	30-Sep-97	Cost estimates for disposal containers		IOC				X
				Cost estimates for pedestal and supports		IOC				X
				Cost estimate for closure weld equipment		IOC				X
	TR234FB2	WP234708	18-Dec-96	Closure weld Technical Guidelines Document		Tech Doc	X			
				TDPP for closure weld TGD		IOC	X			
		WP234715	24-Mar-97	Closure weld mockup for NDE testing		Hardware	X			
		WP234720	29-Aug-97	WP Closure Methods Report	WP234721	Tech Doc	X			
				TDPP for WP Closure Methods Report		IOC	X			
		WP234722	30-Dec-96	Weld equipment envelope		IOC	X			
		WP234724	30-Sep-97	Weld equipment envelope update		IOC	X			
	TR234FB3	WP234727	13-Dec-96	TDPP for NDE Technical Guidelines Document		IOC	X			
				NDE Technical Guidelines Document		Tech Doc	X			X
		WP234734	15-Sep-97	TDPP for WP NDE Methods Report		IOC	X			
				WP NDE Methods Report	WP234736	Tech Doc	X			X
	TR234FB4	WP234738	30-Sep-97	Package of 5 fabrication sketches		IOC	X			X
		WP234740	29-Aug-97	Fabrication Report		Ltr Rept	X			X
1.2.2.4.1	TR241FB2	WP035A3	08-Apr-97	Waste Forms Characteristics Report	WP035A3	Tech Doc	X	X		
		WP35A05	22-Jan-97	WFCR Rev 1 Draft to Performance. Assess.		Draft Rpt.		X		
		WP35A07	26-Feb-97	Draft WFCR Rev 1 to YMSCO for Review		Draft Rpt.		X		
	TR241FB4	WP08522	15-Nov-96	TGA Oxidation Data to Oxidation Models		IOC		X		
		WP08523	02-Dec-96	Input to Models, GENISIS		IOC		X		

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.4.1 Cont'd	TR241FB4 Cont'd	WP08524	02-Dec-96	TGA Oxidation Test Data to GENISIS		IOC		X		
		WP08525A	12-Dec-96	Oxidation Test WFCR Rev 1 Chapter		IOC		X		
		WP08527	12-Jun-97	TGA Oxidation Test Data to Oxidation Mod		IOC		X		
	TR241FB5	WP085301	15-Nov-96	SF Diss Flow Thru Data to Models		IOC		X		
		WP085302	02-Dec-96	SF Diss Flow Thru Test Data to GENISIS		IOC		X		
		WP085305	25-Jun-97	SF Diss Flow Thru Test Data to Models		IOC		X		
		WP85303A	20-Dec-96	SF Diss Flow Thru Test Chap to WFCR-R1		IOC		X		
	TR241FB8	WP0862A	13-Jun-97	Spent Fuel ATM Procurement Report	WP0862A	Ltr Report		X		
	TR241FB9	WP122401	12-Dec-96	Waste Form Model Chap to WFCR-R1		IOC		X		
		WP122403	25-Jun-97	Response Models Results to PA		IOC		X		
	TR241FBA	WP122201	15-Nov-96	Unsaturated SF Drip Data to Models		IOC		X		
		WP122202	13-Dec-96	Unsaturated SF Drip Test Data to GENISIS		IOC		X		
		WP122205	25-Jun-97	Unsaturated SF Drip Test Data to Models		IOC		X		
	TR241FBB	WP122101	15-Nov-96	Dry Bath Oxidation. Data to SF Oxidation Model		IOC		X		
		WP122102	16-Dec-96	Dry Bath Oxidation Data to GENISIS		IOC		X		
		WP122105	25-Jun-97	Dry Bath Oxidation Data to Oxidation Mod		IOC		X		
	TR241GB2	WP110A05	29-Jul-98	Provide WFCR Rev 2 Draft to Performance. Assess.		IOC		X		
		WP110A07	22-Sep-98	WFCR Rev 2 to YMSCO for Review		IOC		X		
		WP110A3	27-Oct-98	Waste Form Char. Report. Rev 2		IOC		X		
	TR241GB3	WP08567	23-Dec-97	Activity Plan		Tech. Doc.		X		
		WP08572A	21-May-98	SF C-14 Release Data to GENISIS		IOC		X		
		WP08574	31-Jul-98	SF C-14 Release Test Data Report/WFCR2		IOC		X		

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							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.4.1 Cont'd	TR241GB4	WP08529	29-May-98	TGA Oxidation Data to Oxidation Models		IOC		X		
		WP08534	30-Jun-98	TGA Oxidation Chapter to WFCR Rev 2		IOC		X		
	TR241GB5	WP085307	11-Jun-98	SF Diss Flow Thru Data to Models		IOC		X		
		WP085309	14-Jul-98	SF Diss Flow Thru Chapter to WFCR Rev 2		IOC		X		
		WP085311	11-Jun-98	SF Diss Flow Thru Test Data to Models		IOC		X		
	TR241GB6	WP08552	30-Sep-98	SF Hardware Release Test Report		Tech Doc		X		
	TR241GB8	WP08616	30-Jun-98	Letter Report to YMSCO	WP08616	Ltr report		X		
	TR241GB9	WP122406	31-Aug-98	Response Model to PA & WFCR-Rev 2		IOC		X		
	TR241GBA	WP122207	11-Jun-98	Unsaturated SF Drip Data to Models		IOC		X		
		WP122209	14-Jul-98	Drip Test Chapter to WFCR Rev 2		IOC		X		
		WP122211	14-Oct-98	Unsaturated SF Drip test Data to Models		IOC		X		
	TR241GBB	WP122107	11-Jun-98	Dry Bath Data to Oxidation Models		IOC		X		
		WP122109	14-Jul-98	Dry Bath Oxidation Chap to WFCR Rev 2		IOC		X		
		WP122111	30-Sep-98	Dry Bath Data to Oxidation Models		IOC		X		
	TR241GBC	WP241800	30-Jan-98	Activity Plan		Tech Doc		X		
1.2.2.4.2	TR242FB1	WP085600	31-Jan-97	Activity Plan		Tech Doc		X		
	TR242FB2	WP122301	15-Nov-96	HLWG Drip Data to Models		IOC		X		
		WP122302	02-Dec-96	Unsaturated HLWG Drip Test Data to GENISIS		IOC		X		
		WP122307	12-Jun-97	HLWG Drip Test Data to Models		IOC		X		
	TR242FB3	WP085101	12-Dec-96	HWG Dissolution Rate Model Chap to WFCR-R1		IOC		X		
		WP085103	13-Jun-97	HWG Dissolution Rate Model Results to PA		IOC		X		
	TR242GB1	WP085620	30-Jun-98	HLWG Flow Thru Test Chap to WFCR Rev 2		IOC		X		

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT: PRELIMINARY DESIGN CONCE	VA COMPONENT: TSPA-VA	VA COMPONENT: LA PLAN	VA COMPONENT: ESTIMATE OF COST
1.2.2.4.2 Cont'd	TR242GB1 Cont'd	WP085625	29-Jan-99	HLWG Flow Thru Test Data to Models		IOC		X		
		WP085630	30-Nov-98	Data to Model		IOC		X		
		WP085631	29-Dec-98	Data to GENESIS		IOC		X		
	TR242GB2	WP122309	09-Apr-98	HLWG Drip Test Chapter to WFCR Rev 2		IOC		X		
		WP122311	10-Jul-98	HLWG Drip Test Data to Models		IOC		X		
	TR242GB3	WP085105	29-Jun-98	HWG Dissolution Rate Model Results/WFCR-R2		IOC		X		
		WP085106	29-Jun-98	HWG Dissolution Rate Model Results to PA		IOC		X		
1.2.2.5.1	TR251FB1	WP26708	16-Jan-97	Statement of initiation of Abiotic & Biotic MIC tests	WP26708	Ltr report		X		
		WP26709	31-Jul-97	MIC Data Input Update to PA		IOC		X		
		WP26713	16-Jan-97	MIC Data Input to PA		IOC		X		
	TR251FB4	WP26305	29-Aug-97	Critical Pot. Measurement Update Data to PA		IOC		X		
		WP26309	15-Jan-97	Critical. Pot. Measurements Data to PA(1)		IOC		X		
	TR251FB5	WP26505	15-Jan-97	Thermogravimetric Anal. Data to PA		IOC		X		
		WP26506	30-Sep-97	Thermogravimetric Anal Update to PA		IOC		X		
	TR251FB7	WP26203	14-Jan-97	Critical Potential Test Data to PA		IOC		X		
		WP26204	31-Jul-97	Diff Area Ratios Test Update Data to PA		IOC		X		
	TR251FB9	WP015A3	28-Feb-97	Engineered Materials Characterization Report	WP015A3	Tech Doc		X		
		WP15A05	15-Jan-97	EMCR Rev 1 Draft to Performance. Assess.		IOC		X		
		WP15A10	01-Apr-97	EMCR Rev. 1		Draft Rpt		X		
	TR251FBA	WP26402	10-Feb-97	Statement of initiation of controlled electrochemical potential tests	WP24602	Ltr Report		X		
		WP26403	30-Jun-97	Potential Control Data Update to PA		IOC		X		
		WP26404	16-Jan-97	Potential Control Data to PA		IOC		X		

