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Spent Nuclear Fuel Canister Storage Building CDR Review Committee Report

William P. Dana
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U.S. Department of Energy Contract DE-AC06-87RL10930

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Abstract: The Canister Storage Building (CSB) is a subproject under the Spent Nuclear Fuels Major System Acquisition. This subproject is necessary to design and construct a facility capable of providing dry storage of repackaged spent fuels received from K Basins. The CSB project completed a Conceptual Design Report (CDR) implementing current project requirements. A Design Review Committee was established to review the CDR. This document is the final report summarizing that review.

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**SPENT NUCLEAR FUELS
CANISTER STORAGE BUILDING
CDR REVIEW COMMITTEE REPORT**

FINAL REPORT

SEPTEMBER, 1995

WHC-SD-W-379-DR-001

Rev. 0

SPENT NUCLEAR FUELS CONCEPTUAL DESIGN INDEPENDENT REVIEW

Prepared by:

Design Review Committee

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8-31-95
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SPENT NUCLEAR FUEL
CANISTER STORAGE BUILDING
CDR REVIEW COMMITTEE REPORT
TABLE OF CONTENTS

I.	Introduction	1
II.	Summary of Findings	2
III.	Recommendations	4
IV.	Major Open Items	6
A.	Safety Requirements	6
B.	MCO Definition	8
C.	Transportation System Interface	8
D.	NRC Equivalency and Seismic	9
E.	ALARA	10
F.	Operations	11
G.	Other Programmatic Issues	12

APPENDICES

- A. Committee Charter
- B. Committee Identification List
- C. Individual Comments
- D. Management Presentation

I. INTRODUCTION

The Canister Storage Building (CSB) is a sub-project under the Spent Nuclear Fuels Major System Acquisition. This sub-project is necessary to receive the repackaged spent fuel from K Basins. Since the continued storage of fuel in K Basins represents a significant safety risk, initiation of early removal (beginning 12/97) has been established as a major milestone.

The CSB project has completed a Conceptual Design Report (CDR) implementing current project requirements. A Design Review Committee was established to review this CDR.

The committee was chartered to review the CDR for successful application of:

- (a) DOE/NRC requirements;
- (b) Cost/schedule effectiveness;
- (c) Operability/maintainability considerations, and
- (d) Other areas.

The process utilized in the design review was:

- (a) Individually, reviewed Significant Project Documentation
 - 1. SNF CSB Performance Specification
(WHC-SD-SNF-FRD-014 Rev 0)
 - 2. SNF Path Forward Preliminary Safety Evaluation
(WHC-SD-SNF-002, Rev 0)
 - 3. SNF CSB Conceptual Design Report by Fluor Daniel, Inc.
(July 1995)
- (b) Submitted individual comments sorted according to selected areas,
- (c) Discussed major comments in group forum,
- (d) Aligned major comments according to impacts on the areas of committee charter,
- (e) Identified risks according to comment area, and

- (f) Provide recommendations to management on project activities.

The committee charter is contained in Appendix A. The committee members and associated pertinent information on each member is shown in Appendix B. Individual comments are sorted by focus area and are contained in Appendix C. The management presentation view graphs which summarize the review (presented to management on 8/9/95) are contained in Appendix D.

A summary of findings is contained in Section II of this report. Recommendations are shown in Section III, and major open items are summarized in Section IV.

II. SUMMARY OF FINDINGS

The Conceptual Design Report has been reviewed by the Committee and comments consolidated to identify the following major findings which have a direct relationship to maintenance of the Path Forward for Transfer and Storage of SNF Fuel:

1. Modification of the CSB facility as designed for HWVP is a feasible means for providing a staging and storage facility for spent nuclear fuels. The CDR documents do not evidence the fact that the HWVP-CSB design was considerate of multi-purpose storage facility requirements. However, presentations and supplemental data provided to the committee indicate this documentation is available and should be included as appendix or reference for design documentation of the modified facility.¹
2. There is limited evidence to confirm that the CSB will be acceptable for storage of other high level radiation sources. The CDR has reflected consideration of Performance Specification requirements related to "future use" of storage vault #3; however, the Committee has identified several programmatic issues related to Cesium/Strontium storage that need be addressed prior to finalization of plans for design/construction criteria related to the vault storage area. Included in these issues is the possible need for additional shielding and blocking of vent areas between vaults 2 and 3, should vault 3 be modified with storage tubes requiring construction workers to enter the vault.

¹ - "Staging and Storage Facility Feasibility Study Final Report" by Fluor Daniel, Inc. February, 1995
- "Canister Storage Building Trade Study Final Report" by Fluor Daniel, Inc. May, 1995

3. There are open operational and design issues that preclude a final assessment of cost and construction schedules. Data provided in the CDR and that gathered by supplemental input failed to provide clear and convincing evidence that the CDR, Performance Specification and Operational Philosophy were aligned so that evaluation of schedule and cost could be properly evaluated.

The CDR reflects a cost in excess of target; there is a presentation and recommendation for facility modifications included to satisfy the Design to Cost Criteria. There was, however, insufficient data to determine that the proposed facility omissions or alterations met the performance specification criteria. Cost data was "global" and lacking detail to adequately evaluate cost assumptions.

The design review provided by Fluor Daniel for the Conceptual Design Report included reference to data developed from review of data developed in the CSB Accelerated Construction/Innovation Methods study; however, no response as to how or when this data could be evaluated for impact on design, cost or schedule segments of the CDR was provided. This study did appear to include cost savings and schedule enhancements that should be refined prior to start of detailed design.

The Construction Schedule appears "tight" but achievable. Failure to finalize open fundamental issues so as to enable a start of construction on or before January 1, 1996 will increase cost of construction as anticipated overtime and multi-shift operations are initiated to provide a complete facility in December 1997.

4. The recently endorsed strategy regarding fuel repackaging and related issues will present new opportunities to simplify the design and construction of facilities required in the Canister Storage Building. Translation of these changes into the conceptual design phase and/or early preliminary design activities should be accelerated to identify cost reductions in the facility planned for staging and storage.

Effect of the revised strategy should be evaluated in the Advanced Conceptual Design Report, and the interface that results for product delivery into staging and storage. There will also be issues of operational requirements that must be confirmed for guidance to the A/E in provision of facilities required to perform functions applicable to staging and storage of the revised "package".

5. Review of the Conceptual Design Report was challenging due to project documents which were not aligned. This was a management risk assumed by the Project Team and did not prevent development of path forward recommendations; nor did it preclude development of meaningful comments for use in advancing the design and construction plans.

The Performance Specification (facility criteria document) provided to the CDR Review Committee reflected programmatic planning beyond that set forth for use by the A/E; this will now require further revision to update recommendations recently approved by DOE-RL.

The Preliminary Safety Evaluation was completed on the basis of data released for use by the A/E in development of basic Conceptual Design Report and is not reflective of current planning. This document will require updating and validation of safety requirements that consider repackaging, operation philosophy changes, and to resolve issues of concern identified in the CDR review.

6. The Multi-Canister Overpack (MCO) design issues should be resolved. Containment and confinement are impacted by the MCO condition. The SNF Project should also come to closure on plans for drying and conditioning the fuel, including where it will be performed, so that MCO design can be frozen. Until this is resolved, seismic, heat transfer, ALARA, operations and maintenance, fluid flow and safety issues related to the CSB cannot be resolved.
7. NRC equivalency issues including seismic design criteria are not satisfactorily resolved. Those issues impact early resumption of concrete pours.

III. RECOMMENDATIONS

1. Resolve high risk issues prior to assuming substantial procurement risk and construction capital outlay:

Basis:

There is considerable risk associated with proceeding into detailed design and construction without resolution of fundamental issues defined in section IV of this report. However, there are issues that can be addressed in a logical and sequential manner so as to enable fast track and phased

release of detailed design. Maintenance of the fast track concept is crucial to satisfy the commitment for December 1997 completion.

The risk associated with issues applicable to NRC equivalency and impact to validation of design calculations for vault wall and operations deck are considered cost and schedule drivers. These risks can be addressed and managed by early resolution of questions regarding seismic design for original CSB and identification of modifications, if any, required to satisfy the revised criteria.

Failure to sequentially address and resolve these issues with intent to enable early start of vault construction and procurement of materials for tube and bellows production will impact schedule and cost.

2. WHC should be allowed to proceed with the CSB Project with some constraints. CSB detailed design should proceed subject to resolution of the following issues:
 - (1) Minimize the reliance of active systems to ensure compliance with safety and normal operating requirements for short term loading and long term storage operations;
 - (2) WHC confirmation that design of CSB is in compliance with a specific seismic design criteria and that this design may be utilized; or that change must be implemented to satisfy NRC seismic design criteria.
3. Proceed with full Key Decision (KD)-1 and selected KD-2 on areas unaffected by open issues. Approval of KD-3A (restart of foundation construction) should be withheld by DOE until resolution of Seismic design issue. Per DOE, physical construction should not begin until issuance of an Environmental Impact Statement Record of Decision (EIS ROD).
4. WHC should establish key interface requirements for the CSB as soon as possible. Key interfaces include MCO size, weight, venting requirements. Until these key interfaces are firmly established by WHC, DOE should withhold issuance of KD-3B (start of construction of the operating deck and superstructure).
5. Plans for drying and conditioning of fuel must be completed prior to construction start of the operating deck so that the MCO design can be frozen. Until this is resolved, seismic, heat transfer, ALARA, operation,

maintenance, fluid flow and safety issues related to the CSB cannot be resolved.

6. A Spent Nuclear Fuels (SNF) integrated project actions/issues resolution process tracking system should be implemented.
7. An independent review of outstanding issues and current design should be implemented prior to start of KD-3A.

IV. MAJOR OPEN ITEMS

A. Safety Requirements

The safety analysis that evaluates potential accident events and abnormal occurrences needs to provide feedback to the design of systems necessary to prevent or minimize conditions that could lead to accident events or to mitigate the consequences to workers and the public. The current Preliminary Safety Evaluation (PSE) has identified several events which should be prevented or minimized due to the potential severity of their consequences. These events include the Multi-Canister Overpack (MCO) canister drop, the transport cask drop, and the MCO canister over-pressurization events. These events have a potentially significant radiological dose consequence to operators and the onsite and offsite personnel. Complex and costly HVAC systems are necessary to mitigate these consequences for all areas where this potential exists.

The CDR review committee recommends more reliance on systems that prevent accident events than on general area HVAC confinement systems. For the transport and transfer cask drop events, an evaluation should be performed to show that the probability of a drop of load event is improbable; the cask can withstand the impact of a drop from the highest point; and the reasonable consequences of a small breach of the cask will not result in exposure in excess of safety limits without the use of the general area HVAC system. Similarly, the support system for the MCO is designed to minimize the possibility of a loss of the MCO; the MCO is designed to maintain its integrity for the maximum drop conditions; and the consequences of an MCO drop that causes a slight breach would not result in radionuclide releases in excess of safety limits. The design shall also assure that this event does not result in loss of structural integrity relied upon for criticality control. For the over-pressurization event, it should be shown that the probability of the event is low based on the drying process and the state of the fuel; the MCO is designed to handle potential reactions

that could cause pressurization; and over-pressurization events during storage can be contained within the storage tubes and instrumentation will be available to assure that conditions are met. In this way little or no reliance is placed on the building HVAC system thus reducing potential contamination, equipment cost, supporting services, floor space, and operating and maintenance cost.

Routine operations should assure the proper containment and confinement barriers to minimize the potential for radionuclide release. Definitions for the terms may be helpful.

Containment is defined as a solid barrier against radionuclide releases usually made of steel. The MCO, storage tube, and the transportation cask all represent forms of containment.

Confinement is defined as the physical barrier, and associated systems as required, that confines a hazardous material to a specific area, and serves to limit the credible release of this material to the environment within allowable limits. The operating deck HVAC system is an example of confinement.

Sources of potential contamination shall be contained as near the source as possible to minimize its spread. The operations that have the potential for radionuclide release are during transport cask sampling and venting, during MCO servicing, if necessary, and during MCO staging and storage sampling. All gas venting should be filtered prior to purging into the general area ventilation system. The storage tube should include ports for controlled venting and sampling and instrumentation to assure proper pressure control of the tube. Instrumentation may be necessary to assure MCO leak tightness.

The design of these containment systems reduces contamination potential and places less reliance on confinement systems. The design should reduce the reliance on HVAC support services such as power supply, filter testing, and system maintenance.

Facility design capability for recovery operations should be addressed for all credible design basis events and abnormal occurrences. Recovery equipment availability should meet safety and operating needs. For abnormal events expected to occur frequently, (once per month to once per year), recovery should be of a short duration to be able to continue operations. Slight, local contamination of the transport cask may be considered as this type of event. Supplies should be on hand to

decontaminate or fix the contamination in place. For less frequent events, such as, MCO drops in the storage tubes or over-pressurization events, which are contained, recovery will take longer due to the severity of the event. Specialized equipment may be required for complete recovery but is not necessary to have on hand prior to the event. Consideration should be given to the release potential to the site when determining which events will require staging of specialized equipment. Trade off studies could be performed to determine cost effective solutions.

B. Multi-Canister Overpack (MCO) Definition

The design parameters for the MCO must be defined as soon as possible. This includes: the number of canisters to be delivered to the Canister Storage Building (CSB); dimensions and tolerances (including roundness and straightness); weight; radiation levels; source term; heat generation rate; amount of residual water; confinement; structural criteria (including whether the impact limiter will be an integral part of the MCO); and the amount of loose surface contamination. A decision must also be made as to whether or not the capability to overpack a failed MCO in an MCOO will be provided. If it is to be provided, then similar information regarding the overpack must be provided.

Failure to finalize this information impacts the schedule for design and procurement of both the transport cask and the MCO handling machine (a long lead item). It also impacts design and procurement of the storage tubes and seismic analysis for the design basis earthquake which in turn impacts the determination of acceptability of the existing seismic design. Finally, it impacts definition of operating modes and methods at the CSB which must be accomplished before the need for service and support systems can be defined and a reasonably accurate ALARA analysis can be performed.

C. Transportation System Interface

The transportation system must be defined including: whether it will be by rail, truck or both; dimensions of the transporter and cask; weight of the cask and radiation levels at its surface; and whether the cask will be top or bottom loading, or both. The need for and degree of cleanliness (from road dirt and grime) that is necessary before the transporter is permitted into the CSB must also be determined.

