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2	1	C. E. Swenson	<i>C. E. Swenson</i>	6/29/99							
2	1	G. D. Bazinet	<i>G. D. Bazinet</i>	6/29/99							
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18. D. M. Black <i>D. M. Black</i> 6/29/99 Signature of EDT Date Originator	19. <i>G. D. Bazinet</i> 6/29/99 G. D. Bazinet Authorized Representative Date for Receiving Organization	20. <i>L. J. Bazinet</i> 6/30/99 L. J. Bazinet Design Authority/ Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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Canister Storage Building Compliance Assessment SNF Project *NRC Equivalency* *Criteria – HNF-SD-SNF-DB-003*

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Abstract: This document presents the Project's position on compliance with the SNF Project NRC Equivalency Criteria – HNF-SD-SNF-DB-003, *Spent Nuclear Fuel Project Path Forward Additional NRC Requirements.* No non-compliances are shown. The compliance statements have been reviewed and approved by DOE. Open items are scheduled to be closed prior to project completion.

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**Canister Storage Building Compliance Assessment
SNF Project NRC Equivalency Criteria - HNF-SD-SNF-DB-003**

Item No.	HNF-SD-SNF-DB-003, Rev. 4A – Additional NRC Requirements	Status	Assessment of Compliance for CSB
1	<p>The final designs of the CSB and CVD facilities shall be reevaluated to reconfirm that DOE Orders 5480.7A and 6430.1A provide adequate fire protection requirements to achieve nuclear safety equivalence. Aspects of the designs to reconfirm are the use of a passive cooling system for MCO cooling in the CSB and the lack of safety-class prevention or mitigation systems in the CSB and CVD facility. For additional information, refer to WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Table 5.b, and 10 CFR 50.48, and 10 CFR 50, Appendix R. Further, fire protection requirements considered for incorporation into the design of the CSB and CVD facility should take into account the implementation of 10 CFR 72.122(c) to date for licensed independent spent fuel storage installations.</p> <p>(References: 10 CFR 50.48, "Fire Protection," Part 50, Appendix R, "Fire Protection for Nuclear Power Facilities Operating Prior to January 1, 1979," and 10 CFR 72.122(c), "Protection against Fires and Explosions")</p>	C	<p>An update of the previous CSB FHA, <i>Phase 2 Fire Hazard Analysis for the Canister Storage Building</i>, HNF-SD-SNF-FHA-002, Rev 2, includes an evaluation to determine if any supplemental requirements in the area of fire protection are necessary to achieve NRC equivalency.</p> <p>The results of this fire protection evaluation are also reflected in the CSB FSAR, HNF-3553, Annex A, Rev. 0, Section A11.4.</p> <p>The conclusion of the review was that the requirements of DOE 5480.7A and DOE 6430.1A provide adequate fire protection in consideration of 10 CFR 50 and 10 CFR 72. 10 CFR 50, Appendix R, is applicable to the safe shutdown of power reactors, and 10 CFR 70 is applicable to nuclear fuel fabrication facilities. Both these documents have limited applicability to the CSB, while 10 CFR 72 is applicable to the CSB. The fire protection requirements located in 10 CFR 72.122(c) were considered for incorporation into the design of the CSB. These requirements are general and are adequately addressed by DOE 5480.7A and 6430.1A.</p>

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			<p>The NRC issued a Technical Position (TP), <i>Guidance on Fire Protection for Fuel Cycle Facilities</i> in the Federal Register, 57FR35607-13, dated August 10, 1992. The eleven positions that were covered by the TP are addressed by mandated DOE Orders and Standards. The only area of significant difference with the DOE Orders and Standards, as applicable to the CSB project, is in the area of building construction. The TP considers Type I construction, as classified by NFPA 220, as adequately fire-safe for process buildings. The CSB is designed as a UBC Type II-N construction which does not have the fire resistance rating of NFPA Type I construction. Both construction types use noncombustible materials. Analysis of the fire hazards has shown that Type II-N construction is adequate with regard to safeguarding life and property within DOE fire risk criteria. Ref: HNF-SD-SNF-FHA-002, Rev. 2, <i>Final Fire Hazard Analysis for the Canister Storage Building</i>.</p> <p>As described in Chapters A2.0 and A3.0 of the CSB FSAR, HNF-3553, Annex A, Rev 0, the supporting CSB Hazards Analysis, HNF-SD-SNF-HIE-001, Rev1, and Fire Hazards Analysis Report, HNF-SD-SNF-FHA-002, Rev 2, the Project's final accident analysis evaluation concludes that fire protection</p>

