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Author Name	Wilkins D R, Heath A C
Author Affiliation	
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TRW Environmental
Safety Systems Inc.

1261 Town Center Drive
Las Vegas, NV 89134
702.295.5400

TRW

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June 15, 1999

To: Distribution

Ladies and Gentlemen:

Subject: Direction to Transition to Enhanced Design Alternative II

This letter and enclosures confirm prior verbal direction to the Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) line organizations to transition ongoing work activities and plans for future work from the Viability Assessment (VA) design to Enhanced Design Alternative (EDA) II. This direction is also recorded in a Project Operations Review Board Decision Paper, dated May 12, 1999. We recognize the U.S. Department of Energy (DOE) has not made a final decision to select EDA II as the conceptual design that will be further developed for site recommendation (SR) and license application (LA). However, we are confident that work activities underway can be adjusted if changes in the EDA II design concept are directed during the final DOE approval process.

Two enclosures to this letter provide specific direction for a systematic approach to transition from the VA design to an SR design based on EDA II. Enclosure 1 provides a flow diagram showing the approach that will be used to modify appropriate requirements documents and technical baseline documents to incorporate EDA II. Enclosure 2 provides preliminary technical guidance in the form of requirements, design parameters and actions that represent an evolving EDA II design concept. We intend to proceed with a conditional Level 3 Change Control Board Action to baseline the requirements for EDA II that are included in Enclosure 2. Should you identify a need for additions or changes to Enclosure 2, please contact Richard Snell, the License Application Design Selection (LADS) Project Manager, by June 22, 1999.

All M&O organizations are directed to proceed with engineering, analysis, design and testing to provide appropriate and timely support to a transition from the VA design to the SR design based on EDA II. Members of the LADS organization will provide guidance to responsible line managers to ensure the guidance in Enclosure 2 is incorporated into ongoing and planned work scope.

If you have any questions, please contact Richard D. Snell at 295-5601.

Sincerely,

D. R. Wilkins
Assistant General Manager
Monitored Geologic Repository

Colin A. Heath
Assistant General Manager
Waste Management & Integration

Enclosures:
(1) Strategy for Baselining EDA II Requirements
(2) Guidelines for Implementation of EDA II, Rev 01, 6/10/99

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Enclosure 1 - Strategy for Baselining EDA II Requirements

Implementing EDA II in the technical requirements baseline of the Civilian Radioactive Waste Management System (CRWMS) Program will involve modifying requirements documents, as appropriate to incorporate the new design concept. The following figure provides a flow diagram representation of the strategy to accomplish this implementation in a timely manner.