The lack of the above required information impacts the design of the transporter receiving area as to whether a separate receiving area is required, or if receiving is performed directly at the CSB Operating floor/adjacent vault; size and methods of transferring the MCO from the transport cask to the MCO handling machine; a determination of the need for shielding; remote handling and support systems; and the cask handling crane design.

D. NRC Equivalency and Seismic

Although the "NRC equivalency" issue has focused on seismic requirements, it has many facets and has the potential for having a major impact on the CSB design schedule and cost. The precise definition of NRC requirements for a specific project typically involves years of review and iterations before arriving at a negotiated position. The accelerated CSB project schedule will not permit a drawn-out iterative process for arriving at a definition of NRC equivalency. It is recommended that the CSB Project management be as pro-active as possible on this issue. A team of competent individuals should quickly establish a common sense position on this issue and aggressively pursue a DOE-RL/Headquarters approval on the position.

The issue of seismic criteria has become more political than technical, due to the programmatic decision to require "NRC equivalency". When the construction of the existing HWVP foundation structure was started, the imposed seismic criteria was conservative relative to the Hanford Site criteria existing at the time (SDC-4.1, Rev. 12). Generally, design criteria cannot change once construction begins. CSB project management may wish to take the position that with the extremely tight CSB schedule, it is inappropriate to impose new seismic criteria, since construction has already begun.

If it is decided to stick with NRC equivalent seismic criteria, then a reasonable precise definition as to what that means should be established as quickly as possible, with DOE involvement in the decision making. The adequacy of the existing structure, relative to the definition, could then be established. If adequacy of the existing structure cannot be demonstrated, then the project should then determine whether the added cost of modifying the building and the resultant slip in schedule, creates a reduction in risk that offsets the perceived risk of continued storage of N-fuels at K Basins adjacent to the Columbia River.

Finally, loading of the storage tube and its response or impact to floor structure during a design basis earthquake should be evaluated for impact to design.

E. ALARA

The design "As Low As Reasonably Achievable" (ALARA) evaluation must be integrated with the shielding analysis in an interactive way to assure that while conducting routine operations and maintenance, the operating personnel can maintain their individual exposures below limits established by regulations. Additional evaluations may be performed for those activities that produce significant exposures to reduce these exposures in a cost effective manner.

Difficulty may come from the establishment of a design to capital cost objective in this evaluation. Potential cost effective dose reduction solutions could increase capital cost. Capital cost objectives may potentially eliminate these solutions.

The ALARA evaluation should include a description of the operating steps, the personnel resources to support these activities including their proximity to the radiation sources, the duration of the tasks, and radiation fields. It should be assumed that an active radiation protection program will be in effect during the storage facility operations. Reasonable exposure criteria must be defined to produce a design utilizing standard industry methods.

Facility design should minimize the potential for contamination. A sealed MCO should make contamination control much easier. MCO service venting operations should utilize ducted exhaust systems. Additional contamination control is provided by the HVAC system during MCO transfer operations. There should be no required use of respirators that would increase operations complexity and direct radiation exposure.

Source terms should meet intended application. Maximum source terms may be necessary to define shielding requirements for maximum dose rate limits. Average source terms may be more applicable for predicting annual operating exposures. Exposure criteria must be defined reasonably to produce a design with existing methods.

ALARA evaluations and shielding design must be integrated with other system items. Issues of major interface are the transport cask shielding design, MCO design, and the impacts on handling and equipment design.

F. Operations

The operational modes and requirements were not clearly defined in the CSB CDR, PSE nor the functions and requirements document. The determinations of operational functions for the near and long term are necessary to establish monitoring requirements, control room configuration, location of alarms (where alarms are transmitted outside of the CSB area), staffing, staff facilities and support systems.

There are references to limits for various parameters such as temperature of the fuel at 400 ° F, the concentration of H₂ inside the MCO, the internal pressure of an MCO etc.; however, the CDR does not clearly define if these are design parameters or operating limits which may or may not be required to be monitored. The frequency and method of monitoring drives the manning, maintenance and complexity of the control room. Frequent monitoring or high maintenance will result in a long term need for continuous manning and the support facilities to support the staff.

The operations required on an MCO are not adequately defined. The following issues need to be resolved: (a) Handling of the MCO; (b) Requirements for MCO venting; (c) Requirements for venting of the MCO seal plug; (d) Requirements for filtering of vented gases and particulates; (e) Methods of venting; (f) Change of operational requirements over the lifetime of the facility; (g) Decisions on whether venting is or is not required for both staging and storage modes;

Venting issues drive the HVAC requirements. For example, if the MCOs are vented while in storage the continuous HVAC may need to support operations to preclude the uncontrolled release to the atmosphere. Venting operations and the HVAC operations and maintenance drive the staffing requirements for the long term operation of the CSB.

The operations necessary to handle / mitigate a failed MCO are not defined. The equipment and processes necessary to place an MCO in a stable condition for either storage or transport are not defined. This needs to be defined to ensure the adequate monitoring requirements are identified and the impacts on the HVAC systems and staffing requirements are defined.

The operations should be kept as simple as possible with local operations of the CSB systems versus remote handling. Manipulation of the MCO valves should be minimized where possible to maximize the integrity of the MCO. These actions in the design should allow for the minimum long term

staffing with the goal of an unmanned building. The long term owner / operator for the CSB needs to be established early on to minimize the impacts of transferring the CSB from the SNF Project to the ultimate owner.

G. Other Programmatic Issues

Technical issues from a programmatic view which need resolution are as follows:

1. The project needs to provide a more consistent and meaningful approach to plant design life. For example, why is the design life of the storage tubes or MCOs (40 years) less than the design life of the vault (75 years)? The term "design life" is not very meaningful for reinforced concrete structures, since the design codes have no requirements relative to design life. The term "service life" is probably more meaningful since it is often used in NRC NUREG documents relative to reinforced concrete structures. The CSB project should consider the approach used in the grout vault project, where a "performance assessment" document was generated. The performance assessment document could address best estimate and worst case aging of the critical components for a period of up to 200 years, or more if needed. In-service surveillance recommendations could also be made.
2. The performance specification requires that technical decisions be based on alternate studies and that life cycle costing be utilized. It is apparent that initial cost and not life cycle cost is the driving factor for the CSB project. Programmatically life cycle costing is required. Management decisions are required to clarify the costing basis.
3. Operational requirements for security and safeguards need resolution for both the staging (2-6 yrs) and long term (75 yrs). Management decisions must be made on what will be required for both temporary and permanent conditions.
4. The Passive Natural Ventilation System for the Storage Vaults is of prime concern. The following concerns will need answering to assure that natural ventilation is viable: (a) Thermal analysis must evaluate all conditions during loading, staging and storage conditions to ensure temperature limits are met. (b) Determine whether the heat load in the vaults will reach a point where air will begin to move

through the inlets and up the stack, or whether a mechanical motive force will be required to initiate the proper air movement and direction. (c) If the decision is made to utilize vault #3 for the storage of CS/SR Capsules, then sufficient thermal analysis should be performed so that significant modifications are avoided after MCOs are loaded. A complete new look at thermal gradients and natural air flow would then be required. Note that some discussions were held about the possibility of installing dampers to direct flow paths because of thermal differences created by having Cs/Sr in vault #3.

5. The Cs/Sr issue must be resolved now. Insulating the concrete in vault #3 may become a "must" rather than a maybe. Analysis should be performed to determine if additional concrete insulation is needed. If needed, then hangers should be installed.
6. Energy conservation issues are not addressed in the CDR although required in the performance specification. Managements needs to decide how to handle the energy conservation program requirements.

APPENDIX A

**SPENT NUCLEAR FUELS
CANISTER STORAGE BUILDING**

**CHARTER
FOR THE
CONCEPTUAL DESIGN REVIEW COMMITTEE**

BY MIKE MAHAFFEY

AUGUST 7, 1995

Design Review Committee Briefing

Project Key Results

- Safe Facility
- Ready to Accept Fuel by 12/97
- Design and Build to \$80M or Less
- Meet Functional and Operational Requirements
- Demonstrate streamlined/accelerated Project Execution
- Public Acceptance

Committee Expectations

- Review Design for compliance with DOE requirements
- Assess constructability to meet schedule
- Assess operability and maintainability
- Document technical risks
- Identify Action Items
- Provide Management Recommendations for Decisions

Package Contents

- CSB Design Issues/Committee Basis
- Performance Specification
- Conceptual Design Report (Includes Estimate)
- Preliminary Safety Evaluation

Decisions Being Requested

- Combined Title I/Title II Design Start
- Release of Specifications for Vault based on existing design to support resumption of construction
- Release Specification for Storage Tubes

CSB Design Issues

- Plant Life of 75 years
- Can Take Design Credit for Administrative Controls and Temporary Shielding during MCO movements
- Temporary or Existing Facilities for Non-Radioactive Maintenance, New MCO storage
- Seismic Criteria 0.35 G
- 750 MCO's with 10 Canisters per MCO
- Truck Shipments
- NRC Equivalency
- CS/Sr Capsules Not Included

Key Contacts

- Committee Secretary - Bill Dana
- Project Engineer - Craig Swenson 376-0288
- Fluor Daniel Project Manager - Ed Jacobs 375-5115
- CSB Project Team Leader - Mike Mahaffey

APPENDIX B

**SPENT NUCLEAR FUELS
CANISTER STORAGE BUILDING**

**CONCEPTUAL DESIGN REVIEW
COMMITTEE IDENTIFICATION LIST**

APPENDIX B
CANISTER STORAGE BUILDING
CDR REVIEW COMMITTEE

rev 3

NAME	POSITION	COMMENTS
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Dana, William P. ICF KH 373-7313 373-6471-fax	Committee Task Secretary	PE, BSME, SRO, Systems Operations, Startup, Design, Construction, Maintenance, 23 yrs exp.
Devine, Jack C. Polestar phone: 373-7755 or 415-948-8242 FAX: 373-9837 or 415-948-8244	DOE Consultant-ITA Report	Polestar; MACTEC-GSSC; Familiar with Path Forward
Eble, Robert G. Jr. Duke Engineering Services (703) 204-8657 ph " " 8620 fax	MRS Design Experience (multi-purpose canister system); NRC Licensability	PE, Nuclear & Mechanical Background; Safety Analysis; Heat Trans; Effluent Analysis; FSAR; HVAC Operations; NUHOM Cask Storage Design; Criticality, Shielding
Fritz, Robert L. ARES 946-3300 fax:946-6006	CDR REVIEW COMMITTEE CHAIRMAN	Electrical Engineer; Hanford Field Experienced; Hanford Project Experienced
Holt, Robert G. (Bob) DOE-RL 376-9989 373-9837-fax	DOE SFD Permitting, Regulatory Strategy, NRC Nuclear Safety Equivalency	MS-Environmental Biology, 30 yrs Natural Resource and Environmental Management

WHC-SD-W/379DR-001
Rev. 0

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Moy, Sen K. DOE-RL 376-8372 372-1926-fax	DOE Safety Analysis	Technical Integration
Pettit, F. Dean Raytheon 377-1981	Constructibility and acquisition planning	Project planner, Project manager
Smith, Luther H. ICF KH 372-0674 372-1440-fax	HVAC	BS Mech Des, Mgr HVAC Dept, 30 yrs exp Nuclear HVAC
Snedeker, Dave BNFL (206) 929-1353 (206) 925-1429-fax	Dry Fuels and Fuels Transportation in UK, USA	ME, MBA; Fluor Daniel HWVP-CSB design support; Dry storage design experience (BOA through LATA: Richard Tooze PM-BNFL)
Sullivan, J. Brian DOE-RL 372-2573 373-9837-fax	DOE-RL project lead	CSB project representative
Thompson, Chris A. WHC 372-0598 373-3324-fax	Operations	K Basins Operations, 26 years Nuclear Navy, BS Meteorology, Ms Mechanical Engineering
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ADDITIONAL REVIEWERS

NAME	POSITION	COMMENTS
Mahaffey, Mike WHC	CSB Project Manager	
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APPENDIX C

SPENT NUCLEAR FUELS CANISTER STORAGE BUILDING

CONCEPTUAL DESIGN REVIEW COMMITTEE DETAILED COMMENTS SORTED BY CATEGORIES

AUGUST 9, 1995

file: summary2.cdr

APPENDIX C

CDR REVIEW COMMITTEE COMMENTS

(SORTED BY CATEGORIES LISTED ON PAGES 1 & 2 BELOW)

CSB TECHNICAL ISSUES TO BE RESOLVED		CSB TECHNICAL DESIGN DECISIONS BEFORE EMBARKING ON HIGH RISK PROJECT PHASES	
1	<p>MCO- Definition of the units to be delivered to the CSB:</p> <ul style="list-style-type: none"> • number • heat load • residual water • confinement integrity • dose rate • exterior contamination • temperature • dimensions • cleanliness 	D	<p>MCO monitoring MCOs in tubes; Corrective actions</p> <ul style="list-style-type: none"> • Temperature/pressure • Radionuclides/hydrogen • Test features • Visual inspections • Corrective actions
2	Transport System interface issues	C	<p>Transport and handling system design features</p> <ul style="list-style-type: none"> • Load in wash down system • Remote shielding & handling • Drop protection
3	<p>Safety requirements</p> <ul style="list-style-type: none"> • Assumptions • DBA selection • DBA Safety analysis and mitigating measures • NRC Regulatory equivalency 	B	<p>Safety systems conceptual design, configuration, including:</p> <ul style="list-style-type: none"> • Safety grade HVAC • Electrical system (including D/Gs) • Cranes
4	<p>Seismic</p> <ul style="list-style-type: none"> • Expand to NRC equivalency 	J	Seismic design

CSB TECHNICAL ISSUES TO BE RESOLVED		CSB TECHNICAL DESIGN DECISIONS BEFORE EMBARKING ON HIGH RISK PROJECT PHASES	
5	<p>Operational modes and requirements:</p> <ul style="list-style-type: none">• Transport• Handling• Staging<ul style="list-style-type: none">- venting?- monitoring?• Storage<ul style="list-style-type: none">- monitoring?• ALARA• Contamination control	F	<p>Vault natural circulation temperature</p> <ul style="list-style-type: none">• Control• Monitoring• Off normal response
6	<p>Programmatic Issues</p> <ul style="list-style-type: none">• Cs/Sr capsules• SNM accountability/security Requirements• Generic use of additional bays• Lifetime:<ul style="list-style-type: none">- service life vs. design life- 40 vs. 75 vs. 100 years- Structure vs. active systems	G	<p>Additional design features for Cs/Sr</p> <ul style="list-style-type: none">• Provisions for additional bays