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			systems within the CSB are adequately classified as general service. No safety class preventive or mitigative systems are required. An analysis of the passive cooling system, CSB-HV-0001, FDI 1996, shows that the maximum expected temperatures for the fuel, MCOs and surrounding equipment are well below temperatures, which would cause a thermal runaway reaction. A thermal runaway reaction has been demonstrated to be a beyond design basis event (BDBA). (Ref: HNF-3553, Annex A, Rev 0 Section A 3.4.2.5, A3.4.2.6, and A3.4.3.1).
2	<p>Adopt the seismic criteria outlined in WHC-SD-SNF-DB-004, <i>Spent Nuclear Fuel Project Seismic Design Criteria, Nuclear Regulatory Commission Equivalency Evaluation Report</i> for the design of the CSB and CVD facility.</p> <p>Incorporate a design basis tornado (including translational velocity, rotational velocity, and pressure differential) and tornado missile for safety-class SSCs into the designs of the CSB and CVD facility taking into consideration the most recent version of NRC Regulatory Guide 1.76, <i>Design Basis Tornado for Nuclear Power Plants</i>, SECY-93-087, <i>Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs</i>, and NUREG/CR-4461, <i>Tornado Climatology of the Contiguous</i></p>	C	<p>The CSB requirements for natural phenomena are implemented in the design by the design requirements documents (HNF-SD-SNF-DB-003 and HNF-SD-SNF-DB-009) and the controlling lower tier design and procurement documentation.</p> <p>The CSB design for natural phenomena, is documented in the CSB FSAR, HNF-3553, Annex A, Rev. 0, Chapters A1.0, A2.0 and the supporting references, e.g., HNF-SD-SNF-HIE-001, Rev1. The CSB FSAR, Table A1-1, summarizes natural phenomena loads and applicable DOE, NRC, and national consensus standards applied to CSB for seismic, straight wind (including missiles), tornado, volcanic ash, flooding, lightning, and snow.</p>

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	<p><i>United States</i> (potential revisions to Standard Review Plan 3.5.1.4, Revision 2, <i>Missiles Generated by Natural Phenomena</i>). Refer to WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Table 5.c, and to 10 CFR 72.24 and 72.122, for related information.</p> <p>The designs of (1) the CSB and (2) K Basins and the CVD facility shall ensure that sharing of common utilities and services and physical interaction between the facilities do not impair the capability of either facility to perform its safety functions.</p> <p>Incorporate the ability for ready retrieval of MCOs into the design of the CSB.</p> <p>(References: Title 10, <i>Code of Federal Regulations</i>, Sections 72.24, "Contents of application: Technical information," 72.90, "General considerations," 72.92, "Design basis external natural events," 72.102, "Geological and seismological characteristics," 72.122, "Overall requirements," and 72.212, "Conditions of general license issued"; NRC Regulatory Guides 1.60, <i>Design Response Spectra for Seismic Design of Nuclear Power Plants</i> [Revision 1], 1.61, <i>Damping Values for Seismic Design of Nuclear Power Plants</i> (Revision 0), and 3.48, <i>Standard</i></p>		<p>Implementation of these requirements is consistent with the SNF Project NRC equivalency criteria.</p> <p>The design basis earthquake (DBE) established for the CSB is anchored at 0.35g free field. This DBE has been evaluated for NRC equivalence. (Ref: WHC-SD-SNF-DB-004, Rev 2). Implementation of this NRC equivalent seismic criteria is demonstrated in the CSB FSAR, HNF-3553, Annex A, Rev. 0, for the Operations Area Shelter, the Support Building and the MHM. (Ref: HNF-3553, Annex A, Rev 0, Sections A4.3.1, A4.3.2, A4.3.3, A4.3.6, A4.3.9, A4.3.10, A4.3.14, A4.4.1, and A4.4.4.)</p> <p>The CSB Operations Area Shelter and Support Building are designed to resist wind borne missiles and tornado wind forces. Tornado wind forces are transmitted and carried by the CSB below grade vault. Tornado missiles have been eliminated from the CSB design. (Ref: HNF-3553, Annex A, Rev 0, Section A1.4.1.1.4 and Section A4.3.3.4).</p> <p>Equipment inside the CSB, including the MHM, is protected from these NPH events. Implementation of the NRC tornado criteria is demonstrated in the CSB FSAR for the Operations Area Shelter and the</p>

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	<i>Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage) [Revision 1]; and SECY-93-087, Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Designs)</i>		<p>Support Building (Ref: HNF-3553, Annex A, Rev 0, Section A4.3.3.4.)</p> <p>The CSB Hazards Analysis, HNF-SD-SNF-HIE-004, Rev. 2, includes consideration of K Basins or CVDF accidents that could impact the CSB. This analysis shows that no accidents, discussed in Chapter A3, at either the K Basins or CDVF would affect safe operation of the CSB. There are no shared utilities between the CSB and the K Basins or CVDF. Interactions between the CSB Operations Area Shelter and the Support Building are eliminated by having structures designed to resist both the DBE and the tornado.</p> <p>The requirement for design features to readily retrieve MCOs is applicable to the CSB. The design of the CSB requires no special process or equipment, other than the MHM, to retrieve MCOs. The storage tube design ensures that MCOs are readily retrievable. There are no identified long term storage conditions that would make the MCOs less than readily retrievable.</p>
3	In the event that safety-class electrical equipment may be required and may be exposed to harsh environments for the CSB and CVD facility during off-normal or postulated	OPEN	The evaluation of this requirement for the CSB facility has not identified any harsh environments based on the definitions found in IEEE-323,