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1.2.2.5.1 Cont'd	TR251FBB	WP60801	11-Aug-97	Startup 3B Tanks	WP60801	Ltr Report		X		
		WP60801A	30-Jul-97	Statement of initiation of LT galvanic corrosion testing	WP60801A	Ltr Report		X		
	TR251FBC	WP60703A	16-Jan-97	Letter Rep Initiation of Crack Growth Rate Testing	WP60703A	LTR		X		
		WP60705B	30-Jun-97	Data to PA		IOC		X		
	TR251FBE	WP60504	18-Jul-97	Crevice Corrosion Data to PA		IOC		X		
		WP60508	30-Sep-97	Prelim SCC/HE Model Info to EMCR-R2		IOC		X		
		WP60509	30-Sep-97	SCC/HE/Prelim. Galvanic. Corrosion. Model Data to PA		IOC		X		
	TR251FBG	WP60103	31-Mar-97	1st Tanks 1st Specimen Results to PA		IOC		X		
		WP60107	30-May-97	1st Specimen (1st Tanks) Report to EMCR-R2		IOC		X		
		WP60116	08-Jul-97	Startup 2A Tanks	WP60116	LTR		X		
		WP60118	08-Jul-97	Startup 2B Tanks	WP60118	LTR		X		
	TR251FBH	WP61607	13-Jan-97	Initiation of Rel Humidity Chamber Corrosion Tests	WP61607	LTR		X		
		WP61613	30-Jul-97	1st Batch Report to PA		IOC		X		
	TR251FBK	WP26904	31-Jul-97	Data input to PA		IOC		X		
	TR251GB2	WP20A01	30-Oct-98	EMCR Rev 2 Prelim Draft		IOC		X		
		WP20A04	02-Dec-98	EMCR Rev 2 Draft to Performance. Assess.		IOC		X		
		WP27005	31-Aug-98	Input to EMCR-R2		IOC		X		
	TR251GB4	WP26303	31-Jul-98	Critical. Pot. Measurements Report. to EMCR-R2		IOC		X		
	TR251GB5	WP26511	30-Sep-98	Input to EMCR Rev. 2		IOC		X		
	TR251GB6	WP25810	30-Sep-98	Input to EMCR-R2 2		IOC		X		
	TR251GB7	WP25206	30-Sep-98	Input EMCR-R2		IOC		X		
		WP26209	29-Sep-98	Data to Model Activity		IOC		X		

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P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.5.1 Cont'd	TR251GB8	WP25860	30-Sep-98	Results to EMCR Rev 2		IOC		X		
	TR251GBA	WP60908	31-Jul-98	Electrochemical Potential Report to EMCR-R2		IOC		X		
	TR251GBB	WP60810	05-Dec-97	3rd Tank/1st Batch Report to EMCR-R2		IOC		X		
	TR251GBC	WP60707	31-Aug-88	Self Loaded SCC Growth Report to EMCR-R2		IOC		X		
	TR251GBD	WP26826	30-Sep-98	Input to EMCR-R2		IOC		X		
		WP26829	04-Dec-97	Data to Performance Assessment		IOC		X		
		WP26831	30-Mar-98	Planning Input to Longer Term Testing		IOC		X		
		WP26833	30-Sep-98	Additional Input to Near Field environment		IOC		X		
	TR251GBE	WP60503	20-Jul-98	Preliminary Crevice Corrosion Update to EMCR-R2		IOC		X		
		WP60516	27-Jul-98	Preliminary Galvanic Corrosion Info to EMCR-R2		IOC		X		
		WP60518	27-Jul-98	Preliminary Galvanic Corrosion Info to PA		IOC		X		
		WP60524	30-Sep-98	MIC Model Info to EMCR-R2		IOC		X		
		WP60526	30-Sep-98	MIC Model Info to PA		IOC		X		
		WP60532	31-Aug-98	Phase Stability Model Update to EMCR-R2		IOC		X		
		WP60534	31-Aug-98	Phase Stability Model Update to PA		IOC		X		
		WP60538	30-Sep-98	Pitting Corrosion Model Update to EMCR-R3		IOC		X		
		WP60539	30-Sep-98	Pitting Corrosion Model Update to PA		IOC		X		
		WP60543	31-Aug-98	Oxidation/General Corrosion Update to EMCR-R2		IOC		X		
		WP60544	31-Aug-98	Oxidation/General Corrosion Model Update to PA		IOC		X		
	TR251GBG	WP60109	28-Sep-98	1st Tanks 2nd specimen Results to PA		IOC		X		
		WP60111	30-Jun-98	Analytical/Biological Feedback to NFE		IOC		X		
		WP60113	02-Dec-98	2nd Specimen (1st Tanks) Report to EMCR-R2		IOC		X		

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							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.2.5.1 Cont'd	TR251GBG Cont'd	WP60126	22-May-98	Analytical/Biological Samples to NFE		IOC		X		
		WP60130	22-Jul-98	1st Batch (2nd Tanks) Report to EMCR-R2		IOC		X		
	TR251GBH	WP61609	03-Aug-98	2nd Batch Report for EMCR-R2		IOC		X		
	TR251GBK	WP26906	31-Aug-98	Input to EMCR-R2		IOC		X		
		WP26909	31-Aug-98	Input Conditions-Long Term Aging Tests		IOC		X		
	TR251FB1	WP61004	31-Jul-97	Prelim. Basket Material Performance. Model to PA & Design.		IOC		X		
1.2.2.5.2	TR252FB2	WP27210	15-Jan-97	ST Basket Materials Test Data to PA		IOC		X		
		WP27211	31-Jul-97	ST Basket Materials Test Data Update to PA		IOC		X		
	TR252GB1	WP61003	31-Jul-98	Input to EMCR-R2		IOC		X		
	TR252GB2	WP27209	30-Sep-98	Input to EMCR-R2		IOC		X		
1.2.2.5.5	TR255FB1	WP60404	30-Jun-97	Data Input to PA		IOC		X		
	TR255FB2	WP26809	29-Aug-97	Feedback to Near-Field Environment		IOC		X		
		WP26815	29-Aug-97	Data to Performance Assessment		IOC		X		
	TR255GB1	WP60408	30-Sep-98	Input to EMCR-R2		IOC		X		
	TR255GB2	WP26807	30-Sep-98	Input to EMCR-R2		IOC		X		
		WP26811	31-Dec-97	Planning Input to Longer Term Testing		IOC		X		
1.2.2.5.6	TR256FB1	WP60413	30-Jun-97	Data Input to PA		IOC		X		
	TR256FB2	WP60301	30-Jun-97	Into LA, Design		IOC		X		
		WP60315A	13-Jun-97	Ceramic Feasibility/Mech. Tests & Evaluation	WP60315A	Ltr. Rpt.		X		
	TR256GB1	WP60417	30-Apr-98	Inputs to PA, Design		IOC		X		
		WP60420	30-Sep-98	Input to EMCR-R2		IOC		X		
	TR256GB2	WP60320A	31-Jul-98	Input to EMCR Rev 2		IOC		X		

APPENDIX D

REPOSITORY SURFACE AND SUBSURFACE PRODUCTS

The data contained in this appendix reflects the status of the Yucca Mountain Site Characterization Project as of 12/16/96. Because of the evolving conditions of the Yucca Mountain Site Characterization Project, data in this appendix is changed or updated as necessary. However, this VA Design and Review Plan will not be revised or reissued as a result of data updates. For a current status of the data in this appendix and/or a copy of the current version, contact D. Stahl. For suggested changes to the contents, contact A. Segrest.

REPOSITORY SURFACE AND SUBSURFACE PRODUCTS

A list of products to be developed by the Repository Surface and Subsurface Products organization is provided. The planning and summary account number, summary account number, work breakdown structure, and activity number are provided for each product. If the product is part of a deliverable, the deliverable number is provided. The product type and the estimated end date are also provided. If the product is directly related to any of the four VA components, that information is also provided.

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.2	TR42FA6	RP100702	31-Dec-96	VA Design & Review Plan	RP120MG1	Tech Doc	X	X		X
			30-Sep-97	Draft LA Design & Review Plan	RP120MG2	Tech Doc			X	
	TR42FB3	RP2402D1	05-Nov-97	Design Guide Plan		Plan				
		RP2402D2	29-May-97	Source Terms Design Guide	RP120MBH	Guides	X			
		RP2402D4	30-Sep-97	Remote Operations Design Guide	RP120MBH	Guides	X			
	TR42FB4	RP2405B1	31-Mar-97	Input to WAST, Quantity, Mix/Thruput SE200A		Input	X			
		RP2405B2	31-Mar-97	Input to Support Retrieval Strategy, SE502		Input	X			
		RP2405B3	07-Apr-97	Input to Seals Closure, SE506		Input	X			
		RP2405B4	30-Sep-97	Input to S&S Requirements, SEZ30		Input	X			
		RP2405B5	30-Sep-97	Input to Waste Package Size, SE460		Input	X			
		RP2405B6	30-Sep-97	Input to Waste Generated (Disp.),SE436		Input	X			
		RP2405B7	25-Jul-97	Input to Test & Evaluation Plan, SE 504		Input	X			
		RP2405B8	30-Sep-97	Input to Perform. Confirmation, SE050B		Input	X			
	TR42FB5	RP120700	15-Jul-97	Radiation Design Guide	RP120M3H	DG	X			
		RP120710	30-Sep-97	Drift Design Guide.	RP120M3H	DG	X			
		RP120715	30-Sep-97	Ground Control SDD		Tech Doc	X			
				EBS SDD		Tech Doc	X			
				SS HVAC SDD		Tech Doc	X			
				WP Handling SDD		Tech Doc	X			
				PC Monitoring SDD		Tech Doc	X			
				Seal System SDD		Tech Doc	X			
				SS Repository Area SDD		Tech Doc	X			