CSB TECHNICAL ISSUES TO BE RESOLVED		CSB TECHNICAL DESIGN DECISIONS BEFORE EMBARKING ON HIGH RISK PROJECT PHASES	
7	ALARA Implementation <ul style="list-style-type: none"> • ALARA analysis for CSB • Integrated ALARA analysis for SNF project 	I	ALARA Plan <ul style="list-style-type: none"> • Shielding • Personnel exposure
		A	<ul style="list-style-type: none"> • How many vaults? • Natural circulation design
		E	Material accountability <ul style="list-style-type: none"> • Assay • Video • System records
		H	Fire protection requirements
		K	MCO Venting requirements
		L	Design implementation

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
3	5	<p>Section 2.3.3 and Appendix III.A. Although the current Performance Spec. specifies a design life of 75 years, there is still some interest in the service life of the vault structure beyond the 75-year design life. It is suggested that service life predictions beyond 75 years remain in the design documentation. The information in the current draft of the CDR could be modified to emphasize the conservatism in the current design life estimate of 75 to 100 years (conservatism: used upper bound sulfates, assumed wet, etc.). The reported soil sulfates does not specify if the numbers are for total or "water soluble sulfates". This may be another conservatism in the service life prediction. Recommendations could be made for improving the concrete service life without adding significant construction costs. Recommendations relative to in-service inspections to monitor potential degradation mechanisms could also be made.</p> <p>There are several 50+ years, older concrete structures at the Hanford Site, with no known evidence of degradation from adverse soil chemistry. There is one 87-year-old concrete pumping structure, located on the Hanford Site on the bank of the Columbia River (relatively wet environment, mix design: low strength, permeable concrete), which was recently inspected for sulfate damage (soil chemistry not known). No below-ground concrete surface damage was observed (reference document available).</p>	BVW		
9	5	Section 2.2.5. Separate negative pressure for contamination control with redundant and continuous filtration seems to be in excess of NRC regulatory criteria. These canisters should be clean and contained during transport. Routine operations should be designed to maintain these conditions during storage facility cask receipt and handling. This should prevent any contamination on the transport cask or MCO canister.	RGE		
15	5	Section 2.4.2.3. Define servicing.	RGE		
2	6	Section 2.3.3, Para. 1. The difference in the 40-year component life and 75-year vault life should be addressed (Performance Spec., Section 3.2.2.1.1). What is the conceptual design philosophy relative to this design life difference? That is, how will the vault function after 40 years if the storage tubes have failed?	BVW		
5	6	Para 3.2.2.1.1 Design life requires that life-cycle costing be a part of the decision making process for this facility. I find no evidence in the CDR that indicates this. All discussion for the total facility is that first cost of 80 million is the driver. I suggest that this life-cycle cost issue be waived or removed.	LNS		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
1	A	2.1 Government Documents. 1.) Energy Conservation Requirements. 10 CFR 435 along with 6430.A and 4700.1 define a Total Energy Conservation Program. This facility in total would not be required nor would it fit the intention of an Energy Conservation Program. For design issues for compliance I would suggest using the Washington state non-residential code and their compliance forms. Possible Energy Conservation areas to be looked at would be in lighting, building above grade envelope and service water heating.	LHS		
4	A1	3.1.3.1.1.4 The current MCO handling equipment has no means to o/pack an MCO. Tubes are provided for storage, but no means are provided to get an MCO into an over pack. Perhaps the existing equipment could be used and MCO/overpack storage could be provided by a Concrete storage cask similar to those being used for FFTF fuel. The CSB o/pack storage tube could then be eliminated.	DS		
5	AC	The Performance Specification should discuss the operating modes of the facility. The most significant modes appear to be: <ul style="list-style-type: none"> • Startup (during fuel loading) • Normal operation • Startup (during third vault material installation) • Maintenance Discussions of the systems which must function during these modes and activities which can or cannot be performed must be provided.	RLF		
	B	2.6.6. page 2-62 The PA system accessible through the telephone lines is acceptable provided that there is a method to make announcements in the event of a loss of the telephone system. Radiation and hazardous conditions alarms need to be announced in the control room DOE 548.19 makes it clear the Operations is responsible for the safe operation of the facility and the control of a casualty situation and all alarm information needs to be provided to the control room to ensure that the Shift manager has accurate and timely information for casualty control. The failure of the computer cannot prevent the actuation of an alarm.	CAT		
	B	Strive for simplification via aggressive approach to safety design: The major opportunity for cost reduction may lie in the simplification of systems (e.g., electrical power and HVAC) which are presumed to be required to deal with safety issues. These "requirements" are based, in turn, on judgments which have been made regarding design basis accidents and their analysis - judgments which are not necessarily rooted in applicable NRC precedent or DOE regulatory requirements, and which in fact drive many design decisions. A careful reexamination of these could be very fruitful and is recommended.	JD		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
1	B	2.6.6 page 2-62 The public address system should be included in all of the temporary trailers and other remote (separate) facilities associated with the CSB (only those in the 200 East area). Alarms should be capable of being activated from the CSB vault operating area. This will ensure that the requirements of DOE 5480.19 chapter IV are met. The temporary facilities become part of the operating facility until the processing of the MCDBs is complete.	CAT		
1	B	Does the conceptual design provide a safe facility; both from a nuclear safety; and personnel safety aspect. Yes. A. Nuclear safety - Based on the Preliminary Safety Evaluation and Ch 6 of the Conceptual Design Report, Nuclear safety can be achieved. The body of work already performed for the MWPC CSB provides a high degree of confidence that this criteria can be met Yes. B. Personnel safety - Detailed shielding analysis has yet to be done. However, the criteria is well established, and normally, adequate shielding can be achieved to assure personnel safety	NW		
1	B	This comment is offered to assist in the WRC nuclear safety equivalency process for the CSB. It is not provided to implement various equivalency issues. The report identifying these potential issues is still under WRC review and WRC has not established a final position on any of the items identified. The suggestions are only to assist in the implementation of various issues as they might be agreed to later for application. Section 2.6.4.1. State that no need for SC-1 power has been identified. Section 2.7.2. State that no need for SC-1 I&C has been identified. Section 2.9.3. State that no need for a SC-1 instrument air system has been identified. Section 2.9.4. State that no need for a SC-1 water cooling system has been identified (or if one has, then state it is not an open-cycle system). Note that Section 6.2.4.3.4.2 provides this information in a general manner, but it would be helpful to have the above specific statements made. An alternative would be to add a sentence to Section 6.2.4.3.4.2 that states "This includes no requirement for SC-1 electric power, instrumentation and control, instrument air, or cooling water systems".	All		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
2	B	The CDR does not meet MRC equivalency with respect to accident dose limits. The MRC limits are 5 rem (10 CFR 72.106) at the controlled area boundary regardless of the predicted frequency of occurrence. If MRC equivalency is to be obtained, the MRC numbers should be used in the accident analysis.	SM		
2	B	Page 30, Section 3.2.2.1.3.1 - The term "containment" is not specified for implementation anywhere in the Specification or CDR so the application here is unclear.	RLF		
3	B	Para 2.5.1 Page 2-28. General comment. All NEPA filter systems need to have a safety evaluation and identify the need for testability. Figures 2-18 (page 2-42) 2-19 (page 2-44) 2-20 (page 2-46) show no provisions for in-place testing of the filters per ASME N510. If these filter trains need to be tested then adequate space within the filter train as well as entrance ductwork int that train must be evaluated for compliance with ASME N509. Proper airflow distribution over the face of the filter bank is required.	LHS		
3	B	The small sintered metal NEPA filters need to be included in this evaluation. "WGP" inside the storage tube may not be acceptable. Confinement barriers may have to be re-evaluated.			
3	B	In Section 2.2.5, state specifically that the negative pressure in the MOD/Cask Service Area will be maintained during normal operation as well as during accident conditions. Section 2.5.6.3 states that this is the case for the Load-In/Load-Out Area.	AM		
9	B	Section 2.7.2.3: This section states that HVAC system maintains a negative pressure in the vault area. There is no HVAC in the vault area; it is a passive system. Assuming it was intended to say "on the vault operating deck," that would only be true, following the detection of radiation, since there is no forced exhaust capability during normal operation and the operating deck is pressurized. Revise to clarify.	SM		
9	B	On p. 3, para. 5, it states that "modular construction concepts were evaluated", but no discussion of modular construction alternatives were found in the CDR (example: The use of steel beam/plate modules to support the operating deck concrete pour and eliminate shoring of the floor.) It is noted that in the oral structural presentation, specific modularization options were mentioned, but not addressed. Will the results of modularization evaluations mentioned in the oral presentation be added to the CDR?	BVM		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
9	B	2-28 2.5.1: 2-40: A building which is NOT normally at negative pressure will not function as designed when called for to startup on radioactive particulate emissions. Experience has shown that this approach is simply not practical for the following reasons: 1. pressure oscillations due to variable negative pressures; 2. building siding which flexes due to the changing negative pressure will ultimately leak air, causing control problems; 3. unexpected outside air velocities cause control problems which cannot be easily solved during a radiological emergency. 4. DOE requires a secondary confinement. Since the emergency exhaust system is already present, it makes good design sense to utilize this system during the staging period when MCOs are being moved about the building. This eliminates the need for a MCO handling machine HEPA ventilation system. 5. MA Dept of Health will most likely require a building which normally operates at negative pressure and exhaust is HEPA filtered.	WPD		
10	B	2-32 2.5.2.5.1: The storage tubes will not function as secondary confinement during loading of MCOs into tubes. Secondary confinement should then be performed by building exhaust (negative pressure through HEPA filters).	WPD		
10	B	The description of the Liquid Waste Collection system talks about washing off road dirt and collecting the water in a collection tank for transfer to the TEDF. What happens if the water in the tank is contaminated. Revise to clarify.	SM		
13	B	2-43: Investigate elimination of backup power supply generators. Safety analysis may be able to show that temporary power hookup to CSB is adequate during a power failure, which is not assumed to be coincident with a radiological accident.	WPD		
13	B	Section 6, Paragraph 6.4.1.4 Integration and acceptance of PSE for SMF-CSB with SAR as completed for MWP-CSB as basis for permitting start of construction may require buy-in by stakeholders. There appears to be a reasonable assessment of unique differences between original and modified CSB. However, there does appear to be a discrepancy between the content of an MCO as stated in the general description of the PSE and the CDR Statement of Work (Assemblies versus "5-high casks").	FDP		
13	B	Section 2.3.3.2. Transfer or transport cask should be used to transfer to the storage vaults. An unshielded MCO would increase risk with no obvious benefit.	RGE		
17	B	2-60: Standby power generators may be started with air motors rather than batteries, eliminating need for battery bank 7 increasing reliability.	WPD		
18	B	Cranes in general. Since the floor of the CSB won't take an MCO drop, suggest invoking Nureg 0612 Control of Heavy Loads, or limit the free height that an MCO can achieve above the operating floor.	DS		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
22	B	Section 2.5.1. The design for three separate and redundant HVAC systems seems excessive compared to NRC criteria. May be in the relative description of the contamination potential without specifying contamination levels. The process may force the designer to assume levels of contamination that are not significantly different and may be serviced by one system. Dampers may be utilized to assure positive air flow from areas of lower contamination potential to areas of higher potential. Another potential cost savings may be to utilize accident filtration system during normal operation.	RGE		
24	B	2.5.3.1. Significant operating cost to condition air used for dilution.	RGE		
26	B	2.5.4. Is there a capability to control effluent resulting from a drop through the MM transfer cask to avoid the potential for gross contamination of the operating deck.	RGE		
27	B	2.5.4. Current spent fuel cask handling and ISFSI operations include fixtures and grapples that comply with NUREG-0612. This assures redundant grappling and redundant load capability. This designs against the possibility of loss of load. In addition, the cask/canister is capable of minimizing consequences of a drop. In this way no radiological condition exists.	RGE		
28	B	2.6.4.1. Is the power supply to the radiation monitor SC2 also, please include.	RGE		
37	B	6.2.4. Seems like doses are reversed for offsite cases 2 and 3.	RGE		
38	B	6.2.4.1.5. IE-3 seems excessively high for the conditions in which it is applied. This value has been used for events of extremely high energy like fires and explosions and assembly drops from high elevations without protection.	RGE		
39	B	Table 6-2. MCO over pressurization without monitoring seems low for 880 canisters. MCO drops seem high for handling systems design. DBA #3 seems to be similar to #2 with the additional human error without a significant change to the probability.	RGE		
	B3	Section 6.1 - "NRC EQUIVALENCY GOAL" may be too broad and all-encompassing. Specifically, 6.1.1 says meet "all applicable DOE requirements" and use commercial standards. Why make the commitment to commercial standards? Suggest softening to "consider commercial standards" and, perhaps, a reference to "NRC safety equivalence".	JD		
	B3	Section 6.1.2 commits to the 10CFR72 radioactive release limits but in fact the DOE limits are limiting. The DOE limits need to be noted at least. (see 6.2.4 for discussion of DBA - no mention of Part 72 limits)	JD		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
	83	<p>Overall Approach to Safety Analysis:</p> <p>***** Jack Devine Comment: "The following comments relate to the safety analysis and the possibility to move to a more realistic safety basis. The advanced light water reactor work on "physically based source terms" and "passive safety systems" has demonstrated WAC willingness to consider more realistic approach to facility safety. Overall, the benefit here is to determine if a storage facility without active safety systems would be possible.</p> <p>The specific active systems I am talking about are active filter systems. The Conceptual Design (Table 6-3) shows "operating area exhaust and stacks" as well as "operating area/cask unloading area" HVAC systems as safety Class 2. As an active system, this classification brings along with it Safety Class power, controls and ventilation (for cooling?). I believe a safety class can be made to eliminate the exhaust stack. It involves a critical re-examination of the Accident Analysis assumptions."</p> <p>***** 1. Eliminate need for consideration of "energetics" releases: Basically there are two energetic mechanisms possible: criticality and burning ("rapid oxidation of fuel"). Criticality concerns have been "designed-out" such that a criticality accident is not part of the accident analysis. Can fuel burning be similarly eliminated? Use of vacuum conditioning (both cold and hot), combined with very effective sludge removal, could be a basis for this case.</p> <p>2. Allow credit for natural mitigation processes: This was a major breakthrough in the reactor licensing world and enables the concepts inherent in the AP600 and SBWR. In the case of the CSB, calculating dose with allowance for settling and plateau and no HVAC could show that the facility is <u>safer</u> if the exhaust fans <u>stay off</u> than if they are turned on. Obviously, if that can be demonstrated the exhaust system need no longer be Safety Class 2.</p> <p>3. Calculate dose using a time-dependent Source Term release and allow reasonable credit for on-site evacuation: The controlling dose appears to be that used for the "worker" (at a neighboring facility). Two unrealistic assumptions are made. First, the Source Term release is assumed to be instantaneous. This is certainly "bounding" but the reality is that for any accident scenario the source will be released over time. The second unrealistic assumption is that no credit is given apparently for evacuation or any other protective measures for workers. Such credit may not make sense as long as the release is instantaneous but the real world behavior of aerosol releases, particularly if they are "non-energetic", is such that protective measures are both prudent and reliable.</p>	JD		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
	B3	Table 6-2 shows some huge "unmitigated" dose numbers that were apparently arrived at by saying the initiating events (earthquake, wind, ashfall) would in some way fail ALL "750 MCOs". I do not see any credible mechanism that would cause such a failure. Why put in such incredible numbers?	JD		
1	B3	The proposed conceptual design for the CSB does not satisfy US DOE requirements for New SNF Facilities. Specifically: "New facilities shall incorporate inherent and passive systems and features to preclude the need for active, manpower intensive operations. Designs for new SNF facilities shall be simplified to improve safety, reliability, constructability, operability, inspectability, and maintainability." The conceptual design proposed for the CSB includes multiple active system features which suggest unfavorable life-cycle costs profiles to the US Government. Examples of such systems include: HVAC Confinement Systems, 1E Electrical Systems, Cask Wash System, Maintenance Areas, Instrument Air, Waste Handling Storage & Disposal, Distributed Computer Data Acquisition/Control System, Liquid Effluent System, etc. WHC should rapidly develop an alternative design to achieving safe fuel storage and reliable low-cost facility operation utilizing passive systems, so that the dependency on above mentioned active systems can be minimized or eliminated in the CSB.	AJC		
	B3	<u>MCO HEAT LOADING:</u> The new conceptual design for reracking the fuel doubles the MCO fuel loading. Can the natural ventilation design still meet the 400 F limit on the MCOs?	JTV		
2	B3	<u>Section 2.2.8, SC2 Emergency Generator Area:</u> There should not be a requirement for an emergency generator. A dropped (breached) MCO accident scenario is not connected to a loss of all AC power accident. Loss of AC accident: No system, as described, requires AC backup power during a loss of AC scenario. Delete the requirement for Emergency Generators. Backup Generators are also not required.	JTV		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
3	B3	<p>Section 2.4.2.4, Safety Class:</p> <p>(1) The COR states that all items capable of damaging Safety Class 1 items shall be designed not to fail during Safety Class 1 DBAs. This is close, but it should state "all items capable of preventing SC1 items from performing their safety function shall be....". Damage is allowed as long as the safety function is not compromised.</p> <p>(2) What is the SC1 function of the tube plugs? SC1 for the CS8 is based on criticality requirements only.</p> <p>(3) If an MCO is designed to not be breached during DBAs, then there would be no requirement for the building, ventilation, etc. to meet SC2. The MCO becomes the only SC2 boundary needed. The building and equipment may be required to meet 3/2 or 4/2 type requirements if not already 4/1.</p>	JTV		
4	B3	<p>Section 2.5.4, Operating Area Emergency HVAC System:</p> <p>An emergency HVAC system is described as providing confinement for the building during a breached MCO scenario. An analysis needs to be performed to determine the necessity of this system. As the SC2 determination was made taking no credit for the building structure, simply securing the Operating Area ventilation may provide sufficient containment of contamination.</p> <p>The PSE is based on the 10 canister MCO which has approximately 25 times more available sludge going airborne than the reracked MCOs resulting in an onsite exposure of 350 rem (WMP-SP-SMF-PSE-002). Therefore, the reracked MCOs would cause an onsite unmitigated release exposure of 14 rem (5 rem limit). If the Ops Area ventilation were to be secured upon a contamination release and it can be shown that the building, with ventilation secured, can mitigate the onsite release fraction to 0.36 of the unmitigated scenario, then no DBA-based ventilation system would be required beyond the safety function of securing the ventilation.</p> <p>Note: This should also eliminate the stack requirement.</p>	JTV		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
4.4	B3	<p>Overall Approach to Safety Analysis: (continued)</p> <p>4. Re-evaluate the Degree of Conservatism in DBA Radiological Assessment: (continued)</p> <ul style="list-style-type: none"> - X/P: For the offsite boundary distance, was 10,750 meters used (page 6-6) or 15,000 meters (Table 6-1)? (Also, Table 6-1 does not seem to be the same information as Table 4-1 of the PSE from which it reportedly was taken. Verify.) <p>The onsite, ground release X/Q (1.13E-2 sec/cubic meter) is the most limiting X/Q and drives toward installation of an elevated release system. It is a "99.5 Percent" value. It may be possible to justify a smaller X/Q by committing to avoid MCO movement during certain times, say the 1% or 2% of the year with the worst dispersion? The operational complication of stopping MCO movement a few days a year may be balanced by not needed a stack and attendant ventilation system.</p> <ul style="list-style-type: none"> - Mitigation other than elevated release: First, it is not clear whether "mitigated" means just elevating the release or if it means also taking credit for filtration. It may be useful to clarify how much benefit comes from the one and how much from the other -- if indeed the filtration was credited at all. Also, as noted earlier, natural holdup and removal process might be investigated. 	JD		
5	B3	Para 2.5.1.7 page 2-33. For a safety analysis to be made, the limiting and upset conditions need to be identified, evaluated and satisfied before vault construction is given the OK. Mechanically forced ventilation could change the supply and exhaust plenum concept.	LNS		
5	B3	<p><u>Section 2.6.4, Electrical System Configuration:</u></p> <p>Safety Classification of the electrical system may be downgraded if items 2 and 4 are resolved and the facility can be shown to be in a safe configuration during a loss of AC. This would eliminate the redundancy requirements.</p> <p>Other system classifications may be similarly affected.</p>	JTV		
6	B3	Table 3.2.2.2.1 page 43 of the PS shows pressure requirements for each zone. Need to show these pressures on Fig 2-10 page 2-29 and assure that the HVAC System will be or can be designed and operated. Some airlocks might have to be pressurized and not just assume the pressure of the side of the airlock exposed.	LNS		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
11	B3	Section 2.4.3.3.6. An important aspect of limiting energetic chemical reactions with the fuel is that the fuel is always oxygen limited for an MCO failure. During that time that the MCO is being lifted out of the cask and into the MMW it appears that this is not the case. This will need to be addressed; possibly by the use of a sleeve or seal between the cask and the ceiling of the fourth station through which the MCO is pulled. This is particularly important during this lift, as the MCO is not provided with an impact absorber.	AM		
13	B3	Section 2.4.3.3.7.4. State if a function of the portable shielding gate is also to prevent release of radionuclides from the confinement provided by the MCO storage tube and the MMW when the MMW is position over the tube. Also, state if, in fact such a barrier will exist at this time. This would be an important aspect of defense in depth for an MCO drop into the tube. This is; 1) use of a highly reliable crane to decrease the probability of a drop, 2) strong MCOs with impact limiters such that the MCO does not fall if dropped, 3) the confinement boundary presented by the tube, MMW and any MMW to operating deck sealing such that radionuclides are not released to the CSB, and 4) the confinement provided by the CSB. The issue here is, does number 3, in fact, exist, and if it does, it should be described.	AM		
15	B3	Section 2.5.2. State if the passive vault cooling system is absent of any active components (e.g., dampers) and if it is completely independent of the need for electric power and control functions. If it does require active components, are they fail-safe relative to maintaining ventilation? Also state if instrument air is required for operation of the system.	AM		
17	B3	Section 2.5.3.5 describes the emergency ventilation system as only functioning during accident conditions. Has consideration been given to the benefits of continuous operation to increased reliability for accident mitigation and to reduced normal offsite release? The time to establish a negative pressure relative to the characteristics of the release (e.g., an MCO overpressure relief may be very quick) must be analyzed. The CDR may not be the place to discuss such a trade study, but such an evaluation should be documented.	AM		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
18	B3	<p>Section 2.5.4.1. Note that WMC-DH-4-46, Section 9, Attachment B, states the following:</p> <p>"A documented risk assessment which demonstrates an acceptable risk when a single, active detectable component failure coincides with the initiating event (e.g., natural phenomenon hazard). Consider the annual frequency of the initiating event and the reliability of the component assumed to fail."</p> <p>This could be the basis for eliminating one train of the emergency HVAC system and one emergency generator (Sections 2.2.8 and 2.3.3.5). The cost of such a change, however, might be that the remaining train must be running during normal operation.</p>	AI		
21	B3	Section 2.7.2.3. The differential pressure control system will need to maintain a negative pressure differential relative to the lee side of the building during high wind conditions. This may require the use of four external pressure sensors and a rather complex control system.	AI		
29	B3	Section 5.5.3 states that "(t)he events that can threaten the integrity of the vault are already established as Design Basis Accidents, except for failure of the MCO relief device(s)". This requires some explanation as to how failure of the relief devices could challenge the vault. Also, does failure of the relief devices mean they do not relieve at the design pressure and the MCO then fails or does in mean the relief valves relieves at too low pressure. Failure of an MCO by over-pressure must be contained within the MCO storage tube as we do not analyze for a radiological release to the vault area.	AI		
30	B3	Table 5-3 indicates that the result of a loss of instrument air is that HVAC systems fail in a safe condition. Explain if the loss of instrument air has any impact on the vault passive ventilation system or operating area emergency HVAC system.	AI		
33	B3	Section 6.1.2 should commitment to the DOE radiological dose limits for the public as they are more limiting than those of Part 72 and to WMC limits for the onsite worker as similar limits are not defined by DOE or NRC. These criteria are correctly referenced and discussed in Section 6.2.4.	AI		
36	B3	Section 6.2.1. To say there are no criticality concerns is probably an overstatement. The Mark 1A fuel will require engineered controls even for a Keff of 0.98. It is suggested that this section be replaced with a discussion similar to that contained in PSE-002 (as issued for comment), Section 8.0, Item 2.	AI		
37	B3	Section 6.2.2. Write as "... classifies all radiological hazards identified....". Then add a sentence that states no use of toxic materials in the CSB has been identified and, as such, non-radiological events were not analyzed.	AI		