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	<p>accident conditions, the following are additional NRC requirements.</p> <p>Ensure that the electrical equipment qualification program includes the requirements of 10 CFR 50.49 that are missing from DOE 6430.1A, HNF-PRO-097, <i>Engineering Design and Evaluation</i>, and HNF-PRO-704, <i>Hazard and Accident Analysis Process</i>. For safety-class equipment, non-safety class equipment that could, upon failure, adversely impact safety-class equipment in performance of its safety function, and certain post-accident monitoring equipment, as described in NRC Regulatory Guide 1.97, these requirements include (1) review of 10 CFR 50.49(e)(5) and Regulatory Guide 1.89 during the design process to determine the aging requirements for such electrical equipment, and (2) testing requirements provided in 10 CFR 50.49(f)(1-4). For additional information, refer to WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Table 5.b, 10 CFR 50.49, and Attachment A, "Detailed Evaluations, Environmental Qualification of Electrical Equipment."</p> <p>(References: 10 CFR 50.49, "Environmental qualification of electrical equipment," and NRC Regulatory Guides 1.89, <i>Environmental Qualification of Certain Electrical</i></p>		<p><i>Qualifying Class IE Equipment for Nuclear Power Generating Stations</i>. CSB safety-class and safety-significant equipment has been incorporated into the CSB design to prevent DBAs that would create a harsh environment. Environmental qualification for CSB safety-class equipment for mild environments is performed in accordance with IEEE 627. The electrical supply equipment is classified general service.</p> <p>The seismic detection system interlocked with the power supply for both cranes is qualified for the DBE, which terminates all power to the MHM and the receiving crane after detecting a seismic event in excess of ½ DBE. No active systems are required during or after the earthquake and there are no further environmental qualification requirements for either the MHM or the receiving crane.</p> <p><u>The safety classification of MHM electrical components is now being reviewed – changes may result.</u></p>

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	<i>Equipment Important to Safety for Nuclear Power Plants [Revision 1], and 1.97, Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident [Revision 3])</i>		
4	<p>Include in the SNF Project Path Forward Integrated Safety Management Plan or the SAR Preparation Plans, the requirement for the SARs that address the CSB and CVD facility to evaluate a loss of ac power to the facility. The design of the CSB and CVD facility should respond as needed for accident prevention and mitigation.</p> <p>(References: 10 CFR 50.63, "Loss of all alternating current power")</p>	C	<p>The CSB FSAR, HNF-3553, Annex A, Rev. 0 and the supporting Hazards Analysis, HNF-SD-SNF-HIE-001, Rev.1 evaluate a loss of AC power to the CSB. Note that for the CSB no safety functions are performed by the AC electrical power system, which is classified as general service. The CSB has no safety-class electrical power loads. All systems fail safe upon loss of AC power. (CSB FSAR, HNF-3553, Annex A, Rev 0, Section A3.4.2.7.4.</p> <p>The electrical power system does interface with the CSB safety systems to provide normal power; qualified isolation devices are provided to prevent a non-safety system failure from impacting a safety-class system. No safety class power is required. Isolation devices comply with IEEE requirements as discussed in item number 7 below.</p> <p>The MHM on loss of power goes into a suspended state. Natural circulation cools any MCO in the turret. After a seismic event, the cranes are manually restarted. Also, during loss-</p>

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			of-power, the hoists may be manually raised or lowered to improve safety of the suspended load.
5	<p>For the CSB and CVD facility incorporate the requirements of IEEE Standard 484-1987, <i>IEEE Recommended Practices for Installation Design and Installation of Large Lead Storage Batteries for Generation Stations and Substations</i>, into the design and installation of safety-class batteries.</p> <p>(References: NRC Regulatory Guide 1.128, <i>Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants</i> [Revision 1])</p>	N/A	Not applicable to the CSB. No safety-class battery power is required for CSB; thus, the CSB design does not include any large lead storage batteries to provide safety-class DC power. The UPS system (Ref: HNF-3553, Annex A, Section A2.8.3) is a general service system supplying uninterruptable, reliable power for a short time period if normal power is interrupted.
6	<p>For the CSB and CVD facility, incorporate the requirements of IEEE Standard 535-1986, <i>IEEE Standard for Qualification of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations</i>, for the qualification of safety-class lead storage batteries.</p> <p>(References: NRC Regulatory Guide 1.158, <i>Qualification of Safety-Related Lead Storage Batteries for Nuclear Power Plants</i> [Revision 0])</p>	N/A	Not applicable to the CSB. See item #5 above.
7	<p>For the CSB and CVD facility incorporate into the design for safety-class instrumentation and control systems, the requirements of IEEE Standard 603-1991, <i>IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations</i>.</p>	OPEN	The hazards analysis for the CSB, HNF-SD-SNF-HIE-001, Rev.1, identified several safety class instrumentation and control systems: the resolver and interlock system for the receiving crane, interlocks on the MHM which prevent potential damage to the MCOs and pressure safety valves for the helium

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	(References: 10 CFR 50.55a, "Codes and standards," and NRC Regulatory Guide 1.153, <i>Criteria for Power, Instrumentation, and Control Portions of Safety Systems</i> [Revision 0])		supply system. Fully redundant safety class instrumentation and control systems have been designed in compliance with the DOE 6430.1A and IEEE 603-1991 single failure criteria. The MHM includes IEEE STD 603-1991 standards for safety class instrumentation and control systems, primarily to dictate labeling of safety circuits on drawings and equipment. Appropriate design criteria for safety class and safety significant single failure proof items is also included in the MHM specification. The primary MHM safety class, important-to-safety Category A, items are the control system interlocks and limit switches that prevent MCO shear, collisions with safety class equipment and the seismic power trip panel. Compliance of MHM systems to IEEE 603 is under review.
8	For the CSB and CVD facility incorporate the requirements of ANSI/ANS-8.3-1986, <i>Criticality Accident Alarm System</i> , into the design. (Note: using the MCO design, which includes the basket configuration, and the quantities and form of the K Basin fuel, evaluate these features as a basis for not incorporating criticality accident alarm systems in the CSB and CVD facility based on demonstrating through safety analyses documented in the associated SARs that criticality is not possible. As the design progresses, reconfirm the evaluation results.) Refer to	N/A	For the CSB facility the basis for not requiring a criticality accident alarm system is documented in the safety analysis, CSB FSAR, HNF-3553, Annex A, Rev.0 and supporting documents (Ref: HNF-SD-SNF-CSER-005). All potential criticality situations analyzed for the CSB show that the k_{eff} is less than the criticality safety limit, even for the double contingency accidents analyzed (Ref: HNF-3553, Annex A, Rev. 0, Chapter A6.0). The analyses conclude that a criticality accident is not possible.