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.2 Cont'd	TR42FB5 Cont'd	RP120715 Cont'd		Subsurface Accesses SDD		Tech Doc	X			
				Retrieval System SDD		Tech Doc	X			
				Backfill Emplacement SDD		Tech Doc	X			
				SS Electrical Power Distribution SDD		Tech Doc	X			
				SS Fire Suppression SDD		Tech Doc	X			
				SS Radiation Monitoring SDD		Tech Doc	X			
				Excavation/Muck Handling SDD		Tech Doc	X			
1.2.4.6	TR46FB2	RP2403A1	14-Jun-97	Space Allocation Analysis Input		Space	X			
		RP2403A2	29-Jan-97	System Configuration Analysis/ Model	RP243AMA	Anal	X			
		RP2403A2	29-Jan-97	Qualification of Witness		V&V	X			
		RP2403A3	30-May-97	Waste Handling Overview	RP243AMB	Dwg	X			X
				Carrier Unloading & Cask Preparation	RP243AMB	Dwg	X			X
				DPC Removal and Opening	RP243AMB	Dwg	X			X
				Spent Fuel Assembly Handling	RP243AMB	Dwg	X			X
				Waste Canister Handling	RP243AMB	Dwg	X			X
				Unloaded Cask Prep & Carrier Loading	RP243AMB	Dwg	X			X
				DC Welding and Transfer	RP243AMB	Dwg	X			X
				Equipment Drawings (4)			X			
		RP2403A3	15-May-97	Horizontalizer			X			
				DPC Delidding System			X			
				Fuel Transfer System			X			
				Fuel Staging Rack			X			

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd	TR246FB2 Cont'd	RP2403A3 Cont'd		Space Allocation Analysis Input		Input	X			
		RP2403A3	30-May-97	Recovery Operations		Anal	X			
				Fuel Transfer System		Anal	X			
				DPC Transfer & Opening		Anal	X			
		RP2403A4	30-May-97	Cask Handling Operations	RP243AMB	Dwg	X			X
				Cask Decontamination	RP243AMB		X			X
				Pool Purification	RP243AMB	Dwg	X			X
				Cask Cleaning	RP243AMB	Dwg	X			X
				Space Allocation Analysis Input		Anal	X			
		RP2403A5	01-Jul-97	Liquid LLW Processing (11 Sheets)	RP243AMC	Dwg	X			X
				Liquid and Solid LLW Material Balance	RP243AMC	Dwg	X			X
				DPC Processing (2 sheets)	RP243AMC	Dwg	X			
				Solid LLW Processing (8 sheets)	RP243AMC	Dwg	X			X
				Space Allocation Analysis Input		Dwg	X			X
				Secondary Waste Generation Analysis		Anal	X			
				LLW Treatment Systems			X			
				DPC Disposition System		Anal	X			
		RP2403A6	11-Jul-97	Functional Relationship Diagram		Anal	X			
				WHO EL. 100+0		Drft GAs	X			
				WHO EL. 116+0		Drft GAs	X			
				WHO EL. 130 +0		Drft GAs	X			
				WHO EL. 143 + 0		Drft GAs	X			

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd	TR246FB2 Cont'd	RP2403A6 Cont'd		WHO EL. 160 + 0		Drft GAs	X			
				WHO EL. 100 + 0		Drft GAs	X			
				WHO EL. 115 +0		Drft GAs	X			
				WHO (2 sheets)		Drft GAs	X			
				WTO		Drft GAs	X			
				WHO		Drft GAs	X			
				WTO		Drft GAs	X			
				WHO		Drft GAs	X			
				WTO		Drft GAs	X			
		RP2403A7	30-Sep-97	WHO		Anal	X			
				WTO		Anal	X			
				WHO (2 sheets)		Dwg	X			
				WTO		Dwg	X			
				WHO (2 sheets)		Dwg	X			
				WTO		Dwg	X			
		RP2403A8	30-Sep-97	Composite Key	'RP243AMD	Dwg	X			X
				Carrier Bay/HVAC Equipment Room	'RP243AMD	Dwg	X			X
				Primary Confinement Supply Air	'RP243AMD	Dwg	X			X
				Secondary & Tertiary Confinement Supply Air	'RP243AMD	Dwg	X			X
				Primary Confinement Areas	'RP243AMD	Dwg	X			X
				Secondary & Tertiary Area (EL. 100+0)	'RP243AMD	Dwg	X			X
				Secondary & Tertiary Area (EL. 116+0)	'RP243AMD	Dwg	X			X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd	TR246FB2 Cont'd	RP2403A8 Cont'd		Secondary & Tertiary Area (EL. 130+0)	'RP243AMD	Dwg	X			X
				Secondary & Tertiary Area (EL. 143+0)	'RP243AMD	Dwg	X			X
				HVAC Equipment Room	'RP243AMD	Dwg	X			X
				Primary Confinement Exhaust Air	'RP243AMD	Dwg	X			X
				Secondary & Tertiary Exhaust Air	'RP243AMD	Dwg	X			X
				HVAC Exhaust Stacks	'RP243AMD	Dwg	X			X
				Neutral Areas	'RP243AMD	Dwg	X			X
				Plan at EL. 100+0		Dwg	X			
				Plan at EL. 116+0		Dwg	X			
				Plan at EL. 130+0		Dwg	X			
				Plan at EL. 143+0		Dwg	X			
				Plan at EL. 160+0		Dwg	X			
				WHO		Anal	X			X
				WTO		Anal	X			X
				WHO		Anal	X			X
				WTO		Anal	X			X
		RP2403A9	11-Jul-97	Space Allocation Analysis		Anal	X			X
				WHO EL. 116+0	RP243AME	Final GAs	X			X
				WHO EL. 130+0	RP243AME	Final GAs	X			X
				WHO EL. 143+0	RP243AME	Final GAs	X			X
				WHO EL. 160+0	RP243AME	Final GAs	X			X
				WTO EL. 100+0	RP243AME	Final GAs	X			X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd	TR246FB2 Cont'd	RP2403A9 Cont'd		WTO EL. 115+0	RP243AME	Final GAs	X			X
				WHO (2 sheets)	RP243AME	Final GAs	X			X
				WTO	RP243AME	Final GAs	X			X
				WHO	RP243AME	Final GAs	X			X
				WTO	RP243AME	Final GAs	X			X
				WHO	RP243AME	Final GAs	X			X
				WTO	RP243AME	Final GAs	X			X
		RP2403AA	30-Sep-97	Waste Handling Prototype Study		Ltr	X			X
				Carrier Staging Shed		Input	X			
				Carrier Staging Shed Material Handling		Input	X			
				Waste Handling Facility		Input	X			
				Waste Handling Facility Ventilation		Input	X			
				Cask/Canister Handling		Input	X			
				Uncanistered Waste Transfer		Input	X			
				Canistered Waste Transfer		Input	X			
				Disposal Container Handling		Input	X			
				Waste Package Remediation		Input	X			
				Cask Maintenance Facility		Input	X			
				Cask Handling, Maintenance and Certification		Input	X			
				Cask Maintenance Facility Ventilation		Input	X			
				Radiological Waste Treatment Facility		Input	X			
				Site Generated Radiological Waste Handling		Input	X			

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd	TR246FB2 Cont'd	RP2403AA Cont'd		Radiological Waste Treatment Facility Ventilation		Input	X			
	TR46FB3	RP2402A1	30-May-97	Radiological Safety Design Analysis		Anal	X			
				Qualification of Microshield		V&V	X			
				Qualification of Qadcggp 1.2		V&V	X			
				Qualification of MCNP		V&V	X			
				Waste Handling Facility Radiological Monitoring		Input	X			
		RP2402A2	30-Sep-97	Normal & Off-normal Dose Assessment	RP242AM	Anal	X			
	TR46FB4	RP2402C5	30-Jan-97	Operations/Staffing Letter Report	RP242CM	Ltr	X			X
	TR46FB5	RP2403C1	30-Sep-97	Site Grading & Drainage Plan		Dwg	X			X
		RP2403C2	30-Sep-97	MGDS Facility Layout		Input	X			
				Carrier/Cask Transport		Input	X			
		RP2403C3	30-Sep-97	Repository Surface Operations Overview	RP243CM	Dwg	X			X
				North Portal Operations Overview	RP243CM	Dwg	X			X
				North Portal Operations Area Site Map	RP243CM	Dwg	X			X
	TR46FB7	RP2405C1	01-May-97	DBE Screening Analysis II		Anal	X			
				Complete the Surface DBE Pilot Analysis		Comp.-Anal	X			
				Shipping Cask Slapdown in NOB Analysis		Anal	X			
				Spent Fuel Damage During Welding Analysis		Anal	X			
		RP2405C2	01-Jul-97	External Events Analysis		Anal	X			
		RP2405C3	27-Feb-97	Input to Aircraft Crash Credibility Analysis		Input	X			
		RP2405C4		Classification Analysis Support	LOE	LOE	X			
	TR46FB8	RP24071	30-Apr-97	Reference Design Roadmap		Ltr				