No.	BIn	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
38	B3	Section 6.2.3.2. Rewrite the first sentence to acknowledge that not all SSCs need to be assigned SC-1, SC-2, or SC-3. The third sentence ("Note that the...") should be rewritten to not imply that DOE Order 6430.1A defines SC-1, SC-2, or SC-3. PSE-002, Section 1.0 has possible wording in the second paragraph to address the difference between the DOE and NRC requirements in this regard.	AM		
39	B3	Section 6.2.4 should contain a statement that the probability values were not used in establishing the acceptance criteria (see PSE-002, Section 1.4 for possible wording).	AM		
40	B3	Section 6.2.4. The third paragraph should explain that even with consideration for the proposed reduced site boundary of 10.75 km West (W 240), the controlling offsite dose is at the proposed near river site boundary 15.0 km East. The PSE will be clarified in this regard in response to a comment by Jay Martin.	AM		
41	B3	Section 6.2.4.1.2. Rewrite this section so that it does not suggest that the frequency assignments of the PMA have a relationship to the acceptable dose limits provided in Section 6.2.4.1.1. See comment Number 39 on this same issue.	AM		
42	B3	Section 6.2.4.1.3. Write the last sentence of item B as "beyond design basis accidents will be considered for evaluation to determine if there are cost-effective measures that can be taken to reduce the residual risk".	AM		
43	B3	Section 6.2.6.1.4. Delete reference to "Safety Class 1" MCOs as this safety class determination is a potential result of the safety assessment.	AM		
44	B3	Section 6.2.4.1.5. Delete reference to the site boundary at 10,750 meters for the reason provided in comment Number 40. Also the statement "IE-3 for all isotopes except Kr-85" should be explained (or deleted) as the RF is accident dependent.	AM		
45	B3	Section 6.2.4.1.6. Be aware that the final PSE will include revised X/Qs.	AM		
49	B3	Section 6.2.4.2.1.A. The safety class assignment for the storage bottle isolation valves should be left for the PMA or more justification for the SC-1 assignment should be provided in the CDR.	AM		
50	B3	Section 6.2.4.2.1.B. The NRC nuclear safety equivalency document has a discussion of the treatment of aircraft hazards that would be appropriate for this section (Table 5.c, in response to §72.24).	AM		
52	B3	Table 6-2. The column providing the estimated frequencies should be deleted for the reasons discussed in comment Number 39.	AM		
60	B3	Need to analyze a MCO drop accident. (from meeting minutes)	AM		

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16	C	2.2.3 see comment 14	DS		
17	C	2.4.3.3.7 Suggest changing from multiple casks and plug casks to a combined unit mounted on a bridge crane, just above the floor. The design for this would be similar to the operating philosophy of the SRS Shielded Canister Transporter, without the transporter.	DS		
35	C	5.6.(f). analyze potential to combine transfer/transport casks to minimize cost, transfers and risk.	RGE		
58	C	Appendix III.B. A typed summary should be added to page 1 of the appendix that states the conclusion relative to the unacceptability of an MCO drop. From the curve and handwritten comment it appears that a drop from any height greater than 1/4-inch is unacceptable. Also, if the MMH catches the MCO on some structure is that also unacceptable as total energy is still transferred to the operating deck? If this is the case, this vulnerability needs to have greater visibility in the CDR. Is a solution to lower the MCO onto some structure prior to moving the MMH from the over the MCO/Cask Transfer Tunnel area?	AM		
5 PAGE 2-18	C1	MCO and impact limiters. The MCO could also be designed, since it doesn't exist yet to withstand by design the drop accident. A single impact limiter on the bottom of the tube could be installed and then the canister drop accident is only the length of an MCO plus 2' BMFL uses this principle for glass storage and we stack 10 high, each canister slightly over 4' tall. You can do away with the step in the tube, and the operational step of adding a second impact limiter.	DS		
6	C2	3.2.1.1.3 There is no provision to decon a transport package. It isn't clear that there really needs to be such capability. Since the cask will have been deconned prior to leaving the basins, transit time isn't long and if the correct cask coating/surface is used or specified the cask body shouldn't be expected to 'weep' contamination.	DS		
5	C5	2-21, 2.4.2: The packaging process for overpacking MCOs should be described, since this will impact design and cost of the CSB.	WPD		
11	C5	2-39 2.5.3.1: During the winter when AM-3 is out of service, backup heating is necessary to preclude freezing of components with water. Design appears not to have backup heating (second train of heating nor unit space heaters).	WPD		