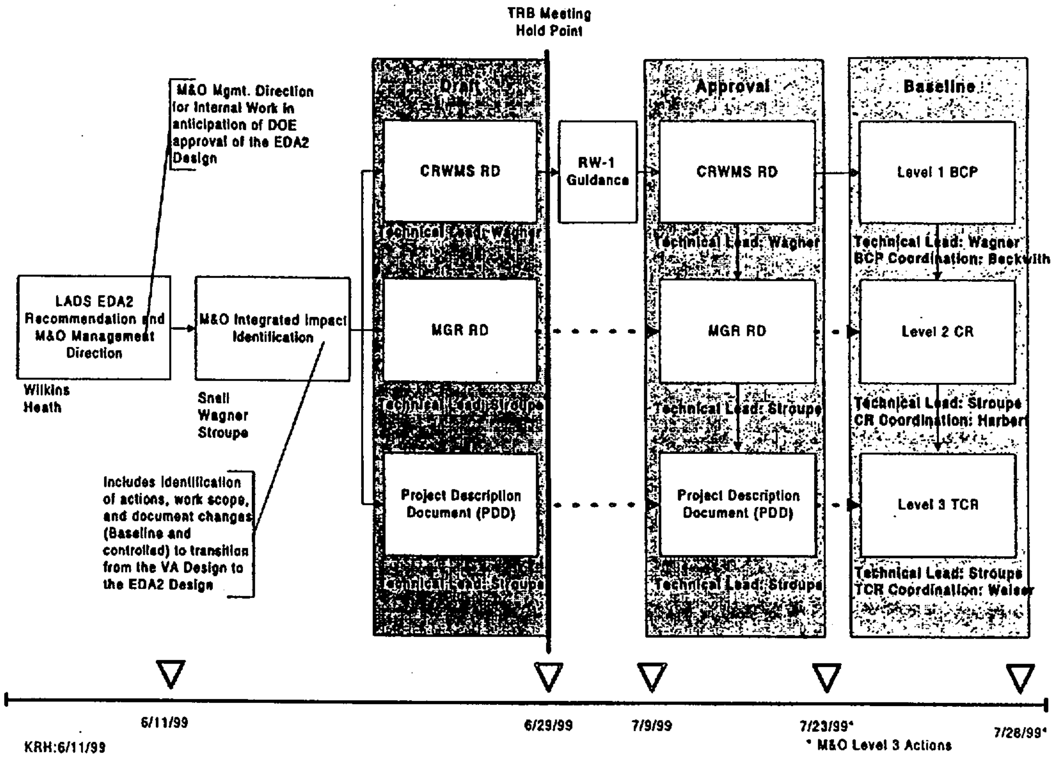
This description is attached to the direction from M&O Management identified in the first block of the flow diagram. The second block in the flow indicates activities by the responsible M&O line organizations to identify the actions, work scope, and document changes needed to transition from the VA Design to the Site Recommendation Design based on EDA II. This second block of activities is underway and will identify the changes needed in the three requirements documents identified.

Preparation of draft changes for the top three requirements documents should be coordinated by the LADS Project Manager to ensure consistency of the changes. Informal reviews of draft changes should be completed on, or before 6/29/99. The revised CRWMS Requirements Document, Monitored Geologic Repository Requirements Document and Project Description Document will be submitted for formal review and approval as soon as DOE makes a final decision on the EDA II recommendation. Adjustments will be made as necessary to accommodate the final DOE decision.

The path forward for changing the technical requirements baseline will follow the process described above for the Requirements Documents. We will establish baseline control of lower level documents as soon as possible to ensure consistency in early analyses and modeling efforts supporting development of the technical basis for the SR. Again, adjustments will be made as required when DOE makes a formal decision on the M&O's design recommendation

6-15-99
Revision 02

LADS EDA2 Technical Baseline Implementation



Enclosure 2 - Guidelines for Implementation of EDA II

The guidance provided below is intended to be a self-consistent set of parameters to be used in the development of requirements, design, performance assessment, cost estimates, calculations, and analysis in support of the Site Recommendation.

A. REQUIREMENTS

The following should be considered requirements or constraints on the SR design. It is intended that these statements will be refined and captured in requirements documents at the appropriate levels.

1.0 Repository Capacity —

Design for initial emplacement layout 70,000 MTU (63,000 MTU CSNF + 7,000 MTU DOE SNF and HLW). This layout is the basis for site recommendation (SR) including TSPA-SR. Source terms for preclosure and postclosure safety analyses should be based on 70,000 MTU.

Design layouts shall also show contingency designs for emplacement area for 86,700 MTU of CSNF plus DOE SNF and HLW, as defined in the CRD, Revision 5.

Rationale: The CRD has established the capacity of the repository for design purposes. The repository is restricted to 70,000 MTU per the Nuclear Waste Policy Act.

2.0 Emplacement Drift Spacing —

The drift spacing shall be 81 meters – drift center to center.

Rationale: Wide drift spacing promotes drainage of thermally mobilized water and increases the independence of individual drifts.

3.0 Repository location —

The foot print of the repository will be entirely within the characterized area.