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	T3PA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.6 Cont'd6	TR46FB8 Cont'd	RP24071 Cont'd		Engineering Files Report Input	RP247M3	Ltr				
		RP24072	30-Sep-97	Operational Staffing Impacts Analysis		Input	X			X
				Operational Wastes/Emissions Impacts Analysis		Input	X			
				HVAC Energy Analysis For Support Structures		Input	X			X
				Electrical Load Estimate		Input	X			X
				Water/Sewage Balance		Input	X			X
				Other Resource Data		Input	X			X
				Off-normal consequences analysis		Input	X			
				Construction Impacts Analysis		Input	X			X
				Engineering Files Report Input Update	RP247M3B	Ltr				
1.2.4.6		RP020700	01APR97	Fifth Rail Corridor Analysis						
		RP020702	05JUN97	Refinement of Rail Corridor Alignments	RP020M3	Dwg	X			X
1.2.4.7	TR47FB1	RP500705	30-Sep-97	Database of Repository Construction Material	RP1206M3	Tech Doc	X	X		X
	TR47FB2	RP510710	31-Jul-97	Near Field Environment of Emplacement Drifts		Anal	X	X		
	TR47FB3	RP506705	31-Dec-96	Materials for Emplacement Drift Ground Support		Anal	X	X		X
		RP506710	01-Apr-97	Stability Analysis for Emplacement Drifts		Anal	X	X		
		RP506715	16-Apr-97	Lining Design for Emplacement Drifts		Anal	X	X		X
		RP506720	30-Sep-97	Emplacement Drift Ground Support GA - Isometric	RP120M3C	Dwg	X	X		
				Emplacement Drift Ground Support Plan & Profile	RP120M3C	Dwg	X	X		X
				Emplacement Drift Ground Support Sections	RP120M3C	Dwg	X	X		X
				Emplacement Drift Ground Support Segment Details & Tolerances	RP120M3C	Dwg	X	X		X
				Accesses Ground Support Section Views	RP120M3C	Dwg	X	X		X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FB3 Cont'd	RP506720 Cont'd		Access Intersections Ground Support - GA	RP120M3C	Dwg	X	X		X
				Access Intersections Ground Support - Sections	RP120M3C	Dwg	X	X		X
				TBM Launch & Recovery Chamber Ground Support - GA	RP120M3C	Dwg	X	X		X
				TBM Launch & Recovery Chamber Ground Support - Sections	RP120M3C	Dwg	X	X		X
				Exhaust Main Ground Support - GA	RP120M3C	Dwg	X	X		X
				Exhaust Main Ground Support - Sections	RP120M3C	Dwg		X		X
				Ventilation Raise Ground Support - GA	RP120M3C	Dwg	X	X		X
				Ventilation Raise Ground Support - Sections	RP120M3C	Dwg	X	X		X
				Emplacement Drift Turnout Ground Support - GA	RP120M3C	Dwg	X	X		X
				Emplacement Drift Turnout Ground Support - Sections	RP120M3C	Dwg	X	X		X
				Shaft Ground Support - GA	RP120M3C	Dwg	X	X		X
				Shaft Ground Support - Sections	RP120M3C	Dwg	X	X		X
	TR47FB5	RP120760	08-May-97	Site Geology and Determination of Available Emplacement Area		Anal	X	X		
		RP120795	11-Feb-97	Subsurface Layout Analysis		Anal	X	X		
		RP120765	29-Aug-97	Subsurface Layout Coordinate Geometry Analysis		Anal	X	X		X
		RP120755	30-Apr-97	Subsurface Construction and Development Methodology Analysis		Anal	X			X
		RP120780	01-Jul-97	Subsurface Construction and Operations Integrated Schedule		Anal	X			X
		RP120789	01-Apr-97	Thermal Load Management Analysis		Anal	X	X		
		RP120775	01-Jul-97	Preliminary List of Construction Equipment		Tech Doc	X			X
		RP120785	30-Sep-97	Site Geology Details Plan & Sections, Sheet 1	RP120M3	Dwg	X	X		X
				Site Geology Details Plan & Sections, Sheet 2	RP120M3	Dwg	X	X		X
				Overall Subsurface Layout GA (3D)	RP120M3	Dwg	X	X		X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FB5 Cont'd	RP120785 Cont'd		Overall Layout Showing Usable Emplacement Area	RP120M3	Dwg	X	X		X
				Potential Emplacement Expansion Areas	RP120M3	Dwg	X	X		X
				Overall Layout Showing Excavation Method & Drift Sizes	RP120M3	Dwg	X	X		X
				Subsurface Drainage Patterns	RP120M3	Dwg	X	X		X
				Typical Access Ramps and Mains Elevations & Cross Sections - Construction Phase	RP120M3	Dwg	X	X		X
				Typical Access Ramps and Mains Elevations & Cross Sections - Emplacement Mode	RP120M3	Dwg	X	X		X
				Emplacement Side Ventilation Shaft GA	RP120M3	Dwg	X	X		X
				Development Side Ventilation Shaft GA	RP120M3	Dwg	X	X		X
				7.62 m TBM Launch and Recovery Chambers (3D)	RP120M3	Dwg	X	X		X
				Exhaust Main and Ventilation Raise GA (3D)	RP120M3	Dwg	X	X		X
				Emplacement Drift Details - Section and Elevation	RP120M3	Dwg	X	X		X
				Emplacement Drift Turnouts	RP120M3	Dwg	X	X		X
				Shadow Shields Details (3D)	RP120M3	Dwg	X	X		X
				Roadheader Openings - Miscellaneous Sections	RP120M3	Dwg	X	X		X
				Pre-Emplacement Construction Schedule	RP120M3A	Dwg	X	X		X
				Emplacement & Development Schedule	RP120M3A	Dwg	X	X		X
				Subsurface Construction & Development Sequence - Phase 1	RP120M3A	Dwg	X	X		X
				Subsurface Construction & Development Sequence - Phase 2	RP120M3A	Dwg	X	X		X
				Subsurface Construction & Development Sequence - Phase 3	RP120M3A	Dwg	X	X		X
				Emplacement Drift Construction Sequence (3D)	RP120M3A	Dwg	X	X		X
				7.62 m TBM and Trailing Gear Configuration (3D)		Dwg	X	X		X
				7.62 m TBM Launch & Recovery (3D)		Dwg	X	X		X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FB5 Cont'd	RP120785 Cont'd		Roadheader Excavation of Emplacement Drift Turnout (3D)		Dwg	X	X		X
				Emplacement Drift TBM and Trailing Gear Configuration (3D)		Dwg	X	X		X
				Emplacement Drift TBM Launch (3D)		Dwg	X	X		X
				Emplacement Drift TBM Recovery (3D)		Dwg	X	X		X
				Equipping of Mains for Emplacement Operations		Dwg	X	X		X
				Emplacement Drift Equipping		Dwg	X	X		X
				Emplacement Drift Ventilation Raises Excavation and Lining Installation		Dwg	X	X		X
				Muck Handling P&ID		Dwg	X	X		X
				Muck Handling Equipment and Operations Details		Dwg	X	X		X
				Emplacement Drift Ground Support Installation (3D)		Dwg	X	X		X
				Ventilation Shafts Excavation Sequence and Lining Installation		Dwg	X	X		X
				Emplacement Area for 70,000 MTU of Waste	RP120M3B	Dwg	X	X		X
				Emplacement Drift and Waste Package Emplacement Arrangement	RP120M3B	Dwg	X	X		X
	TR47FB6	RP502700	14-Jul-97	Emplacement Equipment Design Analysis		Anal	X			
		RP502730	14-Aug-97	Remote Handling and Communications for WP Emplacement Systems		Anal	X			
		RP502705	15-Jul-97	Electrification of SS Railed Vehicles		Anal	X			
		RP502715	30-Sep-97	Emplacement Equipment Description		Tech Doc	X			X
		RP502740	30-Sep-97	RH&C Equipment Description		Tech Doc	X			X
		RP502735	20-Jun-97	Transport Locomotive	RP502M3	Dwg	X			X
				WP Transporter with Unloading System	RP502M3	Dwg	X			X
				Gantry Carrier	RP502M3	Dwg	X			X
				Rail Car	RP502M3	Dwg	X			X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT: PRELIMINARY DESIGN CONCEPT	VA COMPONENT: TSPA-VA	VA COMPONENT: LA PLAN	VA COMPONENT: ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FB6 Cont'd	RP502735 Cont'd		Emplacement Rail System	RP502M3	Dwg	X			X
				WP Gantry Plan & Elevation	RP502M3	Dwg	X			X
				WP Gantry Vertical Lift Detail	RP502M3	Dwg	X			X
				WP Gantry Traction Motor Detail	RP502M3	Dwg	X			X
				WP Gantry Length Adjustment Method	RP502M3	Dwg	X			X
				Repository Partial Plan - Drift Isolation Doors	RP502M3	Dwg	X			X
				Interface Logic Diagram for Mobile Equipment	RP502M3	Dwg	X			X
				Typical Main Drift Overhead Wire System	RP502M3	Dwg	X			X
				Typical Emplacement Drift Conductor Bar System	RP502M3	Dwg	X			X
				Typical Drift Turnout Conductor Bar System	RP502M3	Dwg	X			X
				Emplacement Transfer/Loading Dock	RP502M3	Dwg	X			X
				SS Layout of the Rail Rectifier Units	RP502M3	Dwg	X			X
				Rail Electrification One-Line Diagram	RP502M3	Dwg	X			X
				Emplacement System: Control Systems	RP502M3	Dwg	X			X
				Overview of Control and Communication Systems for WP Emplacement	RP502M3	Dwg	X			X
				Emplacement System: Communications System	RP502M3	Dwg	X			X
				Emplacement Gantry: Control & Communication Systems	RP502M3	Dwg	X			X
	TR47FB7	RP123750	30-Sep-97	Shielding Analysis		Anal	X			
		RP123758	30-Jun-97	Retrieval OPS Analysis		Anal	X			
		RP123752	30-Sep-97	Computer Code Qualification		Tech Doc	X			
	TR47FB9	RP122725	30-Apr-97	Devel./Emplacement. Ventilation Analysis		Anal	X	X		
		RP122710	28-Feb-97	Emplacement. Exhaust. HEPA Filter Analysis		Anal	X			