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	<p>WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Table 6.a, and NRC Regulatory Guide 8.12 for additional information.</p> <p>(References: NRC Regulatory Guides 8.5, <i>Criticality and Other Interior Evacuation Signals</i> [Revision 1], and 8.12, <i>Criticality Accident Alarm Systems</i> [Revision 2], and 10 CFR 70.24, "Criticality accident requirements," and 10 CFR 72.124, "Criteria for nuclear criticality safety")</p>		<p>Therefore, there is no need for installation of criticality instrumentation in the CSB and none is provided in the design. The exclusion of criticality instrumentation is provided by ANSI/ANS-8.3-1997, Criticality Accident Alarm System, and DOE Order 5480.24, paragraph 7.b(3).</p>
9	<p>For the CSB and CVD facility review the NRC guidance of NUREG-0700 and Standard Review Plan 18.1 against DOE 6430.1A, Section 1300-12.4 and the DOE draft standard, <i>Human Factors Engineering Design Criteria: Volume I, General Criteria</i>, to identify appropriate additional NRC guidance for design of these facilities. The reviews should give consideration to the differences in complexity between power reactor control rooms and those of the CSB and CVD facilities.</p> <p>(References: NUREG-0700, <i>Guidelines for Control Room Design Reviews</i>, and Standard Review Plan 18.1, <i>Control Room</i> [Revision 0])</p>	C	<p>The primary function of the CSB control room is monitoring of health physics instruments. SRP 18.1 is directed at a control room and specifies a review process for upgrades to existing reactor control rooms, primarily, with emphasis on emergency actions. There are no safety class mitigation actions or recovery procedures required for the operator from the control console. No NRC equivalency requirements for operator emergency actions are necessary.</p> <p>The CSB safety class components (hard-wired interlocks and other electrical components) are designated as important-to- safety. NUREG-0700 and Standard Review Plan, Section 18.1, were utilized for the human factors evaluation of the CSB</p>

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			<p>(Ref: HNF-3553, Annex A, Rev 0, Section A13.4 and Table A13.1).</p> <p>The MHM also has an operator control console. NUREG 0700 and Mil STD 1472D guidance were applied in designing the MHM control panel. The MHM vendor completed a human factors engineering plan and human factors review of the MHM systems using man-machine interface criteria. A review was conducted of the control console design and layout and suggestions were incorporated to improve ease of operation and minimize the potential for mis-operation.</p> <p>The Receiving Crane also has an operator console. The design of the Receiving Crane operator console was reviewed against the guidance of NUREG 0700 and Mil STD 1472D.</p> <p>The results of the HF evaluation for the CSB, including the MHM and Receiving Crane, is documented in the FSAR (Ref: HNF-3553, Annex A, Rev 0, Section A13.4 and Table A13.1).</p>
10	For the CSB and CVD facility use NRC Regulatory Guide 1.26 to assist in assigning the appropriate code class to <i>ASME Boiler and Pressure Vessel Code</i> , Section III systems	C	Four components of the CSB were required to be designed to ASME Section III; the overpack storage tubes, the overpack storage tube bellows, the

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	<p>and components.</p> <p>(References: NRC Regulatory Guide 1.26, <i>Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants</i> [Revision 3])</p>		<p>overpack storage tube plugs, and the helium supply system pressure safety valves. R.G. 1.26 was used in selecting the code class for these components.</p> <p>Chapter A4.0 of the CSB FSAR summarizes the functional requirements that provided for application of ASME Section III, Subsection NC, for the overpack storage tubes, the overpack storage tube plugs, and the pressure safety valves. For continuity of design, the overpack storage tube bellows are also designed to ASME Section III, Division 1, Article NC.</p>
11	<p>For the CSB and CVD facility review the NRC positions in Regulatory Guides 1.84 and 1.85 on ASME <i>Boiler and Pressure Vessel Code</i>, Section III code cases before using such code cases for safety-class applications. The NRC positions on applicable code cases should be used in the designs. Where no NRC position is stated in regards to the acceptance of a code case, that code case may be used as approved by the code committee.</p> <p>(References: NRC Regulatory Guides 1.84 and 1.85 [both Revision 30], <i>Design and Fabrication Code Case Acceptability ASME Section III, Division 1, and Materials Code Case Acceptability ASME Section III, Division 1</i>).</p>	C	<p>The CSB safety class mechanical components; pressure safety valves, overpack storage tubes, overpack tube bellows and the overpack storage tube plugs are the only components designed to ASME, Section III. NRC positions on ASME code cases in R.G. 1.84 and 1.85 were reviewed for applicability to these CSB components. These code cases were not used in the design of these components. Ref. Addendum 2 of Attachment 1 to FDH-9761261 R4.</p>
12	For the CSB and CVD facility ensure the requirements of	C	These two standards, ANSI/ANS N509-1989 and