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11	C5	Section 2.6.5: This section indicates the SC-2 electrical systems may not meet all requirements for Class 1E systems. If the SC-2 electrical systems provide power to other systems to mitigate the offsite consequences during the DBA, WMC needs to consider the following comments. The CDR discusses an exclusion area of 15,000 meters to the East, but does not indicate where that is. Further analysis of the DBA may be needed. The exclusion area boundary should not exceed the near bank of the Columbia River since public access to the river is not controlled. If the limits of 10 CFR 72 (5 ren) would be exceeded in a DBA, 10 CFR 72 would classify this as a safety related system and Class 1E would apply.	SM		
12	C5	2-39: HVAC diagrams do not show how heating is performed in waste handling, decon room, fan room, electrical room, water treatment room, holding tank room, electrical equipment room, water storage room, instrument air room. Add this capability to the design.	WPD		
1	CD	Page 20, Section 3.2.1.7 - In reviewing the CDR, no equipment to perform: b) radiological surveys of the MCO; c) decontaminate the MCO; or e) repackage failed MCO's were identified. These were discussed in the briefing but no resolution ready.	RLF		
PAGE 6-19					
	CDK	2.4.3.3.1 this section describes returning an MCO that has indications of failure to the K Basins. The K Basins do not have the area, equipment or personnel to handle a failed MCO. If a failed MCO is detected at this point is it safe to transport it back to the basin or to any other facility? The failure mode would most likely be from over pressurization which would imply failure of the drying process. The currently defined requirements are that the MCO must be shipped unwent. Additional analysis needs to be done to determine if the shipment of a failed MCO is safe or if the MCO should be over packed and stored for further monitoring. If additional processing of the MCO is required moving the failed fuel container closer to the site boundary to a facility that lacks a filtered ventilation system and no equipment to mitigate the problem does not seem to be in the best interest of the public.	CAT		
	D	2.7.2.2 page 2-72 The design calls out a specific requirement for a maximum temperature of 400°F for an MCO. It is not clear how the proposed instrumentation will ensure that a specific MCO does not exceed the maximum temperature. Are there RTDs on each tube and how does this correlate to the internal limit of 400°F?	CAT		
1	D	MRC requirement from 10CFR72.122(h)(4) requires that the storage confinement system have the capability for continuous monitoring in a manner to determine corrective action. Monitoring building exhaust from the operating deck area may not be appropriate due to the dilution effects and the inability to determine which storage canister has a problem.	RGE		

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2	D	In Sections 2.2.1, 2.4.3.7.7 and 2.9.8.2, state if the MCO impact absorbers will absorb sufficient energy to prevent loss of MCO containment integrity upon a MMH failure. If this analysis has not been completed then state that this is a design requirement of the MCOs. This issue may also be appropriate for the <u>Interface with SNF MCO</u> discussion in Section 5.2.1.	AM		
2	D	same area 3.1.2.2 e No means is provided to monitor the integrity of a stored MCO. Failure will be by alarm or when the NEPA's kick in. Air flow rate should be monitored, although with a Natural circulation store, you can't really effect the airflow, maybe the requirement should be dropped. Does there really need to be a means to monitor MCO integrity?	DS		
8	D	Section 2.1.1, 2nd para and elsewhere: The berm does not appear necessary. Even if the cask dose rate were 200 mr/hr on contact and tracks are 20 ft apart, the dose rate at the other track is less than 0.5 mr/hr. Since the MCO is only 14.5 ft long, a train travelling at 1 mph would pass the cask in approximately 10 seconds and the crew would receive 0.0014 mrem maximum.	SM		
PAGE 2-20	D	3.2.1.5 This requirement doesn't appear to have been explicitly met. As there are no monitoring functions for the tubes or the MCO how do the operators determine if the MCO is at a stable temp, doesn't under go some slow exothermic reaction. There needs to be some analysis performed and verified that and MCO with it's heat source and chemical energy can't reach 400F or that this requirement should be dropped.	DS		
8	D	2-28 2.5.1: Radioactive particles should not automatically start up backup power supply if normal power supply is still available.	WPD		
10	D	3.2.1.8 g Off gas monitoring esp for H2 evolution. This doesn't seem to be provided, where would it be measured, and what would you do if you found some. What type of 'facilities' are to be provided.	DS		
23	D	2.7.2.1 "Sophisticated alarm systems" Are these really needed. When the CSB is in operation, there won't be a 'control room' so why go for an expensive DCS	DS		
23	D	Section 2.5.2.5.2.8. Is there a helium tracer in the nitrogen cover gas for ease in detection?	RGE		
24	D	2.7.2.2 Multiple RTD's why? he operator will have no control over temp or airflow. Trends for operation may be meaningless over time as the heat input to the store will vary with time. Some thought needs to be given to what needs to be monitored and what effect that parameter being monitored has or how it can be effected either by the operator or through changes in store heat load or possible air flow blockage	DS		
25	D	No mention of hydrogen monitoring or what to do if discovered	DS		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
28	D1	6.2.3.2.1 Purging of the tube, why? it is supposed to be self venting? It there some criteria for this?	DS		
4	D8	Executive summary. The history of the changes to the design requirements is confusing and not a necessary part of the facility design. The design is to satisfy the requirements as stated in the performance spec. Delete historical perspective or move to appendix.	RGE		
	DK	2.4.2.3 Page 2-20 The scenario of storing an MCO that is generating excessive hydrogen does not identify any method of monitoring pressure build up inside of the MCO. Without monitoring, how will the internal pressure be determined?	CAT		
24	DL	DOE Order 6450.1A, Section 0110-99.0.8, requires automatic monitoring and alarm devices where increases in radioactivity may occur. (See RCR Comment No. 17.) In the ACDR, detailed discussion of the need (or lack of need) for area monitoring (AMS), space monitoring (SMS), criticality monitoring (CAS), continuous air monitoring (CAM), and continuous air effluent monitoring (CAEM) systems should be provided.	RLF		
	E	2.7 There is no discussion of any requirements for equipment or instrumentation to meet the security and safe guards requirements for special nuclear material. These requirements need to be included in the ACD to minimize their potential impact at a later date.	CAT		
3	E	The CDR says the facility will meet 10 CFR 72 requirements. 10 CFR 72 requires compliance with applicable sections of 10 CFR 73 (including DOE for a NRC licensed facility). The CDR does not appear to meet NRC equivalency for protection against radiological sabotage with respect to Physical Security requirements for protected area physical barriers, penetration detection and alarms, and on-site guard force. If NRC equivalency is to be obtained, the applicable parts of 10 CFR 73 must be met.	SM		
	F	Section 2.5.2.5.2.5 - Regarding natural circulation cooling, this section states that "total flow is assumed to be evenly and uniformly distributed..." and that is a "critical assumption that must be assured..." Even an uniform flow distribution seems to me to be extremely unlikely, particularly for a large geometry, low flow, low heat load situation. Further, it will be difficult to verify by analysis. Dependence on this assumption is a technical risk of some significance and needs to be assessed.	JD		
2	F	1-9, para 1.4.2: There will be no requirement for temporary vault cooling during staging.	WPD		

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3	F	<u>Section 2, Paragraph 2.5.2, Page 2-31</u> CSB vaults are designed for and dependent upon passive ventilation. No test or modeling data referenced or provided to evidence that this function in initial staging operation so as to satisfy Performance Specification 3.2.1.5 which requires "maintaining temperature of MCO" and/or 3.2.2.1.4.1 regarding "temperature control" in the storage vaults.	FDP		
4	F	Para 2.5.2.6 page 2-33. Obviously, maximum vault temperatures will not be reached until vault loading is complete and actual thermal gradients established. When will actual stack flow begin? Have loading configurations been considered?	LMS		
16	F	Section 2.5.2.7 (labeled as 2.5.1.7). An additional open issue is confirmation that adequate natural circulation will be obtained for a partially loaded vault.	AH		
20	F	2-75: Require blanking off of unused vaults, so that short circuiting of cooling air does not occur.	WPD		
34	F	Use of teflon in radiation areas should only be used as a last resort if it can be demonstrated that it will not degrade in the predicted design radiation fields.	WPD		
3	F1	Page 2-33 - Section 2.5.2.6 - Last sentence, last paragraph - The supply air temperature is a maximum of 115 degrees.	RLF		
5	FB	A means to test the operation of the natural circulation airflow should be identified. As an example, for the Sellafield Store for vitrified glass, heaters were placed in the storage tubes as part of the acceptance test to simulate the glass and develop the required buoyancy to initiate airflow. Even though this was a regulatory requirement, BNFL was still forced, by the regulator, to install powered back-up fans. These have never been used.	DS		
11	FG	3.2.2.1.2.5 "Flexibility" The store work on the principles of natural circulation driven by buoyancy of the heated air. When the CSB was designed for glass the heat load among the cells could be kept fairly similar by glass loading. If Cs/Sr is to be added, then the fluid flow analysis must be done in that condition. The extra heat load, imposed by Cs/Sr, will not preclude the store from working, however, the expected cooling to the M-rx fuel may be degraded. In other words the greatest airflow will be where the greatest amount of heat is. Adjustments to force d-p in the store to account for this can be designed in, but it is doubtful if this could be added after the fact. The Sellafield store has a range of remote shutters that can be moved to account for differing heat loads in the glass as a result of fuel burn-up and cooling time prior to reprocessing.	DS		

C-22

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
12	FG	3.3.1.12 "Defense in Depth" The principles behind the operation of the store assume natural circulation and an upper limit on MCO fuel temp. Is this upper limit conservative or in fact a real limit? If, through natural causes, natural circulation is lost, ie blockage, loss of stack does it matter that there may be no flow or reduced flow. It is not clear from the PSE that this condition has been looked at nor how the store would perform in an upset mode. In other areas it appears that sufficient back-up systems are provided for, except in the case of cooling. Again, if Cs/Sr is added the condition worsens.	DS		
21	FG	2.5.2 The assumption that air flow will be uniformly distributed is wrong. Airflow will go where the heat is. Unless the loading pattern is such that all vaults are filled at once, or the two unused vaults are blocked off, there will not be uniform air flow and heat transfer. This impacts MCO c/l temp but again that may not be an issue. It will be an issue if Cs/Sr capsules are loaded. When BNFL modeled the CSS two years ago we used a CFD code which identified the importance of by-pass flow around the tubes to hold concrete wall temperatures down. However, two things have changed, a reduced heat load, but a longer facility life. The reduced heat helps the concrete, but if the airflow isn't there to cool the concrete has anything changed? I don't know. This needs to be looked at independently	DS		
20	FL	2.5.2 Passive Vent System past analysis suggests that a cheaper store could be built by reducing the height of the stack and adding another shorter stack. Certainly the store will 'pump' better, what is uncertain is the cost of the tall seismic stack vs two short more seismically stable stacks.	DS		
21.	G	An early decision about Cs/Sr should be made and how the capsules will be introduced to the store. While natural circulation works, it does depend on a variety of factors that must be used together. It may make more sense to load each vault with half fuel and half capsules, certainly this will better than all of one. Unless flow control is provided.	DS		
19	G6	2.4.3.3.7.8 Floor Plugs. The insulating concrete for the floor plug has been removed as the heat from M-fuel is insignificant when compared to MWVP canisters. However, if all plugs are made this way and Cs/Sr capsules are stored in the vault, the heat out from those were, in some combinations greater than glass canisters. A later problem may arise with the floor plugs and floor surface temps.	DS		
19	H	Page 2-90 - Section 2.10 - No provisions to collect fire water are provided. Is that acceptable since the areas protected could be contaminated? Required by DOE Order 6430.1A, Section 1540-99.02.	RLF		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
24	N	Section 2.10.1 includes the sentence "(t)he uranium metal fuel, which will be stored in the building within containers, is combustible under certain conditions during the staging phase of operation". As the sentence does not lead anywhere and the issue is probably not important to fire protection, it is suggested that it be deleted. The material provided in Section 5.1.1 provides adequate discussion of this concern. Also, delete the sentence, "After the fuel is stabilized,".	AM		
25	N	Section 2.10.2. It is stated that automatic smoke and/or heat detectors will be provided in the electrical switchgear and control rooms. Are these the only locations to be provided with fire detection? This should be made clear as other locations in the CSB will have in situ and transient combustible loadings for which the FMA will identify the need for detection and suppression. Also is "automatic" needed in reference to the detection?. Note that DOE Order 6430.1A requires complete automatic fire protection for facilities of the size and cost of the CSB.	AM		
26	N	Section 2.10.2. Add references to NFPA 14, <u>Standpipe and Hose Systems</u> , and NFPA 24, <u>Private Fire Mains and Their Appurtenances</u> , to this section. Note that NFPA 14, Section 3-2.1, requires that all locations within a building be within 30 feet of a nozzle when attached to no more than 100 feet of hose.	AM		
27	N	Section 5.2.1 should also consider the interface with the existing Hanford 200 East fire protection system or this consideration should be added to <u>Interfaces with the existing water and sewage systems</u> . This interface is included in Table 5-1.	AM		
29	N	2-90 Sprinkled fire protection should also be eliminated from MCO service area where MCO valves are opened, exposing dried fuel.	MPD		
31	N	Table 5-1 states that failure of the fire protection system can result in flooded storage tubes or thermal shock to the tubes. In Section 2.10.2 it is stated that these areas have no automatic protection. Is this risk from the use or failure of hose stations and standpipes?	AM		
32	N	5.1.1. Please provide reference to the data to support conclusion on fire potential of the MCO. Significant impact on facility design.	RGE		
47	N	Section 6.2.4.2.1.A. The paragraph that starts "(f)or the purposes of this analysis...." does not appear to be correct relative to the assumption that fire/explosion is not assumed to be a credible initiating event. Also, as this section acknowledges that the FHA remains to be completed, it is not apparent that this paragraph is needed.	AM		
53	N	Section 6.2.6. Consideration will need to be given to the combustible loading presented by cable insulation.	AM		
22	N3	Section 2.9.8. In Figure 5-1, <u>Fire Protection Function Hierarchy</u> , and in Section 5.1.4, reference is made to a hydrogen monitoring system. This system should be discussed in Section 2.9.8 or Section 2.5.3.	AM		