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FB9 Cont'd	RP122720	28-Feb-97	Airflow Control Analysis		Anal	X	X		
		RP122705	31-Jan-97	Dust Control Analysis		Anal	X	X		
		RP122730	30-Apr-97	Preliminary Equipment List and Description		Tech Doc	X			X
		RP122745	30-Sep-97	Overall Subsurface Ventilation GA - Pre-emplacement Construction Early Phase	RP120M3D	Dwg	X	X		X
				Overall Subsurface Ventilation GA - Pre-emplacement Construction Mid Phase	RP120M3D	Dwg	X	X		X
				Overall Subsurface Ventilation GA - Pre-emplacement Construction Late Phase	RP120M3D	Dwg	X	X		X
				Overall Subsurface Ventilation GA - Development and Emplacement Early Phase	RP120M3D	Dwg	X			X
				Overall Subsurface Ventilation GA - Development and Emplacement Mid Phase	RP120M3D	Dwg	X	X		X
				Overall Subsurface Ventilation GA - Development and Emplacement Early Final Phase	RP120M3D	Dwg	X	X		X
				Overall Subsurface Ventilation GA - Caretaker Phase	RP120M3D	Dwg	X	X		X
				Exhaust Shaft GA Fans & HEPA Filters Sheet 1	RP120M3D	Dwg	X			X
				Exhaust Shaft GA Fans & HEPA Filters Sheet 2	RP120M3D	Dwg	X			X
				Exhaust Shaft GA Fans & HEPA Filters Sheet 3	RP120M3D	Dwg	X			X
				South Portal Intake Fans and Airlock GA Sheet 1	RP120M3D	Dwg	X			X
				South Portal Intake Fans and Airlock GA Sheet 2	RP120M3D	Dwg	X			X
				South Portal Intake Fans and Airlock GA Sheet 3	RP120M3D	Dwg	X			X
				Emplacement/Development Isolation Airlocks (3D)	RP120M3D	Dwg	X			X
				Emplacement Drift Ventilation Doors (3D)	RP120M3D	Dwg	X			X
	TR47FBA	RP504705	13-Jun-97	Waste Package Retrieval Equipment		Anal	X			
		RP504715	29-Aug-97	WP Retrieval Equipment Description		Tech Doc	X			X
		RP504710	18-Jun-97	Rerailer	RP504M3	Dwg	X			X
				Heavy Duty Forklift		Dwg	X			X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FBa Cont'd	RP504710 Cont'd		Inclined Plane Hauler	RP504M3	Dwg	X			X
				Inclined Plane Hauler & Shielding	RP504M3	Dwg	X			X
				LHD with Ejector Bucket		Dwg	X			X
				H.D. Forklift for Emplacement Drift		Dwg	X			X
				Covered Shuttle Car & LHD Unit		Dwg	X			X
				Multipurpose Vehicle w/Impact Hammer		Dwg	X			X
				Multipurpose Vehicle w/Bucket		Dwg	X			X
				Multipurpose Vehicle w/Shear	RP504M3	Dwg	X			X
				Hydraulic Shear	RP504M3	Dwg	X			X
				Retrieval Skid Plate	RP504M3	Dwg	X			X
	TR47FBD	RP123762	30-Sep-97	DBE Scenario Analysis		Anal	X			
		RP123768	30-Sep-97	CMF Logic Analysis		Anal	X			
		RP123764	15-Sep-97	SSC Support Document		Tech Doc	X			
		RP123766	30-Apr-97	Computer Code Qualification		Tech Doc	X			
	TR47FBH	RP128715	04-Aug-97	Subsurface Repository Engineering File		Tech Doc	X			
		RP128705	30-Jun-97	General Surface, Subsurface Arrangement - Proposed Action		Dwg	X			
				Subsurface Layout - Proposed Action (High Thermal Load)		Dwg	X			
				Subsurface Layout - Alternative (Medium Thermal Load)		Dwg	X			
				Subsurface Layout - Alternative (Low Thermal Load)		Dwg	X			
	TR47FBI	RP126710	14-Jan-97	Backfill Strategy and Preliminary Design		Anal	X	X		X
		RP126720	28-Feb-97	Waste Package Support System		Anal	X	X		X
		RP126700	31-Jan-97	Emplacement Drift Invert		Anal	X	X		X

WBS 1.2.4 Repository Products (Rev 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEPT	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.4.7 Cont'd	TR47FBI Cont'd	RP126730	31-Mar-97	Backfilling Operations (3D)	RP120M3E	Dwg	X	X		X
				Backfilling P&ID	RP120M3E	Dwg	X	X		X
				Waste Package Support System	RP120M3E	Dwg	X	X		X
				Emplacement Drift Invert & Support System (3D)	RP120M3E	Dwg	X	X		X
	TR47FBJ	RP124700	15-Apr-97	Remote Monitoring, Communications, and Control Systems for Performance Confirmation		Anal	X			
		RP124705	02-Apr-97	Performance Confirmation Facilities		Anal	X			
		RP124715	01-Apr-97	Mobile Remote Monitoring System: Physical Layout	RP120M3F	Dwg	X	X		X
				Mobile Remote Monitoring System: Electrical Subsystems	RP120M3F	Dwg	X			X
				Mobile Remote Monitoring System: Control and Instrumentation	RP120M3F	Dwg	X			X
				Performance Confirmation Drift and Access - Sheet 1	RP120M3F	Dwg	X	X		X
				Performance Confirmation Stations Detail	RP120M3F	Dwg	X	X		X
				Performance Confirmation Stations Detail	RP120M3F	Dwg	X	X		X
				Performance Confirmation Drift Ventilation System	RP120M3F	Dwg	X	X		X
				Performance Confirmation Drift Ventilation System	RP120M3F	Dwg	X	X		X
				Performance Confirmation Test Drilling Arrangement - Sheet 1	RP120M3F	Dwg	X	X		X
				Performance Confirmation Test Drilling Arrangement - Sheet 2	RP120M3F	Dwg	X	X		X

APPENDIX E

SYSTEMS ENGINEERING PRODUCTS

The data contained in this appendix reflects the status of the Yucca Mountain Site Characterization Project as of 12/16/96. Because of the evolving conditions of the Yucca Mountain Site Characterization Project, data in this appendix is changed or updated as necessary. However, this VA Design and Review Plan will not be revised or reissued as a result of data updates. For a current status of the data in this appendix and/or a copy of the current version, contact S. Meyers. For suggested changes to the contents, contact A. Segrest.

SYSTEMS ENGINEERING PRODUCTS

A list of products to be developed by the Systems Engineering Products organization is provided. The planning and summary account number, summary account number, work breakdown structure, and activity number are provided for each product. If the product is part of a deliverable, the deliverable number is provided. The product type and the estimated end date are also provided. If the product is directly related to any of the four VA components, that information is also provided.

WBS 1.2.1 Systems Engineering Products (Rev. 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
1.2.1.2	TR12FB2	SE422M3	03-Mar-97	MGDS-RD Update		Document	X	X	X	X
	TR12GB2	SE530AM4	31-Mar-97	Rqmts. Doc. Status Report		Ltr. Report	X	X	X	X
	TR12FB3	SE400BM3	30-Sep-97	MGDS Conops, Rev. 1		Document	X	X	X	X
	TR12GA1	SE400AM4	02-Feb-98	MGDS Conops Status Report		Ltr. Report	X	X	X	X
	TR12FB2	SE422705	30-Apr-97	CDA Update		Document	X	X		X
		SE422710	30-Sep-97	CDA Update		Document	X	X		X
		SE580AM4	02-Feb-97	CDA Status Report		Ltr. Report	X	X		X
	TR12FB1	SE405AM4	31-Dec-96	SDD Status Report		Ltr. Report	X	X		X
		SE405BM4	31-Mar-97	SDD Status Report		Ltr. Report	X	X		X
		SE405CM4	30-Jun-97	SDD Status Report		Ltr. Report	X	X		X
		SE405M4	30-Sep-97	SDD Status Report		Ltr. Report	X	X		X
	TR12GB1	SE522AM4	31-Dec-97	SDD Status Report		Ltr. Report	X	X		X
		SE522BM4	31-Mar-97	SDD Status Report		Ltr. Report	X	X		X
		SE522CM4	30-Jun-97	SDD Status Report		Ltr. Report	X	X		X
1.2.1.3	TR13FB1	SE418701	31-Mar-97	Test & Evaluation Plan Development Status Update		Briefing	X	X		X
		SE418M3	30-Sep-97	VA Test & Evaluation Plan		Document	X		X	
		SE488706	25-Mar-97	Design Compliance Plan for LA Status Update		Briefing	X	X	X	X
		SE488M3	30-Sep-97	Draft Design Compliance Plan for LA		Document	X		X	X
	TR13GB1	SE419AM4	31-Mar-98	Status of Update to T&EP		Briefing	X		X	X
		SE419M3	30-Sep-98	Final VA T&EP		Document	X		X	X
		SE540M3	30-Sep-98	Design Compliance Plan for LA, Rev. 0		Document	X		X	X
1.2.1.5	TR15FB1	SE050705	05-Mar-97	Establish Draft Performance Confirmation Baseline		IOC	X		X	X
		SE050720	29-Aug-97	Complete Initial Performance Confirmation Plan		IOC	X		X	X

WBS 1.2.1 Systems Engineering Products (Rev. 0, 12/18/96)