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	<p>ANSI/ANS N509-1989, <i>Nuclear Power Plant Air-Cleanup Units and Components</i>, and ANSI/ANS N510-1989, <i>Testing of Nuclear Air Treatment Systems</i>, are incorporated into the design of safety-significant and non-safety class HVAC systems used to achieve onsite radiological limits or to implement the principals of ALARA.</p> <p>(References: NRC Regulatory Guide 1.140, <i>Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants</i> [Revision 1])</p>		<p>ANSI/ANS N510-1989, are both imposed on the CSB facility HVAC systems by the performance specifications. The main HVAC system is classified general service; the Sampling Weld Station HVAC system is safety significant up to the HEPA on the discharge of the exhauster, AH-006.</p> <p>Implementation is through the applicable procurement specifications and testing documents. The MHM extract system contains HEPA filters. The system draws air over the MCO and through the hoist enclosure during normal operation. The filters provide a general-service confinement function for postulated releases from the MCO. They are designed to N509 and tested to methods in N510 per the MHM performance specification.</p>
13	<p>For the CSB and CVD facilities, incorporate the design requirements of ANSI/ANS-57.1, <i>Design Requirements for Light Water Reactor Fuel Handling System</i>, and ANSI/ANS-57.2, <i>Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants</i>. (This only applies to new facilities that will include the capabilities to lift MCOs or MCO casks, not to K Basins.)</p> <p>(References: NRC Standard Review Plan 9.1.5, <i>Overhead</i></p>	C	<p>A detailed comparison of these standards for the CSB equipment including the MHM was previously transmitted with FDH-9855462 dated July 2, 1998. The MHM design is based on ASME NOG-1 which is commonly regarded as the nuclear version of CMAA-70. The Receiving Crane is also designed to ASME NOG-1.</p> <p>The CSB crane design compliance with the guidance of standards ANSI/ANS 57.1 and 57.2 was included</p>

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	<i>Heavy Load Handling Systems [Revision 0]; NUREG-0554, Single Failure Proof Cranes for Nuclear Power Plants; and NUREG-0612, Control of Heavy Loads at Nuclear Power Plants, Resolution of Generic Technical Activity A-36)</i>		<p>in Addendum 2 of Attachment 1 to FDH-9761261 R4 dated January 20, 1998. The CSB Receiving Crane evaluation focused on compliance with Section 5.0 of 57.1 and 57.2, <u>System Functional Description</u>, and <u>Facility Performance Requirements</u> respectively, and with compliance to Section 6.0 of 57.1 and 57.2, <u>Design Requirements</u>.</p> <p>A review of the MHM and Receiving crane review packages revealed that some of the NRC requirements identified were already included as features in the vendor's design either due to inclusion by the procurement documents or required by ASME NOG-1 design guidance.</p> <p>The evaluation concluded that the MHM and Receiving Crane meet the design requirements of ANSI/ANS 57.1 and 57.2.</p>
14	<p>For the CSB and CVD facilities incorporate applicable design requirements of NRC Generic Letters 88-14, 89-10 and 89-13 into safety-class instrument air systems, motor-operated valves, and open-cycle cooling water systems, respectively.</p> <p>(References: NRC Generic Letters 88-14, <i>Instrument Air Supply System Problems Affecting Safety-Related</i></p>	N/A	<p>The CSB does not possess safety class instrument air systems, motor-operated valves or open-cycle cooling water systems. Incorporation of these NRC Generic Letters is not required by the CSB design.</p>

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	<i>Equipment; 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance 10 CFR 50.54(f), with supplements; and 89-13, Service Water System Problems Affecting Safety-Related Equipment)</i>		
15	<p>For the CSB and CVD facilities incorporate a requirement into safety-class procurement specifications that requires suppliers to report defects and noncompliances in items or services. The requirement should be similar to the following:</p> <p style="padding-left: 40px;">Safety-class equipment and/or services furnished under this order are subject to reporting of defects. If equipment and/or services contain defects that could cause a substantial safety hazard, then immediate reporting to the Buyer is required unless the Seller has actual knowledge that the Buyer has been adequately informed of such defect.</p> <p style="padding-left: 40px;">The Seller shall evaluate identified or suspected defects. If the Seller's evaluation determines a defect does exist that could cause a substantial safety hazard, then the Seller shall notify the Buyer as soon as practicable and, in all cases, within 5 working days following completion of the evaluation.</p> <p style="padding-left: 40px;">If the Seller determines that it does not have the</p>	C	<p>Safety class purchasing requirements in HNF-PRO-259 and HNF-PRO-3144 specify that purchasing of safety class and safety significant items comply with the ANSI/ASME NQA-1 requirements. The NQA-1, Section XV, Control of Nonconforming Items, requirement is:</p> <ul style="list-style-type: none"> • Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use. Controls shall provide for identification, documentation, evaluation, and segregation when practical, disposition of nonconforming items, and for notification to affected organizations. <p>The NQA-1 requirement meets the intent of reporting defects and non-compliances in items and service. Future procurements of safety-class items will continue to follow NQA-1 and will include a similar clause. Any defects/non-compliances identified are reported, recorded and corrected using the outlined format in Chapter 14, Sections 14.4 and 14.5.</p>