NO.	Bin	COMMENTS/Discrepancy: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	Disposition: (Provide justification if NOT accepted)	STATUS
	1	2.4.3.3.2 page 2-23 Unbolting the cask from the rail car with the crane and an impact wrench seems to be cumbersome and expensive. The basic sequence described is hard to follow, is the operation 100 % remote or just the removal of the bolts? This concept needs to be more clearly defined.	CAT		
4	1	It is recommended that WMC reevaluate the use of a maximum allowable dose rate of 0.2 mR/hr for the CSB cask. It appears unnecessary and expensive (additional shielding, heavier cranes, and remote handling). 10 CFR 835.002 allows 0.5 mR/hr in areas of continuous occupancy. The CSB is planned as a storage facility and not a continuously occupied area; thus an even higher design dose rate could be used based on occupancy factors. With regard to the CSB cask, the MCD will only be in the cask for a short period of time. For a worker to exceed the Hanford design limit of 500 mrem/yr from the cask alone, he would have to stand against a loaded cask for 2500 hours during the year. A realistic estimate of the time it will take to load an MCD into the tube, move the cask to a tube, and discharge the MCD into the tube should be developed. Providing shadow shielding for the crane operator, as well as the operator's distance from the cask should be considered in calculating the maximum design dose rate for the cask.	SM		
5	1	It is recommended that WMC reevaluate offices, and support functions, including the Control Room and maintenance, being located in the CSB, so that the building is only occupied when MCDs are actually being moved or serviced. Alarms, instrument readings, and controls can be telemetered or hardwired to a remote location outside the security fence, thus cutting down occupancy time, and permitting a higher design dose rate for the CSB and less shielding.	SM		
14	1	Section 2.4.1. Many places in the design refer to remote handling requirements for ALARA in addition to increasing shielding to very low levels to allow for contact handling. Please address a consistent approach.	RGE		
20	1	Describe the function of the floor plug flask? Does this equipment provide needed shielding of a top MCD when retrieving the lower MCD for servicing?	RGE		
21	1	2-75: Require shipping cask to have neutron shielding per Fluor recommendation (last para).	MPD		
22	1	2-76: Alara Appendix p. 2: Require shielding cask to 0.2 mR/h ONLY if shown that 3.3 foot distance is not overly conservative, since worker will average a distance from the cask much greater than 3.3 feet during an 8 hour shift.	MPD		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
29	1	Radiation zoning used for preliminary definition of personnel occupancy should be measured against predicted occupancy times to determine shielding and ALARA features needed. For a cask receipt and handling facility the dose rate values will vary with the presence of the cask. Rad zones will also change as will the access requirements. It may be allowable to perform scheduled operations and maintenance when the cask is not in the immediate area or not expected for a period of time. In this estimate occupancy and frequency of the radiation source could be used to decrease shielding and still maintain exposures ALARA.	RGE		
32	1	3-29: Reduction in operating deck floor thickness is NOT recommended, since long term mission for higher radiological source term is expected to increase.	MPD		
40	1	Appendix V. Where is the dose assessment? It would be helpful to have an estimate of the operating steps, durations, personnel resource requirements, locations associated with the radiation source, dose times, and the resultant doses. This may be helpful in understanding the basis for the shielding concerns.	RGE		
41	1	Appendix V.(C). Analysis does not seem to correspond to current operations.	RGE		
42	1	150 mppcm from receipt to storage and 20 mppcm for service seems reasonable compared to current power plant operations.	RGE		
44	1	1.2. Provide basis for the source terms used. Maximum, average or some other combination. May need to produce more than one. That is, use maximum source strength for maximum dose rates and dose limits. Use average source strengths for annual average occupation exposures.	RGE		
45	1	Appendix V.7.1. Should reach consensus on design application of radiation limits and general ALARA philosophy. Typically there are two primary functions of the shielding/ALARA analyses. I. The dose assessment should show that while conducting routine operations and maintenance; the operating contractor should have little trouble maintaining exposures well within the requirements of part 20 and/or DOE orders for individual workers. That is, the design does not rely on "radiation sponges". II. ALARA evaluations of the major dose producing tasks that could be reduced by design improvements.	RGE		
46	1	7.1. Must take into consideration the personnel occupancy times and frequency of the source to define the dose rate levels needed to give acceptable exposures.	RGE		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
47	1	7.2. Combination of external exposure with internal exposure is dangerous. This facility should be rather clean, that is, little or no contamination potential. There should be little or no required use of respirators. Use of respirators will greatly increase the dose times and risks to perform routine operations which will increase exposures. Radiation protection engineering staff should try to design facility to minimize potential for contamination.	RGE		
43	11	1.2. Variation on MCD internal mass is unclear and may have significant impact on the dose rate results. Clarify difference of 1 to 4 gm/cc. It could be explained by the use of U metal density vs. UO ₂ density. Provide composition of the source region in table 1.A.	RGE		
19	17	Thicknesses of shielding seem excessive between handling areas. Is the intent to have multiple casks/canisters in the process at one time? Is there a need to access areas adjacent to the area containing a cask on a frequent basis? A operating description that provides the operating steps, durations, and personnel resource requirements would be helpful in understanding the basis for some of the ALARA concerns.	RGE		
3	1	2-15; 7-3: Since this facility is to be constructed to DOE criteria the earthquake acceleration of 0.35g is substantially over the 0.20 g presently required. Pursue a waiver from DOE to avoid more restrictive NRC criteria. Note that the CSB is not planned to be licensed by the NRC, and delays or additional concrete reinforcement could delay or kill the CSB project, which could also increase public risk. (Ref: p. 7-3 where Fluor says change to this criteria could be "profound impact".	WPD		
4	1	In Section 2.3.1, change to read "...for new DOE Order 5480.28 and for NRC nuclear safety equivalency". The current seismic requirements are established in SDC-4.1, Standard Arch-Civil Design Criteria." This will make it clear that the current commitment is to SDC-4.1 and that implementation of DOE Order 5480.28 remains to be evaluated.	AM		
5	1	Section 2.3. The key structural component in determining the structural feasibility of converting the existing RMWP design to the SMF needs is the foundation mat, since it is already constructed. The conceptual design report should include a careful review of the RMWP foundation mat relative to the new SMF application. A list of the key parameters influencing the RMWP foundation design should be reviewed with best estimates of how these parameters will change with the new SMF design. Special attention should be given to areas of small safety margins and conclusions made relative to whether all foundation mat safety margins will remain positive with the new SMF design.	BW		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
6	J	Section 2.3.2 and Appendix III.A. The definition of the Design Basis Earthquake for the SMF CSB is provided in Section 3.2.2.1.3.3 of the Performance Specification (Definition: SDC-4.1 DBE definition with a 1.75 multiplier). The conceptual design report should take this definition as input and not worry about the new DOE standards and NRC equivalency. The position on NRC equivalency & new DOE standards is currently on a fast-track evaluation by WNC. But until the performance specification changes, the Conceptual Design Report should focus on the adequacy of the existing foundation for the 0.35g DBE, rather than on the appropriate definition of the DBE event.	BVW		
6	J	Section 2.3.3, the reference in the second paragraph and page 8-4 (reference 57) should be to MUREG/CR-5542. The reference in the third paragraph should be MUREG/CR-4652 (no space). The latter reference should be added to Section 8.0.	AM		
11	J	Section 2.3.1. The seismic design criteria may have an impact on the foundation / Phase I, design.	RGE		
19	J	Review need for seismic I walls surrounding control room. Consult safety analysis.	WPD		
2	J4	The Seismic analysis of the CSB may not meet DOE Requirements to achieve "commercial industry standards for resistance to seismic events". WNC should immediately provide to DOE a seismic design basis for the CSB, which evaluates the NRC Seismic equivalence of the structure. Detailed design should proceed too far before this technical basis is provided. Under no circumstances should civil construction or procurement of long-lead time items begin before this seismic design basis is finalized by WNC, and accepted by RL.	AJC		
14	JK	<u>General Comment - Assessment of Constructibility</u> The CDR and related documents, such as the design specification, CDR overview by Fluor-Daniel, trade studies, and various meeting notes have been reviewed in summary to establish a basis for current scope of the Project and in consideration of constructibility issues related to construction operations and scheduling. The open issues regarding NRC equivalency guides, ALARA issues regarding MCO shielding in transport and handling at the CSB and decontamination requirements to be considered for provision at the CSB will impact schedules for design and construction. A clear and concise summary of changes made in the process of completing CDR and in definition of "path forward" should be compiled for review with A/E and construction management personnel to plan incorporation with minimal impact on design/construction schedules.	FDP		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
	K	Section 2.9.8.4 - The implications of continuous MCO venting during staging are significant, and include safety, licensability, capital cost and operating cost. They need to be evaluated (as this section states), and consideration should also be given to not venting. (This approach appears practical with the refined path forward.)	JD		
	K	Section 2.9.8.3.1 MCO vent valve open during storage. The open vent valve will have to be HEPA filtered. The HEPA will be part of the primary confinement barrier it must be accessible for periodic testing in accordance with 6430.1a Section 1300-3.6	JBS		
2	K	The unique design for this facility lies in the method of confinement for the spent fuel. The potential release of radioactive material from the storage package is mitigated by the operating deck area general MVAC system. Per the requirements as stated in the performance spec. section 3.2.2.1.7. The contamination should be confined to the vicinity of the source. The proposed solution may be to pipe exhaust from the MCO or storage tube to a filter system for control and monitoring on a continuous basis. Another potential solution may be to pipe to the operating deck and provide continuous monitoring of the pressure for frequent inspection.	RGE		
4	K	2-20 para 2.4.2.3: The MCOs should be staged with valves open, not closed, to avoid inadvertent pressurization due to gas generation from water radiolysis. MCO tubes should also be inerted. MCO tubes could be periodically monitored for hydrogen/oxygen concentrations, with inerted MCOs (open valved) stored in inerted MCO storage tubes.	MPD		
5	K	Section 1.4.2, page 1-9, show how the system provides for double containment criteria. Why is there no requirement during normal operation? See ANSI 57.9, 1992, section 6.2.2.1.3(2).	RGE		
16	K	Section 2.4.2.3. Are vented effluent controlled? monitored? filtered at the source?	RGE		
21	K	Section 2.4.2. Should address venting process and the design to provide confinement in this section.	RGE		
25	K	2.5.3. Add description of this system to control, filter and monitor routine releases from vented canisters.	RGE		
31	K	2.9.8.3.1. How is the inert gas maintained in a opened and vented canister?	RGE		
34	K	5.1.4.(b). How is this function accomplished in the design?	RGE		
17	K1	Section 2.4.2.3. Is the MCO backfilled with inert gas during venting?	RGE		
18	K1	Section 2.4.2.3. What is the design pressure limit in the MCO?	RGE		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
36	K1	6.9.2. Prevent contamination of the operating deck by piping and controlling potential leakage and/or relocate operating deck filtration system to near the source of contamination.	RCE		
	L	Section 2.4.3.3.3 Maintenance Area Investigate the use of trailers or wooded framed buildings located on the operating deck of the unused vault. These structures could easily be removed after fuel loading operations are complete.	JES		
	L	Section 3.1.1.1.1 - The assumption of fixed price contracting has huge implications on overall cost, and these implications are not clear from the following sections (although they may be implicit in the contingency factors). The number of fixed price contracts, their scope and interfaces, and their timing all will have a major effect on cost. It is not at all clear that fixed price contracting is a sensible approach for a "fast track" engineering/construction project - it places very high demands on the engineering process and it introduces high financial risk related to design changes. This should be reconsidered.	JD		
1	L	p. 5 WCO handling machine cask portion should also be included in the cost estimate. WCO Impact absorbers should remain out of cost estimate.	WPD		
2	L	Does the Conceptual Design provide a basis for completion of construction by December 1997; the schedule obviously considers the existing CSB structure. Yes. The construction schedule appears tight, but doable. The detail design impediments need to be eliminated from the design. <u>CONCERNS:</u> 1. Will the design agent be required to submit the design to the constructor for constructability aspects and resolve those comments quickly. 2. Will the design agent be required to interface with WHC for pre-operational testing, readiness reviews and turnover. 3. Will the design agent be required to have an ongoing as-building program, culminating in "Field Verified As-built" drawings. 4. The WCO design is not established and as the design evolves, might negate some handling and transport design.	JW		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
3	L	<p>Does the conceptual design provide a basis for a maximum \$80 million facility.</p> <p>No.</p> <p><u>CONCERNS:</u></p> <ul style="list-style-type: none"> All of the operational aspects of the CSB involve the handling, moving, venting, etc., of the MCO. Without a fixed and proven design of an MCO, the design and construction of the CSB handling equipment is uncertain. The CSB conceptual design is based on "a storage facility" concept. Therefore, no provisions are made for a "broken MCO"; decontamination facilities do not exist; etc. The concept of "return the MCO to the K-Basin or ship it to another facility" is acceptable only if the K-Basin has capabilities for handling a "broken MCO" or another facility does exist. The design to cost features are too uncertain to be considered until the design has matured. For example, all the mobile systems are basically a gleam in a designer's eye. 	JW		
4	L	<p>Section 2, Paragraph 2.8.5, Page 2-78</p> <p>Recognize that the SMF Transportation System Project will develop transport cask - however, lack of pertinent data re: shielding, weight and configuration has a significant impact on design and design-to-cost criteria that is inadequately addressed in the CDR.</p>	FDP		
5	L	<p>Does the conceptual design provide a basis for determining that a streamlined and accelerated project design effort has been executed.</p> <p>Yes.</p> <p>The parallel design efforts and application of system engineering is providing a "fast track" design effort.</p> <p><u>CONCERNS:</u></p> <p>If Fluor-Daniels is not selected as the design agent, the accelerated schedule will not be feasible.</p>	JW		
5	L	<p>Section 2, Paragraph 2.9.6, Page 2-87</p> <p>The performance specification requires that sanitary facilities be provided and tied to existing septic field. This section of CDR indicates requirement was not addressed in scoping and estimate.</p>	FDP		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
6	L	Section 3, Paragraph 3.4, Page 3-24 The BA/RO schedule does not reflect accelerated schedule whereby commitments for long-lead procurement and accelerated construction start will create greater liabilities in FY96.	FDP		
7	L	Section 3, Paragraph 3.5.1 and 3.5.2, Page 3-26 Design-to-cost assessments require further development and validation of both concept and probability of acceptance. Evaluation of estimated cost and consideration of design/construction planning will have impact on schedule.	FDP		
8	L	Section 4, Paragraph 4.2.2, Page 4-1 No definition of basis used for statement of procurement and construction assumption. No definition reflected in CDR regarding changes required in adapting walls currently in place for vault; however, there would appear to be changes to reflect new loadings for MCO Handling Crane and the yet-to-be-defined details for construction of operating floor.	FDP		
9	L	Section 4, Paragraph 4.3, Page 4-3 The summary schedules and this paragraph fail to provide definition of regulatory and permitting assumptions. Thus there is no basis for comment on "risk" of proceeding to procurement and/or early start of construction.	FDP		
10	L	Section 5, Systems Engineering, Page 5-1 The Performance Specification (predecessor document of Rev. 0 to WHC-SD-SMF-PBD-014) appears to have reflected operational and/or facility management concepts that have changed and continue to change. Commitment to and plan outlined for functional analysis that will be performed in the next design phase appears sound; however, evaluation of operability and maintainability cannot be based on what the A/E has proposed. In summary, the CDR states "it will do" not "how" requirements are to be met.	FDP		
11	L	Section 6, Paragraph 6.4 and following on Page 6-17, 6-18 Summary of quality assurance requirements will require update to reflect Performance Specification wherein it states, all work to be in accordance with 10CFR72 and 10CFR830.120.	FDP		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
15	L	<u>General - Assess constructibility to meet schedule</u> Please refer to general comment 14 wherein basis for summary review is stated. Review of design and construction features confirm that facility can be completed and made ready for receipt of fuel packs in December 1997; however, delays in fixing operational philosophy and concept for handling MCO's will preclude early start of construction and may result in extended days or multi-shifts to complete construction and startup. Current schedules indicate start of construction in January 1996 rather than the "challenge" schedule of October 1995.	FDP		
16	L	<u>General - Construction Operations</u> Reference Section 4 of the CDR assumptions set forth regarding methods of construction and sequence of events are subjective. Construction planning, based on evaluation of systems used for typical structures and plans developed for the original CSB, indicates these are cost savings, safety, quality control and schedule enhancements to be gained by use of other approaches. "How" the work is to be performed must be left to the discretion of construction subcontractors.	FDP		
17	L	Pages 2-73 through 2-78 - Section 2.8 - The radiation protection aspect of the CDR must address other systems such as criticality alarm, area radiation monitors, continuous air monitors, etc. These must be addressed to comply with DOE Order 6430.1A (not necessarily included, but addressed).	RLF		
17	L	<u>General - Technical Risks</u> Refer to Appendix 2 for recommendations regarding Long-Lead Procurement - The requirement for providing GFE items to the construction subcontractor must be evaluated from the concept of "risk" for late delivery and for "compatibility" with end-use operation. Recognize that fabrication/manufacturing durations may not support ideal system of having item "purchased and installed"; however, it may be more advantageous to manage completion of Performance Specification and performance by subcontractor than it is to risk the management of claim resultant from late delivery of GFE.	FDP		
18	L	2-61 2.6.5.11: Cost savings to reduce spare cabling from 25% to 15%.	WPD		
23	L	2-79, 2.9.3: Consider elimination of pneumatic controls as cost savings (higher cost installation and higher cost maintenance).	WPD		
24	L	2-84; 7-3; 2-86; 3-1 Eliminate piping to Treated Effluent Disposal Facility and associated sampling building (p. 3-1) to reduce cost. Provision for trucker pump-out of holding tank is satisfactory and less costly.	WPD		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
25	L	2-85: Confine liquid waste collection only to rooms with water to reduce cost.	MPD		
26	L	2-85: Cool instrument air compressor with air cooled refrigerated system to avoid connection to cooling water system and reduce cost.	MPD		
28	L	2-88 HPS system can utilize portable units with operating continuous air monitors. Eliminate expensive centralized vacuum system.	MPD		
30	L	Appendix 4, 5.1.6 Exhaust stacks of acid resistant materials. Why, there is no acid in the building. This would imply as or epoxy coated. Seems expensive	DS		
33	L	4-3: Assembly of operating deck steel adjacent to CSB prior to concrete pour is recommended. This is done by lifting assembled steel operating deck and welding in place; followed by concrete pour. The above will eliminate expensive sub-shoring below the deck to support concrete pours.	MPD		
2	LM	Page 2-28 - Section 2.4.7, Section 2.5.1.7, etc. - Open issues should be summarized in a separate section and related to the contingency analysis of the estimate.	RLF		
18	LM	Page 2-79 - Section 2.9.3 - The need for instrument air is unclear. The applications should be evaluated to attempt to eliminate the need for this system.	RLF		
	M	Implications of the new "Integrated Process Strategy": While it is clear that the CSB Conceptual Design (CDR) was intended to focus on the adequacy of the CSB conceptual design in carrying out the established design requirements, the recently adopted changes to the path forward ("Integrated process strategy") will significantly affect the conceptual design. In some respects, the changes (particularly the decision to repack the K basin fuel) extend beyond the design evolution or refinement which is normal for any ongoing engineering project. In my view, the CDR process must address these changes and should not be considered complete until that is done.			
	M	Section 2.2.6.1 Systems Controls Area, Figure 2-2, Footprint of this area appears to be rather large for the simple functions it is required to monitor. Optimize size during detail design, eliminate if possible.	JBS		
	M	Section 2.2.8 SCZ Emergency Generator Area Provide design requirement or design basis for two separate enclosures.	JBS		
	M	General comment the CSB conceptual design does not identify any maintenance philosophy for the safety equipment. Will base line vibration information be taken during the installation and start up testing? Will the online DCS monitor the condition of the safety equipment and compare the current vibration data to the base line? Is the recommended	CAT		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
1	M	It is difficult to directly apply the regulations of 10CFR72 for dry storage facilities to the design for the K Basin Spent Fuel Storage facility due to the inherent instability in the fuel characteristics and the need to allow venting from the storage canister. However, there are equivalent confinement criteria applicable to nuclear power facilities in 10CFR50 and its codes and standards for auxiliary building processes, radwaste processes and spent fuel storage pools that may be applied to show NRC licensability.	RGE		
1	M	There is nothing on the SNF Project to take care of an MCD that has been failed and needs to be overpacked or repaired.	Mike Mahafey		
1	M	Section 6.2.4. It is imprudent to present the dose consequences resulting from release fractions in DOE-STD-1027-92 without explanation of conservatisms. The analysis of the MPM DBAs result in "significant" offsite consequences and the PSD may determine that the CSB should be Hazard Category 1. The MPM DBA is a bounding type analysis based on the conservative release fractions in DOE-STD-1027-92. Only the release fractions are based on 1027. The receptor locations and X/Qs are based on the PSE. A hazards category analysis will be performed during ACD to establish the potential offsite consequences from a DBA. Based on this analysis, a recommendation will be prepared regarding the facility hazard category.	Dean Smith		
1	M	Section 2.3.1, Para. 2, Appendix IIIA, Section 1.0, and Section 2.3.3, Para. 1 (Note: There are two sections numbered as 2.3.3. This is the second one.) Structural design life should be reduced to 75 years in accordance with Section 3.2.2.1.1 of the Performance Spec.	BW		
1	M	The ODR does not conform to the "refined path forward," nor with the current Performance Specifications.	SM		
2	M	2.2 Non Government Documents. 1.) ASHRAE 90A is now ASHRAE 90.1 - 90.1 should be used as the design basis. 1.) ASME N510 is a 1989 issue and not 1984. ASME N509 and N510 are to be used together so that a NEPA Filter System, when designed to N509 requirements will be able to be tested to N510.	LHS		
2	M	A self contained impact absorber should be considered to be integrated into MCD design. This would reduce operator dose and time to insert absorbers into MCD tubes. The existing plan to have absorbers fabricated and installed separately will increase fabricating schedule time and complicate installation. There are probably other design solutions that would accomplish the same thing.	Mike Mahafey		
2	M	Section 6.2.4.1.1. For consistency, the dose consequences should be calculated using the dose factor (Ci/g of fuel) in the PSE.	Dean Smith		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
3	M	Page 57 of the Performance Spec requires a design that will accommodate DECON and decommissioning. Make sure that all materials used will accommodate the cleaning process. I.E. stainless steel for potentially contaminated ductwork. Para. 5.9.1 alludes to this but only identifies special coatings.	LHS		
3	M	The decontamination function in the performance spec and CDR needs to be defined.	Mike Mahaffey		
3	M	Page 50, Section 3.2.2.4.7.3 - No provisions in the CDR for sanitary sewers are apparent.	RLF		
3	M	Liquid waste should be collected and then transported to the ETF. The dozen or so ISO's procured to move Nitric acid to Sellafield in the UK will be redundant and certainly could be used. In fact you could plumb them in as the collection system.	DS		
3	M	Section 6.2.4.1.5 and 6.2.4.1.6. The site boundary distance and the X/Q values should be consistent with the PSE.	Dean Smith		
4	M	Section 2.3.3, Para. 3. It is true that nuclear power plants are typically designed for a service life of 40 years and NUREG/CR-4652 is appropriate for addressing life extension of concrete components in nuclear power plants. However, the SMF CSB is not a power plant and a more appropriate reference is NUREG/CR-4086 entitled "Service Life of Concrete", which addresses long-term storage vaults (up to 500 years). The NUREG/CR-4086 concrete service life predictions should be compared to the NUREG/CR-5542 predictions.	BVW		
4	M	Page 51, Section 3.2.3.2 - The Regulatory Guide NUREG 700 is specified by Section 1300 of DOE Order 6430.1A and also seems more appropriate.	RLF		
4	M	Page 2-50, Table 2.2; Page 2-51, Table 2.4 - The table should show XMFR for Load No. 5, not PNL Board. This 15 kVA refers to XMFR size.	RLF		
4	M	1.) Section 2.0 page 2 of the Performance Spec (PS) requires compliance with applicable documents. CFR's 10CFR 20, 10CFR 835, 10CFR 1021, 29 CFR 1910, 40CFR 61 and 40CFR 1500-1508 are missing from CDR. See Section 8.0 References page 8-1. 2.) Need to include in this section and assure that the design will comply. An evaluation of the entire required references per the (PS) are necessary and if "yes" then they need to be addressed in the CDR.	LHS		
4	M	Section 6.2.4.2.1. Item B implies that the HWVP analysis was based on the fact that security no longer uses helicopters. I don't believe this to be the case.	Dean Smith		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
4	M	Does the conceptual design provide a basis for determining if the functional and operational requirements can be met. Yes. Once the MCO is located in the storage tube (both staging and storage), the functional and operational requirements can be met, e.g., monitor; maintain integrity; accommodate operations, maintenance, and repair activities. <u>CONCERNS:</u> The major risk is during the transportation and handling of the MCO. There is very little detail, and the MCO design does not exist. The possible accident scenarios involving the MCO during handling and movement has not been established.	JW		
5	M	In Section 2.3.2, change the PSE reference to "WNC-SD-SNF-PSE-002" (the statement in the CDR is correct, but "002" is the most recent PSE for the CSB and is the only PSE referenced in Section 8.0).	AH.		
5	M	Table 6-2. The frequencies identified for the PSE accidents are not derived from the PSE and are inconsistent with the PRA. I suggest that the frequencies be identified as "undefined".	Dean Smith		
5	M	Page 2-53, Table 2.4 - The lighting feed should feed a panel in the operating area and from there feed contractors, welding receptacles, etc. This would then allow line of sight lockout for safety, save money, and MCC space, etc.	RLF		
6	M	2-23, 3rd para: It is not apparent that use of a bridge crane to connect up (a) sampling equipment and (b) wire tow rope is technically achievable.	WPD		
6	M	Section 2.8.2, 2nd para, last sentence: States that the third vault will remain empty for the life of the facility if it is not completed before loading of MCOs begins, while elsewhere (Section 2.0) it is stated or implied that the third vault can be tubed anytime. Which is correct? If the 3rd vault is ever to be used, it appears prudent to tube it during construction. Tubing it after the N-Reactor fuel is in the other two vaults will create significant radiological exposure problems	SM		
6	M	Para 3.2.2.1.16 Energy Conservation page 41 and DOE 6430.1A and 10 CFR 435 specify that Energy Conservation issues be identified and addressed. I find no information in the CDR that specifically addresses Energy Conservation.	LHS		
6	M	Table 6-3. An item S.C. 1, 2 rooms structures is identified. there is no SC-1 HVAC.	Dean Smith		