P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCEI	TSPA-VA	LA PLAN	ESTIMATE OF COST
		SE050BM3	30-Sep-97	Performance Confirmation Plan, Rev. 0		Document	X		X	X
		SE436700	01-Apr-97	Start Waste Generated Study		Briefing	X	X		X
		SE436M3	30-Sep-97	Complete Waste Generated Study		Document	X	X		X
		SE440700	01-Oct-96	Conduct Research for Waste Isolation Requirements Study		Briefing	X	X		X
		SE440M3	01-Apr-97	Complete Waste Isolation Requirements Study		Document	X	X	X	X
		SE460700	01-Apr-97	Start Waste Package Size Study		Briefing	X	X		X
		SE460M3	30-Sep-97	Waste Package Size Study Report		Document	X	X		X
		SE506700	01-Oct-96	Start Seals Study		Briefing	X	X		X
		SE506M3	03-Jun-97	Seals Study Report		Document	X	X	X	X
	TR15FB2	SE200700	01-Oct-97	Start Waste Quantity, Mix, Throughput Study		Briefing	X	X		X
		SE200M3	11-Apr-97	Waste Quantity, Mix, Throughput Study		Document	X	X		X
	TR15FB3	SE502700	01-Oct-96	Start Retrievability Study		Briefing	X		X	X
		SE502M3	06-May-97	Retrievability Study		Document	X		X	X
	TR15FB4	SE456700	01-Oct-96	Start Rail COrridor Evaluation		Briefing	X			X
		SE456M3	30-Apr-97	Rail corridor Evaluation Report		Document	X			X
1.2.1.7	TR17FB1	SE124700	01-Oct-96	Start MGDS Cost Estimate Planning		Briefing	X		X	X
		SE124AM3	30-Sep-97	Draft MGDS Cost Plan		Document	X		X	X
	TR17681	SE124850	20-Aug-98	Final VA Cost Estimate		Document	X		X	X
1.2.1.8	TR18FB2	SE500M3	27-Jun-97	Safe Guards and Security VA Rqmts. Study		Document	X		X	X
1.2.1.11	TR1BFB1	SE310700	31-Mar-97	DBE FY97 - 1st Half		Briefing	X		X	X
		SE320700	31-Mar-97	CA/Q-List FY97		Briefing	X		X	X
		SE310705	30-Sep-97	DBE FY97 - 2nd Half		Briefing	X		X	X
		SE320705	30-Sep-97	CA/Q-List-FY97		Briefing	X		X	X

WBS 1.2.1 Systems Engineering Products (Rev. 0, 12/18/96)

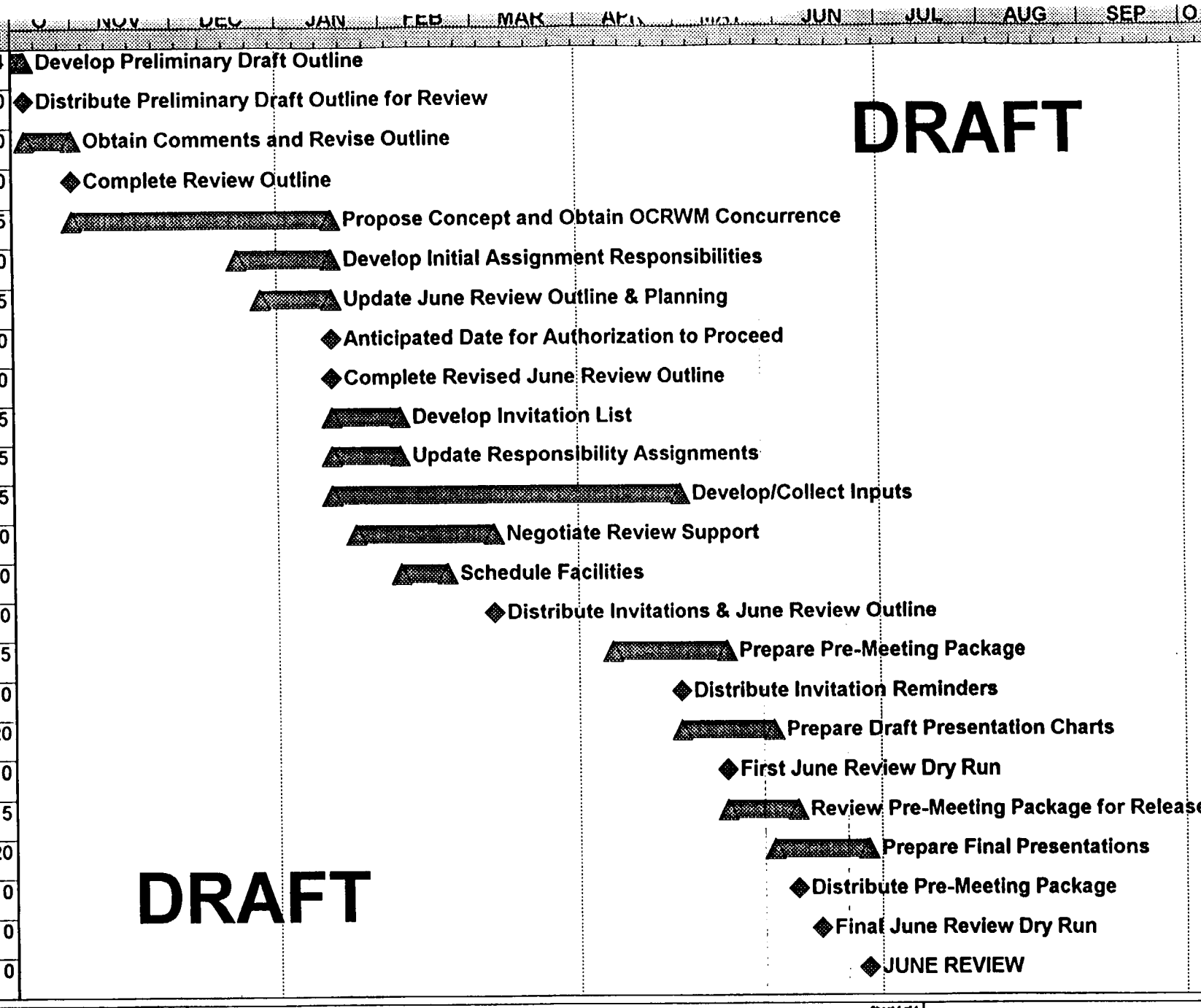
P&S ACCOUNT	SUMMARY ACCOUNT	ACTIVITY NUMBER	ACTIVITY END DATE	PRODUCT TITLE	DELIVERABLE NUMBER	PRODUCT TYPE	VA COMPONENT			
							PRELIMINARY DESIGN CONCE	TSPA-VA	LA PLAN	ESTIMATE OF COST
	TR1BGB1	SE310800	31-Mar-98	DBE FY98 - 1st Half		Briefing	X		X	X
		SE322800	31-Mar-98	CA/Q-List FY98 - 1st Half		Briefing	X		X	X
		SE310805	30-Sep-98	CA/Q-List FY98 - 2nd Half		Briefing	X		X	X
		SE322805	30-Sep-98	CA/Q-List FY98 - 2nd Half		Briefing	X		X	X

APPENDIX F

JUNE DESIGN REVIEW

The data contained in this appendix reflects the status of the Yucca Mountain Site Characterization Project as of 12/16/96. Because of the evolving conditions of the Yucca Mountain Site Characterization Project, data in this appendix is changed or updated as necessary. However, this VA Design and Review Plan will not be revised or reissued as a result of data updates. For a current status of the data in this appendix and/or a copy of the current version, contact M. Sellers. For suggested changes to the contents, contact R. Snell.

Start	Finish	duration
14OCT9	17OCT9	4
	17OCT9	0
18OCT9	31OCT9	10
	31OCT9	0
01NOV9	16JAN97	55
20DEC9	16JAN97	20
27DEC9	16JAN97	15
	16JAN97	0
	16JAN97	0
17JAN97	06FEB97	15
17JAN97	06FEB97	15
17JAN97	01MAY9	75
24JAN97	06MAR9	30
07FEB97	20FEB97	10
	06MAR9	0
11APR97	15MAY9	25
	01MAY9	0
02MAY9	29MAY9	20
	15MAY9	0
16MAY9	05JUN97	15
30MAY9	26JUN97	20
	05JUN97	0
	12JUN97	0
	26JUN97	0



Project Start 14OCT96
Project Finish 26JUN97
Data Date 14OCT96
Plot Date 22NOV96

Early Bar
Progress Bar
Critical Activity

JUNE

Sheet 1 of 1

SCHEDULE FOR JUNE REVIEW - REV H

November 18, 1996

JUNE DESIGN REVIEW

1.0 PURPOSE

The purpose of this June 1997, review is to assess the overall engineering approach to the VA milestone and obtain high-level management concurrence. Key interfaces such as the relationship between Design Engineering and Performance Assessment will be described. The preparation of an MGDS Cost Estimate and an LA Plan will also be described. Finally, the design status as it currently exists will be reviewed to facilitate an overall understanding of the system and to encourage high-level course correction where needed. This will be a non-Q review.

A draft schedule to prepare for and execute the review is attached.

2.0 REVIEW AUDIENCE

The target audience for the June Design Review is OCRWM (YMSCO and WM&I), Project Management Organization, and M&O Management, as well as M&O Teammate Corporate Executives. TRB and NRC representation is also suggested. The June Design Review will also be shared with the Repository and other consultant boards.

3.0 REVIEW FORMAT

A pre-review package will be prepared to facilitate background development and to help achieve the meeting goals in a single day. Topics for the package will consist of key summary-level material to help set the stage for the review. Candidates for this material include an update to the Director's Summary, Highlights of the DOE's Waste Containment and Isolation Strategy for the Yucca Mountain Site, and the MGDS Concept of Operations. Other material such as the VA Design and Review Plan and the VA Monitoring Plan which describe the VA activities and the role of the June Design Review en-route to that assessment may be provided.