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	<p>capability to perform the evaluation, the Seller may request the buyer to cause an evaluation to be performed. Seller's request shall be effected within 5 working days of this determination. If the Seller elects to have the Buyer perform the evaluation, then all necessary and pertinent information and correspondence shall be sent to the Buyer. Results of evaluations by the Buyer will be transmitted to the Seller.</p> <p>(References: 10 CFR 21, "Reporting of Defects and Noncompliance")</p>		
16	<p>Before implementation, the DOE-Richland Operations Office will review and approve any changes to WHC-SP-1131, <i>Quality Assurance (QA) Program and Implementation Plan</i>, for the SNF Project that could be interpreted as decreasing the Quality Assurance Program's existing commitments for the SNF Project. (Note: HNF-SP-1228, <i>Quality Assurance Program Implementation Plan for Nuclear Facilities</i>, is in the process of being revised for subsequent approval by DOE-RL. Nuclear facility lists and descriptions from WHC-SP-1131 are being relocated to ES&H nuclear safety documents. WHC-SP-1131 remains in effect until DOE-RL approval is secured for HNF-SP-1228 and facility lists and descriptions are relocated to ES&H nuclear safety documents.)</p>	C	<p>The CSB FSAR (Ref: HNF-3553, Annex A, Rev. 0) in Chapter A14.0 <u>Quality Assurance</u> defines the QA requirements for the CSB sub-project including a requirement related to the QA rule (10 CFR 830.120) implementation plan. This plan, which describes how the QA rule is implemented at Hanford and its subprojects, requires DOE approval prior to changing it. This approval, prior to implementation is similar to the NRC requirement 10 CFR 50.54(a).</p>

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	(References: 10 CFR 50.54(a), "Conditions of licenses [Quality Assurance Provisions]")		
17	<p>Implement the PHMC Occurrence Reporting System for the design and construction of the CSB and CVD facility.</p> <p>(References: 10 CFR 50.55(e), "Conditions of construction permits")</p>	C	<p>Reporting of SNF Project occurrences during the design and construction phase is implemented by Administrative Procedure AP 2-15. This procedure applies to K Basins, CVDF, and CSB and implements the requirements of DOE Order 232.1A.</p> <p>For the CSB design, reporting of unusual occurrences is provided by the Architect Engineer's corrective action system invoked in Section 16 <i>Corrective Action</i> of FDI's QAPP.</p> <p>For the MHM design and construction the PHMC Occurrence Reporting system is in effect.</p> <p>For the CSB construction, reporting of unusual occurrences is provided by implementation of the QAPP, Section 16 <i>Corrective Action</i> and Section 15 <i>Control of Nonconforming Items</i>.</p>
18	<p>For the CSB, CVD facilities, and K Basin FRS and post-FRS fuel handling activities, ensure the appropriate quality requirements in existing PHMC procedures and instructions remain in effect (e.g., in SNF Project-specific documents). These procedures and instructions and the subject</p>	C	<p>The SNF-DB-002 identified QA items such as QA organizational freedom, QA program identification of Safety related items, graded approach to design, supplier QA program requirements, supplier qualifications, inspection of fabrication and</p>

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	<p>requirements are identified in WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Attachment A, "Detailed Evaluations, Quality Assurance Criteria."</p> <p>(References: 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and 10 CFR 72, Subpart G, "Quality Assurance")</p>		<p>installation, and status tagging for installation and inspection have been maintained in the PHMC and SNF Project QA programs.</p>
19	<p>Institute a process to identify safety-class equipment that has been identified in the commercial nuclear power industry, via NRC Inspection and Enforcement Bulletins and Notices, as being potentially defective.</p> <p>Ensure the areas of vendor and subcontractor quality assurance records and control of safety-class purchased material, equipment, and services receive emphasis during SNF Project audits, surveillances, and assessments.</p> <p>(References: IEN 95-29 and a number of NRC Inspection and Enforcement Bulletins and Notices addressing procurement of potentially defective equipment)</p>	Open	<p>The SNF Project has documented a review of NRC Inspection and Enforcement bulletins and notices for the purpose of identifying potentially defective safety-class equipment or components. (Ref. Presently an informal memo from Stu Krieg to G. D. Forehand dated 5/6/99, titled: <i>In-Depth Review of NRC Equivalency Bulletins and Notices</i>.). The Project has committed to implement a procedure for such a process.</p> <p>For the MHM, the appropriate QA and procurement clauses have been invoked on the contract. Purchased parts have been reviewed against known defects, (e.g. counterfeit bolts).</p>
20	<p>For the CSB and CVD facilities, incorporate control devices for access to high-radiation areas that conform to the requirements of 10 CFR 20.1601. 10 CFR 20.1601 requires</p>	C	<p>Radiation dose rates in the accessible areas of the CSB will not be high enough to require control devices under application of either the NRC or DOE</p>