Rationale: For 60 MTU/acre and 63,000 MTU of commercial SNF, approximately 1050 acres will be used for loaded emplacement drifts. For 60 MTU/acre and 87,000 MTU of commercial SNF, approximately 1450 acres would be used for loaded emplacement drifts. If the lower block is used, emplacement of waste in the lower block will not be made below emplacement regions of the upper block i.e., not a two-tiered repository.

4.0 Emplacement Drift Diameter —

The diameter of the waste emplacement drifts is 5.5 meters.

Rationale: The use of large waste packages, drip shields and backfill necessitates a diameter of at least 5.5 meters to provide space for handling equipment and adequate clearances.

5.0 Ground Support — (LADS Recommendation # 8)

The ground support in the repository will be carbon steel (steel sets and/or rock bolts and mesh) with granular ballast in the invert. Cementitious grout will be used to anchor the rock bolts. The amount of grout should be kept to a minimum while affording satisfactory performance of the rock bolts. The ground support shall be maintained during the preclosure period.

Rationale: Carbon steel is the standard material to be used. Thick concrete has been eliminated as the primary material due to pH control issues, however, grout will be utilized.

6.0 Invert Materials — (LADS Recommendation # 8)

A carbon steel frame will be used to construct the invert, and a granular material will be used as ballast. Criteria for selection of ballast material will include ability to control pH and considerations of thermal, hydrological, and geochemical consequences of available materials. Candidate materials include crushed limestone or marble.

Rationale: Elimination of concrete in the invert reduces uncertainties associated with radionuclide transport. The ballast design includes material selection and material configuration (particle size distribution). The ideal ballast material should have high thermal conductivity, not wick water toward the WP, and buffer the chemistry of water transporting radionuclides.

7.0 Backfill — (LADS Recommendation # 10)

The backfill will be chosen considering thermal, hydrological, and geochemical consequences of available materials. Backfill will be included in the final design.

Rationale: The ideal backfill material should have high thermal conductivity, not wick water toward the waste package, and buffer the chemistry of water transporting radionuclides. Candidate materials include calcium carbonate, limestone (marble), quartz sand and crushed tuff.

8.0 Drift loading — (LADS Recommendation # 3)

Line loading with approximately 10 centimeters between the ends of waste packages will be used.

Rationale: Line loading produces a more uniform temperature distribution along the drifts and reduces cost of excavations, drip shields and backfill.

9.0 Drip Shield Material — (LADS Recommendation # 9)

Titanium Grade 7, at least 2 centimeters thick, will be used as the initial basis for the drip shield material. Various forms of stiffening and/or reinforcement should be considered.

Rationale: The drip shield must meet structural, seismic, and corrosion resistance requirements. The corrosion resistance must be adequate to prevent failure of any drip shields by corrosion within 5,000 years. Structurally, the drip shield must not be breached by the largest (design basis) rock fall if backfill is not eventually emplaced, for at least 5,000 years. Seismically, it must cope with the largest (design basis) acceleration without losing its capability to divert water around the waste packages, for at least 5,000 years.

The selection of a titanium material is a significant cost driver and titanium drip shield fabrication methods/feasibility need to be confirmed. An evaluation of the industry to ensure that such a device can be produced economically shall be conducted as a part of optimizing EDA II.

10.0 Waste Package — (LADS Recommendation # 6)

The waste package will be a two layer device consisting of an inner barrier that is approximately 5 centimeter thick stainless steel (alloy 316L) and an outer barrier that is approximately 2 centimeter thick alloy 22 material. No 12-PWR capacity WPs will be included in the design; derating will be used for situations in which 21 PWR assemblies cannot be loaded into a given WP.

Rationale: The LADS report concluded that a dual CRM WP is not required to meet performance goals. It will be confirmed that the use of 316L does not create adverse chemical conditions after initial penetration of the outer corrosion resistant material. During detailed design, post weld (heat or mechanical) treatment (and other fabrication requirements) of the separate shells, assembled shells, and closure welds will be selected.

Selection of different corrosion resistant materials for the WP and drip shield reduces the likelihood of common mode failures. The relatively small number of small WPs does not merit a separate design effort.