Presentations similar to those provided during the February 1-2, 1996 Management Reviews for the MGDS ACD will be provided. The goal is to develop a set of presentations which can be used for multiple audiences. The presentations would be delivered by the M&O Engineering and Integration Operations' managers. A draft agenda is attached. An explicit definition for the content of the presentation charts is provided below. Comments will be requested.

4.0 PRESENTATION CONTENT

4.1 VA Description

A brief introductory discussion describing the purpose and scope of the VA activities will be provided along with an overview of how the YMP's engineering efforts support the assessment. In addition, the meeting logistics will be explained, along with the comment process. Comments will be requested on the day of the review, and comment sheets will be provided to facilitate proper documentation.

4.2 MGDS Design Drivers And Requirements

The key requirements and design drivers will be identified and explained in terms of their significant implications to MGDS cost, schedule, or performance. Examples may include the required repository capacity, the form and rate of the waste received at the repository, the repository performance requirements in terms of pre- and post-closure, and the governing regulatory requirements for the MGDS. Major assumptions necessary to move the design forward will be identified. Engineering studies, design basis events evaluations, safety analyses, and functional/requirements analyses and their role in establishing requirements will be summarized as appropriate.

4.3. MGDS Concept of Operations

The operational concept for the MGDS will be summarized to explain the disposal process from waste receipt through emplacement, closure, and decommissioning. Key VA issues related to operations will be highlighted. The purpose of this presentation is to set the stage for the remaining presentations for each design area and for the major VA issues.

4.4 MGDS Design Overview

An overview of each design area will be provided, including the Yucca Mountain Site arrangement and layout, the general arrangement of the surface facilities, the general arrangement of the subsurface facilities and layout, the subsurface development plans, and the repository's relationship/ interface with the Exploratory Studies Facility. An overview of waste package designs and the general emplacement arrangement of waste packages in the emplacement drifts will be provided. Waste Package materials testing will be summarized. Other significant features in the Engineered Barrier System and how these elements work together to support the waste containment and isolation strategy will be explained. The features of design and the key analytical methodologies will be summarized. Major contingency design alternatives will be identified.

5.0 MAJOR TECHNICAL ISSUES, DATA AND METHODS FOR RESOLUTION, RESOLUTION STATUS

The major technical issues important to the success of the VA milestone will be identified along with the resolution plan for each issue. Current status will be provided. The expected contribution of scientific and test data toward issue resolution will be identified. Performance assessment model development and their use in issue resolution will be explained. Design option and operational concept evaluations under consideration and the timing of expected decision/resolution points will be identified.

6.0 ENGINEERING AND PERFORMANCE ASSESSMENT INTERACTIONS

The iterative interactions between the design development activities with the performance assessment models will be explained. Tight coupling and integration between the design and TSPA which will support the VA milestone will be stressed. Sensitivities of the models to design parameters will be identified to show areas in the design with significant pre- and post-closure performance contributions. Interactions between the design and process models & abstractions will

be identified to illustrate the way in which performance assessment predictions influence the design process to converge on performance-sensitive design parameters. Dependencies between the design and the near-field models will be explained.

7.0 PLANS FOR PREPARING A COST ESTIMATE

The plan, strategy, and assumptions for the preparation of an MGDS cost estimate will be identified. Included will be a discussion of the E&I activities to provide information on the cost to complete the MGDS design, to construct the MGDS, to operate the MGDS, and to close, decommission, or, if necessary, to retrieve from the MGDS. Current assumptions and their relationship to cost estimating assumptions (such as those provided in the ACD) or to revised versions of the TSLCC will be explained. The basis and format which will underpin the capital cost estimates will be identified.

8.0 MGDS PLANS TO SUPPORT LA

The strategy and schedule for developing the design sufficient for licensing will be explained. The general level of design detail necessary to docket an LA will be provided, along with representative examples. Design activities required to support the LA for which progress is needed at the time of the VA milestone will be identified along with an indication of the post-VA activities necessary to support a docketable LA. E&I will support YMP cost estimating activities for the design to be included in an LA in March 2002.

JUNE DESIGN REVIEW

DRAFT AGENDA

8:00 am	Introduction and VA Description
8:10 am	Meeting Logistics and Comment Process
8:15 am	Requirements
8:55 am	Concept of Operations
9:35 am	Waste Package (Development & Materials)
10:20 am	Break
10:30 am	Surface Facilities
11:10 am	Subsurface Design
12:35 pm	Lunch (Catered)
1:10 pm	Major Technical Issues, Resolution Plans, and Status
2:10 pm	Performance Assessment Interactions
2:50 pm	Break
3:00 pm	Cost Estimate Plans
3:30 pm	LA Plans
4:00 pm	Open Discussion
5:00 pm	Adjourn

APPENDIX G

PHASE I DESIGN REVIEW

The data contained in this appendix reflects the status of the Yucca Mountain Site Characterization Project as of 12/16/96. Because of the evolving conditions of the Yucca Mountain Site Characterization Project, data in this appendix is changed or updated as necessary. However, this VA Design and Review Plan will not be revised or reissued as a result of data updates. For a current status of the data in this appendix and/or a copy of the current version, contact J. Clouet. For suggested changes to the contents, contact R. Snell.

PHASE I DESIGN REVIEW

1.0 PROPOSED CONCEPT

The proposed concept for the Phase I Design Review includes an engineering emphasis and provides an update to the progress of engineering since the June Review. An engineering review is performed to assess the state of the design relative to the planned progress at the time of the VA milestone. Interfaces with engineering are also emphasized since the Phase I Design completion is marked by the final data deliveries between design and its interfacing organizations. This will help ensure that each organization has what it needs from engineering, and that engineering has what it needs from other organizations to adequately support the VA milestone. The review identifies any items still to be provided and the plan for providing those items in time to support the VA milestone. The target audience includes the YMSCO, Project Management Organization, and M&O Management.

2.0 PRESENTATION SUMMARIES

2.1 Engineering

Engineering presentations will be provided to summarize the engineering completed to date along with a comparison against what is needed to support the VA milestone.

2.2 MGDS Cost Estimate

All information needed from engineering to prepare the MGDS cost estimate will be identified and any information not yet received will be emphasized for increased focus prior to the final cost estimate preparation. Coordination with the TSLCC will be summarized.

2.3 Scientific Programs

Presentations focused on model updates and documentation to support engineering needs will be provided. Open issues will be identified for increased focus to ensure necessary information is available to support VA milestone.

2.4 Performance Assessment

Presentations by PA to show readiness to proceed with the TSPA-VA will be provided. A summary of all data received and any data still missing and needed from engineering will be provided. Preclosure Safety work will be summarized to show progress to date relative to that needed for the VA milestone.

2.5 Licensing

A briefing of the LA Plan will be given to provide the picture of post-VA emphasis required from engineering. The Compliance Plan and the License Application Design and Review Plan and their incorporation into and/or relationship to the LA Plan will be summarized. A status of the Project Integrated Safety Assessment preparation will be provided.

2.6 NEPA/EIS

Although not slated to support the VA milestone, necessary progress toward the EIS requires engineering data deliveries during the Phase I Design time frame. The Phase I Review provides a convenient opportunity to review the timeliness and adequacy of these data deliveries. Progress on engineering support to the EIS will be statused. Data deliveries provided to date will be summarized including Engineering Files. Progress on the Description of Planned Actions and Alternatives will be summarized. Any additional data needs will be identified for increased focus in the FY 98 to FY 99 time frame.

3.0 TIMING

The Phase I Design Review is tentatively scheduled for early September, 1997. The planning activities for this review are provided in the schedule at the end of this appendix. The review verifies the completion of the Phase I work scope and the necessary data deliveries required through the end of Phase I Design. Any residual Phase I issues and the remaining work scope necessary to support the VA milestone will be identified and finalized for emphasis during the initial portion of the Phase II Design.

4.0 DESIGN REVIEW CHECKLIST

The intent of the Phase I Design Review Checklist is to provide a methodical listing of items to be evaluated against expectations at the conclusion of the Phase I Design. The checklist includes listing of engineering products and their expected level of completion (Appendices C, D &E), a listing of critical interfaces (Appendix L), expected progress on issue resolution (Appendix B), expected progress on selected topics and/or items needing decisions (to be identified as part of activities 028 and 035 of the attached schedule), and an assessment of cost and schedule variances as identified in the most recent PACS report.

4.1 Product Listings _____

Each design area has developed a product listing with an expectation of the level of completion for each item at the time of Phase I Design completion.

____ Repository Sub-surface Product Listing

____ Repository Surface Product Listing

____ Waste Package Development Product Listing

____ Waste Package Materials Product Listing

____ Systems Engineering Product Listing

4.2 Critical Interface Listing _____

4.3 Issue Resolution Progress Listing _____

This listing contains the expected level of completion toward resolution of the 13 critical engineering issues important to the VA.