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	<p>control devices to all high-radiation areas, defined in Section 20.1003 to be 0.1 rem in 1 hour at 30 cm, whereas 10 CFR 835 does not require incorporation of control devices until the dose rate in an accessible area reaches 1 rem in 1 hour at 30 cm. Control devices are hardware features, such as alarms or locked entryways, as opposed to administrative controls.</p> <p>For the CSB and CVD facilities, incorporate into the design the 10 CFR 20.1301 hourly dose limit of 0.002 rem to the public for any unrestricted area from external sources during normal operations and anticipated occurrences.</p> <p>(References: 10 CFR 20, "Standards for Protection Against Radiation," and 10 CFR 72.126, "Criteria for radiological protection")</p>		<p>criteria. Areas of the CSB where radiation levels are expected to be high, such as the below grade vault, are not accessible to personnel. The MHM is provided with interlocks to protect the worker from exposure to the MCO should the MHM shield skirt not be lowered. (Ref: HNF-3553, Annex A, Rev 0, Section A4.4.13).</p> <p>The MHM dose rates to the facility workers are determined by shielding analyses to be ALARA. The MHM does not result in exposures to the Public. Shielding and ALARA analyses for the CSB, which have recently been updated for the welding/sample station addition, have been performed.</p> <p>Dose levels in the service station and sample stations have been calculated at less than 10 mrem/hr at 0.3 meter from the top of the MCO. (Ref: HNF-3779)</p> <p>Regarding the 2mrem/hr public dose, DOE requirements limit the maximum radiological doses to the exposed individual members of the public to 10 mrem/yr from normal operations. For normal operations and anticipated events associated with the CSB activities, no periodic dose levels of 10mrem/yr or higher are planned or expected. Consequently, the</p>

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			2mrem/hr public dose criterion will not be exceeded.
21	<p>Apply the radiological exposure criteria of 10 CFR 72.104 to the design and safety analyses of the CSB and CVD facility. These criteria apply during normal operations and anticipated occurrences to any real individual of the public. These annual dose-equivalent criteria are 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other critical organ. (Note: existing DOE requirements are 25 mrem to the whole body and 75 mrem to any critical organ.)</p> <p>(References: 10 CFR 72.100, "Defining potential effects of the ISFSI or MRS on the region"; 10 CFR 72.104, "Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS," and 10 CFR 72.126, "Criteria for radiological protection")</p>	C	<p>The radiation control program for the SNF Project has incorporated into the design and safety analyses, Title 10, Code of Federal Regulations, Part 20, <i>Standards for Protection Against Radiation</i>, Section 20.1301, <i>Dose Limits for Individual Members of the Public</i> (10 CFR 20.1301), hourly dose limit of 0.002 rem (2.0×10^{-5} Sv) to the public from external sources for any unrestricted area during normal operations and anticipated occurrences. The radiological exposure annual dose criteria of Title 10, Code of Federal Regulations, Part 72, <i>Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste</i>, Section 72.104, <i>Criteria for Radioactive Materials in Effluents and Direct Radiation from and ISFSI or MRS</i> (10 CFR 72.104), also have been incorporated. These criteria apply to design measures to protect any real individual of the public (offsite) during normal operations and anticipated occurrences. These annual dose equivalent criteria are 25 mrem (0.25 mSv) to the whole body, 75 mrem (0.75 mSv) to the thyroid, and 25 mrem (0.25 mSv) to any other critical organ. (Note that specific mention of a thyroid dose limit is not included in the current DOE requirements of 25 mrem [0.25 mSv] to the whole body and 75 mrem</p>

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			<p>[0.75 mSv] to any other critical organ.)</p> <p>The estimated annual dose-equivalent exposure from normal operation and anticipated occurrences at CSB is well below both the DOE and NRC criteria of 10 CFR 72.104 (See DOE/RL-98-30, Radioactive Air Emissions Notice of Construction, Canister Storage Building, (Revised Sealing Configuration for Spent Nuclear Fuel) Project W-379, dated June 1998). The normal operation dose equivalent for the maximum exposure individual is estimated in the Notice of Construction at 1.58×10^{-2} mrem/yr.</p>
22	This additional NRC requirement was deleted because of changing how the "important to safety" criteria of 10 CFR 72, are applied. Refer to item 29.	N/A	No compliance assessment required.
23	<p>For the CSB and CVD facilities, incorporate the requirements of NRC Regulatory Guide 8.8 into the design. (Note: DOE 6430.1A-1540-99.0.6 references Regulatory Guide 8.8 for piping design considerations for systems that carry radioactive material.)</p> <p>(References: NRC Regulatory Guide 8.8, <i>Information Relative to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will be as Low as Reasonably Achievable</i> [Revision 3])</p>	C	<p>The CSB FSAR (HNF-3553, Annex A, Rev. 0, Section A7.4) discusses the ALARA policy and program applied for CSB design including application of Regulatory Guide 8.8. Reg Guide 8.8 provides guidelines for the implementation of ALARA at Nuclear Power plants.</p> <p>The design of the CSB includes features to protect the facility worker from excessive doses of radiation. Design features that protect the worker from radiation can be found in the service station, sampling/weld</p>