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6	M	ALL MCC Load Tables - The feeds to the 208v/120v XMFRs from the MCCs should carry a neutral. The MCC serves as the service, and the neutral would be tied to the ground at the MCC and carry through to the panel. Outside lighting is typically 277v, not 480v (can be 480v if there is a reason), and if that is the case, the feed from the MCC to the proposed lighting panel would also need a neutral to accommodate future outside lighting.	RLF		
7	M	2-25 6th para: If lid is placed on cask before loading with the new MCO, how is lid again place on the cask?	WPD		
7	M	Section 1.1.4, Para. 2. Section 1.4.4, Para. 1. Executive Summary, Para. 10. A key component in the feasibility of the SMF CSB concept is the storage tube. The CDR has almost no information addressing adequacy of the storage tube concept for the SMF canister storage. The apparent (see next comment) conceptual design involves a carbon steel storage tube with a dry environment and a max. operating temperature of 400 degrees. It is recommended that a list of best estimate design parameters (design pressure, corrosion rate, seismic loading, etc.) with scoping calculations (or at least a discussion) demonstrating the feasibility of the storage tubes meeting the required design life. Expansion bellows (expected requirement for 400 degF) should also be addressed.	BVM		
7	M	Sections 2.4.2.1, 2.5.1, 2.5.2.3.1, 2.5.2.4, 2.5.2.5.2.3, 2.5.2.6, and 2.9.8.2. Statements are made in these sections that the maximum allowable MCO temperature is 400 F. It should be made clear that this is the maximum fuel surface temperature (as is stated in Appendix IV. B, page 2).	AM		
7	M	<p>Jack Weber overall Recommendation:</p> <p>The conceptual design is excellent and more advanced than can be expected. The use of the MWVP CSB is providing "advance" design information which is useful and will be critical in achieving the accelerated schedule. It is my recommendation that we accept the conceptual design and proceed to the next design stage; however, milestones need to be established to address the major concerns.</p> <p>The major problem areas are:</p> <p>The lack of a design for MCO and the MCO over pack; the total transportation, handling, storage aspects can not be evaluated without a reasonably mature design.</p>	JW		