11.0 Waste Package Heat Output — (LADS Recommendation # 1)

Waste packages will have a maximum heat output of 11.8 kW at emplacement. This output is dependent on blending to 20% above the average PWR thermal output (9.8kW); however, the maximum power rather than the blending percentage is the governing requirement.

Rationale: The LADS Report concluded that limiting the peak to average waste package power output could attain significant performance advantages.

12.0 Repository Ventilation — (LADS Recommendation # 4)

Each drift segment in the repository will be ventilated during preclosure, which for base case analyses should be assumed to be 50 years (see #13.0 for additional preclosure period assumptions). The ventilation system shall be designed to remove at least 70% of the heat generated by the waste packages during preclosure. The ventilation flow rate may vary with time in order to meet thermal performance requirements.

Rationale: The LADS report concluded that ventilation was capable of limiting temperatures to meet thermal design goals.

13.0 Repository Preclosure Period — (LADS Recommendation # 4)

The repository will be capable of closure at 50 years (in 2060); however, the design parameters should not preclude longer operation. For planning purposes, an extended operational period of 100 years should be evaluated.

A current requirement in the CRD, Revision 5 is to be able to close the repository 10 years after emplacement of the last waste package. This requirement must be removed.

Rationale: Closure at 50 years is estimated to limit water boiling to about 20% or less of the pillar space between drifts. Longer periods of ventilation will improve the thermal performance.

14.0 Waste Form/Fuel Cladding —

EDA II design goals already reflect the selection of repository operating conditions that preserve/do not impair the condition of fuel cladding as-received at the repository. No further implementation actions for this purpose are required. Presently defined conditions should be retained.

B. DESIGN PARAMETERS

The following are considered design parameters that are consistent with the goals of EDA II. However, they are not intended to be prescriptive, and the designer is free to let these guidelines float, and is encouraged to improve upon these concepts.

15.0 Areal Mass Loading —

The areal mass loading (AML) is anticipated to be approximately 60 metric tons of uranium (MTU)/acre while maintaining flexibility within reasonable spans.

Rationale: The AML is a function of waste package inventory combined with line loading and drift spacing selected to achieve temperature goals. Together with burnup, aging, and ventilation, AML (and its defining subparameters) is an overall indicator of the thermal performance of the repository.

16.0 Emplacement Drift Length —

The total emplacement drift length will be calculated from the waste package inventory (including DOE waste packages) and the WP-to-WP gaps.

Rationale: This parameter is derived from others. It is included here to ensure that the DOE waste packages are included in the calculations.

17.0 Age of Waste —

Design basis: average CNSF waste age will be 26 years (no additional aging beyond that implied by reactor and repository operation schedules).

C. ACTIONS

The following are considered actions that should be taken to advance the development of the SR design.

18.0 Waste Stream Design Basis —

Reference waste stream(s) shall be identified and its definition made available to all operations areas. This identification shall be conformed upon completion and placed under appropriate change control. The starting point for this identification will be the Waste Acceptance Systems Requirement Document (WASRD) and the Waste Quantity Throughput Study (due in June 1999).

Rationale: Work is needed to provide improved characterization of the expected waste stream(s).

19.0 Surface Facility Design — (LADS Recommendation # 2)

Confirmation of the adequacy (expected to be 5,000 MTU) of operational surface storage to meet EDA II waste package thermal output goals is needed. This storage capacity shall be confirmed by analysis of the blending requirements using the waste package thermal analysis. The confirmation document shall be subjected to update based on change control processes placed on the waste stream throughput study.

Rationale: The current concept of EDA II is believed to be very flexible with ventilation and waste blending being fundamental to the operation. The technical approach could be modified to use ventilation for longer than 50 years, therefore, the operational parameters should allow for this possibility.

20.0 Off-Normal Access -

The ventilation system and other repository elements shall be designed to allow limited-time personnel access for evaluating and remediation planning to deal with operational upset situations.