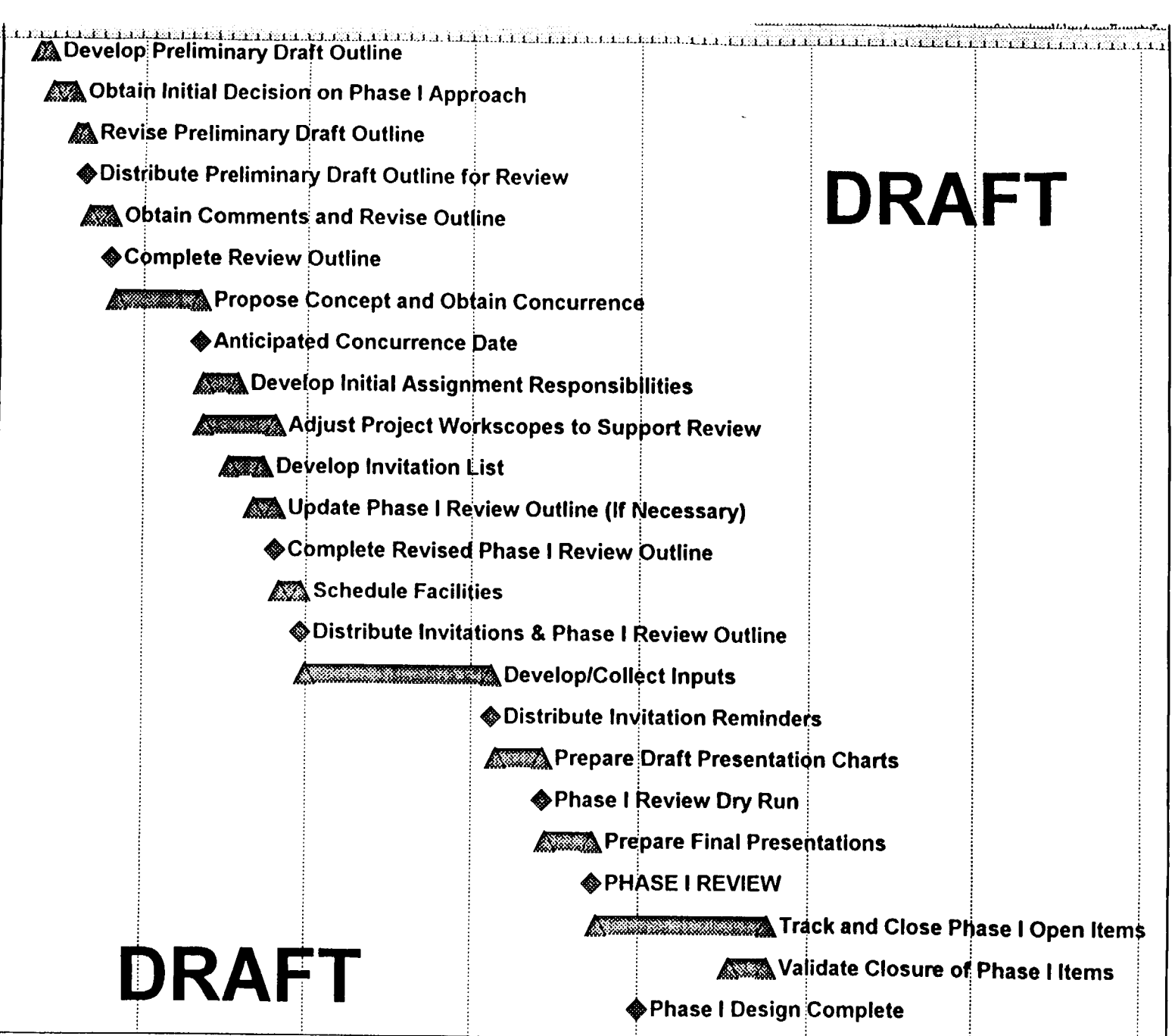
4.4 Selected Topics & Decisions Listing _____

This listing contains selected topics or decisions important to the VA not already covered in the Product, Interface, or Issue Resolution Listings.

4.5 Assessment of Cost and Schedule Variances _____

This listing contains the activities which should be completed by the end of Phase I and an assessment and explanation of variances.

005	04NOV9	08NOV9	5
006	11NOV9	22NOV9	10
007	25NOV9	29NOV9	5
010		29NOV9	0
015	02DEC9	13DEC9	10
020		13DEC9	0
022	16DEC9	31JAN97	35
023		31JAN97	0
021	03FEB97	21FEB97	15
031	03FEB97	14MAR9	30
026	17FEB97	07MAR9	15
028	03MAR9	14MAR9	10
035		14MAR9	0
036	17MAR9	28MAR9	10
040		28MAR9	0
045	31MAR9	11JUL97	75
047		11JUL97	0
046	14JUL97	08AUG9	20
052		08AUG9	0
065	11AUG9	05SEP97	20
080		05SEP97	0
085	08SEP97	09DEC9	67
090	19NOV9	09DEC9	15
095		30SEP97	0



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Project Start 14OCT96
Project Finish 09DEC97
Data Date 14OCT96
Print Date 16DEC96

Early Bar
Progress Bar
Critical Activity

PH-1

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December 16, 1996

4.3 Issue Resolution Progress Listing _____

This listing contains the expected level of completion toward resolution of the 13 critical engineering issues important to the VA.

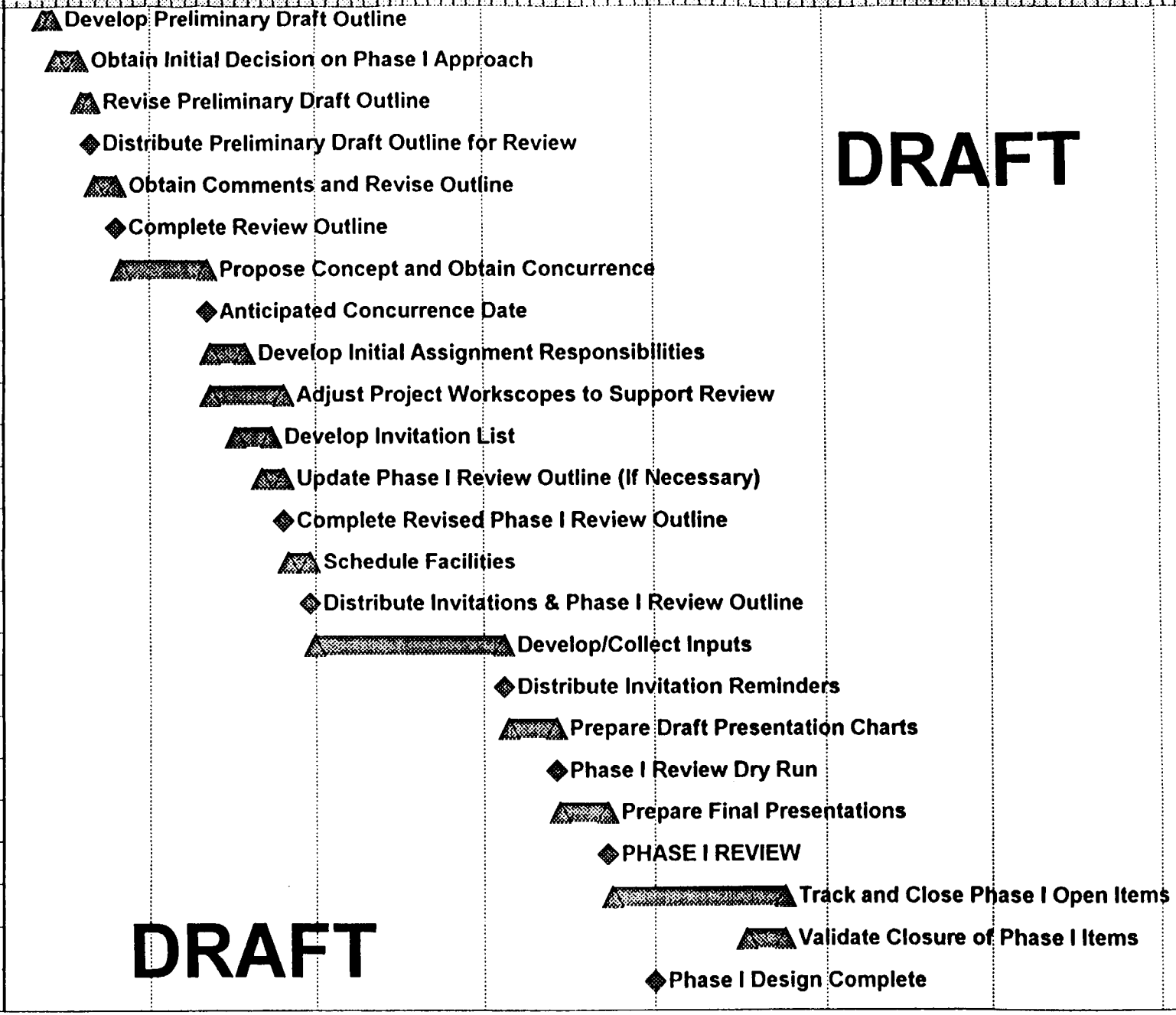
4.4 Selected Topics & Decisions Listing _____

This listing contains selected topics or decisions important to the VA not already covered in the Product, Interface, or Issue Resolution Listings.

4.5 Assessment of Cost and Schedule Variances _____

This listing contains the activities which should be completed by the end of Phase I and an assessment and explanation of variances.

ID	Start	Finish	Duration
005	04NOV9	08NOV9	5
006	11NOV9	22NOV9	10
007	25NOV9	29NOV9	5
010		29NOV9	0
015	02DEC9	13DEC9	10
020		13DEC9	0
022	16DEC9	31JAN97	35
023		31JAN97	0
021	03FEB97	21FEB97	15
031	03FEB97	14MAR9	30
026	17FEB97	07MAR9	15
028	03MAR9	14MAR9	10
035		14MAR9	0
036	17MAR9	28MAR9	10
040		28MAR9	0
045	31MAR9	11JUL97	75
047		11JUL97	0
046	14JUL97	08AUG9	20
052		08AUG9	0
065	11AUG9	05SEP97	20
080		05SEP97	0
085	08SEP97	09DEC9	67
090	19NOV9	09DEC9	15
095		30SEP97	0



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Project Start 14OCT96
Project Finish 09DEC97
Data Date 14OCT96
Plot Date 19DEC96

Early Bar
Progress Bar
Critical Activity

PH-1

Sheet 1 of 1

SCHEDULE FOR EARLY PHASE I REVIEW

December 16, 1996