NO.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
7	M	<p>It is recommended that WHC reevaluate the 0.05 mrem/hr limit for a person outside the CSB.</p> <p>It would appear cost effective to fence the facility so that non-facility workers cannot approach it. The fence distance could be set to achieve the 0.05 mrem/hr limit.</p> <p>An MCO loaded transportation cask in the washdown area having a dose rate of 200 mrem/hour on contact (which is permissible in commercial transportation), would require the fence be at only 63 feet from the cask (assuming no shielding from the building). Placing the controlled area fence at 63 feet or more would permit:</p> <p>Replacement of the steel doors on the Washdown area with a standard roll-up metal door.</p> <p>The roll-up door to remain open while the cask is being washed down so the transport vehicle (locomotive or tractor) would not have to be disconnected and could move the transporter into the Load-In/Load-Out Area after wash down, thus eliminating the need for a donkey engine or tow rope.</p> <p>Replacement of the concrete receiving structure with a standard metal building.</p> <p>Potentially less shielding in the exterior walls of the vault and tunnels.</p>	SM		
7	M	Page 2-57 - Section 2.6.4.2 - the oil-filled XMFR should only be 13.8 - .48 kV unless we are carrying a neutral to allow use of .277 kV option.	RLF		
8	M	Page 2-58 - Section 2.6.5.1 - The environmental guidelines for the State of Washington and the DOE Order both require pads to contain the potential oil leak of a transformer. The A/E should include this as routine design and not involve WHC EU.	RLF		
8	M	Section 1.4.2, Para. 3, Section 1.1.4, Para. 1. The conceptual design concept for the storage tubes is not clear. Section 1.4.2 refers to the storage tubes as CORTEN tubes, whereas the last reference to material type in Section 1.1.4 is carbon steel. The current position on the storage tube material (and bellows, if needed) should be clearly stated. Conformance of the storage tubes to ANSI/ANS-57.9 (Performance Spec. requirement, p. 6) should also be addressed.	BVM		
9	M	Section 2.4.3.2. Write item 6 as "remove MCOs from storage tubes to send them to the Conditioning Facility". That is, don't refer to unstabilized fuel and use the new name for the Conditioning Facility.	AM		
9	M	Page 2-58 - Section 2.6.5.2 - The MCOs should distribute feeds to lighting panels which should then feed contractors and equipment (weld receptacles, power outlets, etc.). This will save space and money. (See RCR No. 5.)	RLF		

Mo.	Bin	COMMENTS/DISCREPANCY: Except for editorial, provide: 1. Technical justification for the comment; and 2. Detailed recommendation of the action required to correct/resolve the problem.	Int.	DISPOSITION: (Provide justification if NOT accepted)	STATUS
10	N	Page 2-59 - Section 2.6.5.4 - 480 volt lighting circuits should not be direct buried but rather placed in conduit. This is a safety issue and probably costs no more in the long run.	RLF		
10	N	Section 2.2.8. Can't seem to find cost estimate for radiation monitoring equipment as described in this section.	RGE		
11	N	Page 2-61 - Section 2.6.6 - The facility should not provide for installation of MLAM or GPS. There should be conduit and space provided but the program should install the hookups using site contractors after construction completion.	RLF		
12	N	Section 6. Paragraph 6.4.2.3 Is there consensus among the stakeholders regarding conclusion that RCRA design requirements do not apply to the SHF-CSB?	FDP		
12	N	It is not clear whether the CSB will have decontamination/overpacking capabilities. While not directly applicable to the CDR for the CSB, it should be noted that if these facilities area not provided, the SAR for transporting the MCO should not take credit for double confinement. Otherwise, if a breached MCO is discovered at the CSB, there would not be any way to transport it back to K-Basins or to another facility.	SM		
12	N	Section 2.3.2. Performance spec reference should be July, 1995.	RGE		
12	N	Figures 2.22, 2.23, 2.24, and 2.25 - The location of the main lugs imply that the MCOs and switch gear will be bottom-fed through embedded conduits. This should be so stated if planned. Schedule advantages are obtainable if top feed surface run raceway is utilized.	RLF		
13	N	Page 2-67 - Figure 2.27 - No provisions for XMFMS (480V - 208/120V) are shown. This could impact size of room or at least the location of the panel boards.	RLF		
13	N	3.8.2 D&O Criteria Add as built drawings so that when the facility is added people know what they actually have to take apart. The criteria presented are better for decon than decommissioning.	DS		
14	N	2-49: Interlocked tie breakers should be normally open to avoid energizing utility bus when portable generator is tied in.	MPD		
14	N	Section 2.5.2. As filtration cannot not be provided for the inlet of the vault natural circulation system, what would be the impact of an ashfall on the system and the ability to cool MCOs? (This comment was made by MJ Montney on the draft MPC nuclear safety equivalency document and is appropriate for the CSB CDR.)	AM		
15	N	Page 2-70 - Figure 2.30 - No provision for automatic transfer switch is shown in MOC room or DG building. Since this switch must be seismically qualified, it could be of significant size.	RLF		

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15	M	2-49: Provide transformers between 208/120V and 480V. (typical)	WPD		
16	M	Page 2-72 - Section 2.7.2.4 - If the facility is unnamed during normal operations where will emergency alert tie into?	RLF		
16	M	2-58: Pursue waiver to allow oil filled transformers near buildings if used.	WPD		
19	M	Section 2.6.2.1 and page 8-2. The document number is WHC-SD-GH-DGS-3034.	AM		
20	M	Section 2.6.4.1. MRP 5.46 was replaced by WHC-GH-4-46, Section 9.0.	AM		
20	M	No reference to leak detection on the piping systems is made. Those systems containing hazardous waste must have test capabilities and leak detection.	RLF		
22	M	2.5.2 It is not clear if the air inlets to the vault are screened or not. Some comment was made that they are. I wouldn't think they should be as drop out big chunks, but not add up at the inlet. A provision to remove possible sand/debris build-up should be provided.	DS		
23	M	Section 2.9.8.1 states the MCO Monitoring and Servicing System will check MCO pressure. Explain how this will be done. If it is by the sample cart, add this discussion to Section 2.9.8.3.2. Section 2.9.8.3.1 mentions a one-time measurement when the MCO is received and Section 2.9.8.3.4 suggests routine sampling is not practical.	AM		
23	M	A Human Factors Engineering Checklist should be utilized during ACDR to assure considerations are appropriately given to MFE. This is a requirement of DOE Order 6430.1A, Section 1300-12.4, and of the referenced safety standards (3480.23 and STD 3009). One was developed for the WHF and provided to Mickey Witherspoon for use previously.	RLF		
25	M	DOE Order 6430.1A, Section 273-99.0, requires that the sanitary sewer have the capability to be monitored (or sampled) for radioactivity. The Performance Specification indicates there is a sewer system and the CDR does not. This must be resolved.	RLF		
26	M	Page 2-75, 4th para this must be a typo 200 mc/hr not 200 R/hr	DS		
27	M	2.9.2 Bottled gas, why not go for a large vendor supplied tank of the required gas. Then you don't have to build anything but some gas piping, the cost of the deliver or supply vessel is placed on the supplier.	DS		
28	M	Section 5.3. Reference should also be made to proposed DOE standard, Human Factors Engineering Design Criteria, Volume I, General Criteria. By telecon with DOE-HQ on August 2, 1995 it was learned that this standard should be issued soon. It is available now as a draft for consideration.	AM		

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29	M	page 6-11 table 6-2 Design basis wind and ashfall this is mitigated by the intakes, but I don't see how?	DS		
30	M	3-1: Independent cost estimate should be compared against the Fluor Estimate.	WPD		
30	M	Section 2.9.7.1. Does this system include the monitors? Please include.	RGE		
32	M	Section 5.9.2 (labeled as 6.9.2). For decommissioning considerations, add DOE Order 6430.1A Sections 1300-11.2 and 1321-7.	AH		
33	M	Figure 5-2 & 5-3. Update flow diagrams for current design and operations.	RGE		
34	M	Section 6.1.3. Write as "... has stated that new SMF facilities, such as the CSB, will be designed and constructed to achieve nuclear safety equivalency comparable to Nuclear Regulatory Commission-licensed facilities."	AH		
35	M	Section 6.2.0. Change the date for reference 1 to the as-issued PSE. The PSE now referenced was issued for review and comment.	AH		
46	M	Section 6.2.4.2.1.A. To be consistent within the CDR and with WHC-SD-GM-DGS-303, the generators should be referred to as "emergency generators". This comment also applies to page 6-9, item 2; and Table 6-3, pages 6-14 and 6-15.	AH		
48	M	Section 6.2.4.2.1.A. Reference could be made in the paragraph starting "(p)rocess Engineering has reviewed...." to DOE Order 6430.1A, Section 1550-99.0.1 relative to the need to maintain the hydrogen concentration below 4%.	AH		
51	M	Section 6.2.4.2.2. Explain that the loss of ventilation is relative to the passive vault cooling system.	AH		
54	M	Section 6.4 should include some discussion of the MRC equivalency issues or reference another section where this is discussed. Reference should also be made to DOE Order 5480.4. As an alternative for these two comments, include the first paragraph of Section 2.0 of PSE-002.	AH		
55	M	Section 8. The following RL Directives listed in this section have been canceled: RL 4320.2C, RLIP 5300.1C, and RL 6430.1C.	AH		
56	M	Appendix I, page 10. The reference should be to NUREG/CR-4227.	AH		
57	M	Appendix III. Add reference to ACI 349. Appendix B of ACI 349 will be important for the MCO storage tube and the failure philosophy is different from ACI 318. (This comment was made by MJ Montney on the draft MRC nuclear safety equivalency document and is appropriate for the CSB CDR.)	AH		

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59	M	Appendix IV. This section references ANSI/ASME N510. This reference should be added to Section 8.0.	AM		
14	M BC	Page 2-68 - Figure 2.28 - The battery located in the SC2 room is presumably for starting the diesel generator. This battery could require special ventilation due to hydrogen gas generation and will incur a very large voltage load to get to the generators. Consideration should be given to moving battery to the diesel building. This saves time and money. Other options include bottled air start, This may be the best in the long run.	RLF		

APPENDIX D

**SPENT NUCLEAR FUELS
CANISTER STORAGE BUILDING**

**CONCEPTUAL DESIGN REVIEW COMMITTEE
RESULTS SUMMARY
MANAGEMENT PRESENTATION**

**WHC-SD-W/379-DR-001
Rev. 0**

AUGUST 9, 1995

CSB CDR Review

○ Introduction:

- Charter
- Team
- Process
 - » Documents
 - » Presentations
- Deliverables

CSB CDR Review

- Findings:
 - CSB is a feasible design for storing Hanford SNF. Other high radiation sources may be accomidated.
 - Numerous fundamental issues need to be resolved before detailed design and construction can proceed at minimal risk.
 - Open items preclude final assessment of cost and construction schedule.

CSB CDR Review

- Findings continued...
 - Recently endorsed strategy presents new opportunities for simplification and cost reduction
 - Project documents are not aligned (PSE/Spec/CDR/Path Forward)

CSB CDR Review

- Issue Resolution:
 - MCO Definition
 - Transport Cask Interface
 - Safety Requirements
 - Seismic (NRC Equivalence)
 - Operational Modes
 - Programmatic Issues
 - ALARA Plan Implementation

CSB CDR Review

- MCO Definition:
 - Number
 - Weight
 - Source term
 - Heat output
 - Residual water
 - Confinement
 - Interfaces
 - Structural criteria
 - Loose surface contamination

CSB CDR Review

- Transportation System:
 - Top or bottom loading
 - Interfaces, dimensions
 - Confirm road transport
 - Cleanliness

CSB CDR Review

- Safety Requirements:
 - Selection of DBA's iterated with design
 - Assumptions on release potentials, dispersion, X/Q
 - Required NRC Nuclear Safety equivalency (K_{eff} related equipment)

CSB CDR Review

- Seismic Issues:
 - Verify of existing design
 - Verification of NRC equivalence
 - Resolution of regulatory differences

CSB CDR Review

- Operating Modes and Requirements:
 - Handling
 - Staging
 - Storage
 - Transport
 - Monitoring
 - Recovery from MCO failures

CSB CDR Review

- Programmatic:
 - Seismic criteria
 - Cs/Sr Storage
 - Number of bays
 - Lifetime/service life
 - Life-cycle cost evaluation

CSB CDR Review

- ALARA Implementation:
 - Perform Alara dose analysis
 - Need to agree on source terms and exposure criteria
 - Needs to be integrated with K-Basins, Transport Operations and the CSB

CSB CDR Review

ACTIONS TO MINIMIZE RISK

- A. Resolve seismic
- B. Resolve MCO design issues
- C. Cs/Sr
- D. Operations functions and design basis for abnormal events

CSB CDR Review

A. Resolve Seismic Issues

- Demonstrate the the current design of 0.35g creates an NRC acceptable safety envelope
- If not, existing pad in jeopardy, plus major impact to schedule and cost

CSB CDR Review

B . Resolve MCO Design Issues

- Come to closure on conditioning plans so that MCO design can be frozen
- If not resolved then seismic, heat transfer, ALARA, maintenance, fluid flow and safety issues can not be resolved

CSB CDR Review

C. Cs/Sr Issues:

- Need to decide early if Cs/Sr will be stored in the CSB
- If not, affects cost, heat transfer, construction, operations, safety and ALARA
- Lack of resolution should not delay the project but may compromise future opportunities

CSB CDR Review

D. Operations

- Determination of operational functions for near and long term
- Determines monitoring requirements, control rooms, staffing, location of alarms, support systems and staff facilities.
- Security and accountability requirements

CSB CDR Review

RECOMMENDATIONS:

- SNF Project resolve high risk issues
- Full KD-1 and selected KD-2 on areas unaffected by open issues
- Issue resolution must precede procurement and construction
- Establish actions/issues resolution process and tracking
- Independant review again prior to KD-3

CSB CDR Review

- Areas of Potential Cost Savings
 - Load in/wash down area
 - Maintenance area
 - HVAC Equipment
 - Diesel Generators
 - 1,2 or 3 Vaults
 - DCS
 - HPS Systems/rad monitors
 - Use of surplus equipment