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			<p>station, receiving crane, and the MHM. The shielding on the MHM is specified based on ALARA considerations and analysis.</p> <p>Reg Guide 8.8 requirement C.2.b. (9) and others require designs to provide features to minimize personnel dose in servicing of equipment. The MHM service pit provides maintenance equipment and facilities to minimize exposure to personnel.</p> <p>The CSB design has been reviewed for ALARA compliance at each design change. The weld station design change is evaluated in ALARA Analysis 09.</p>
24	<p>Include in the SNF Project Path Forward Integrated Safety Management Plan the requirement to provide for the CSB SAR the information called for in 10 CFR 72.24 and NRC Regulatory Guide 3.48 that is not required in DOE 5480.23 and DOE-STD-3009-94 and that is unique to spent nuclear fuel storage. For further information, refer to WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, Table 5.c, and 10 CFR 72.24. Further, as the Hanford Site evolves, public health and safety must be revisited, and probable uses of Hanford Site lands in the future should be considered in the design bases of the CSB and CVD facility at this time.</p>	C	<p>The SNF Project Path Forward Integrated Safety Management Plan (Ref: HNF-SD-SNF-PLN-012, Rev 0) includes the requirement to provide in the CSB FSAR the information called for in 10 CFR 72.24 and NRC Reg Guide 3.48. Implementation of this requirement is ensured through a lower tier document, HNF-SD-SNF-SP-012, Rev. 0, <i>Additional Guidance for Including Nuclear Safety Equivalency in the Canister Storage Building and Cold Vacuum Drying Facility Final Safety Analysis Reports</i>, that specifically identifies information called for in Reg Guide 3.48 that is to be included in the CSB FSAR. The SP-012 document was used in the preparation of</p>

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	<p>Include in the SNF Project Path Forward Integrated Safety Management Plan the requirement to provide for the CVD facility SAR, in consideration of conditioning processes and safety features, relevant information called for in NRC Regulatory Guide 3.26 that is not required in DOE 5480.23 and DOE-STD-3009-94 and that is unique to the conditioning processes. (The review to identify any additional applicable information for the CVD facility SAR should not occur until the associated processes and safety features are better defined.)</p> <p>(References: 10 CFR 50.34, "Contents of an application: Technical information"; NRC Regulatory Guide 3.26, <i>Standard Format and Content of Safety Analysis Reports for Fuel Reprocessing Plants</i> [Revision 0]; NRC Regulatory Guide 3.48, <i>Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage)</i> [Revision 1]; and 10 CFR 72.24, "Contents of an application: Technical information," and 10 CFR 72.98, "Identifying regions around an ISFSI or MRS site")</p>		<p>the CSB FSAR, HNF-3553, Annex A, Rev. 0, to ensure inclusion of the Reg Guide 3.48 and 10 CFR 72.24 required items in the CSB FSAR. The discussion of MHM design features and operation was also made compliant against the content requirements of SP-012.</p> <p>As the Hanford Site evolves, public health and safety must be revisited, and probable uses of Hanford Site lands in the future should be considered in the design bases of the CSB and CVD facility at this time.</p>
25	<p>For the CSB and CVD facility, review the effluent monitoring requirements of, for example 10 CFR 20, 10 CFR 70.59 and 10 CFR 835, to provide the necessary monitoring instrumentation. (For the CSB, this may apply</p>	C	<p>The sealed MCO produces essentially no effluents for monitoring. The CSB effluent monitoring instrumentation (revised CSB Rad air NOC) as described in HNF-3553, Annex A, Rev. 0, Section</p>

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	<p>as a result of MCOs being vented at any time while in the CSB.)</p> <p>(References: 10 CFR 50.36a, "Technical specifications on effluents from power reactors," and 10 CFR 70, "Domestic Licensing of Special Nuclear Material")</p>		<p>A2.7.4, was approved by the EPA on 8/26/98. Washington DOH approval was received earlier on 7/30/98. The Health Physics System, rather than the MHM, provides directly connected instrumentation for monitoring effluent from the MHM ventilation system. There is also non-safety class effluent monitoring from the building in the building stack. Monitoring is in compliance with 10 CFR 20 and 10 CFR 70.59 requirements through permitting and reporting measures completed and approved by WDOH and the EPA. 10 CFR 835 is not applicable to environmental protection or monitoring of facility airborne emissions.</p>
26	<p>During final design of the CVD facility, review (1) the conclusions of Attachment A, "Detailed Evaluations," to WHC-SD-SNF-DB-002, <i>Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities</i>, and (2) the general design criteria of 10 CFR 50, Appendix A, to determine whether NRC nuclear safety equivalency is achieved without application of any of the general design criteria of 10 CFR 50, Appendix A.</p> <p>(References: 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants")</p>	N/A	Not applicable for the CSB.
27	Incorporate a criticality safety value of 0.95 for k_{eff} . (This	C	A criticality k_{eff} value of 0.95 is incorporated for the

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	<p>requirement applies at the point the spent fuel, in an MCO basket, is placed in an MCO.)</p> <p>(References: NRC Standard Review Plan 9.1.2, <i>Spent Fuel Storage</i> [Revision 3], and NUREG-0612, <i>Control of Heavy Loads at Nuclear Power Plants, Resolution of Generic Technical Activity A-36</i>)</p>		<p>MCO upon loading at K Basins, and during all CSB handling steps through interim storage. (Ref: HNF-3553, Annex A, Rev. 0, Section A6.3.4 and supporting documents).</p>
28	<p>For the CSB, review ANSI/ANS-57.9-1992, <i>Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)</i>, to identify any additional requirements that would need to be incorporated into the design to demonstrate nuclear safety equivalency.</p> <p>(References: NRC Regulatory Guide 3.60, <i>Design of an Independent Spent Fuel Storage Installation (Dry Storage)</i> [Revision 0])</p>	C	<p>The design criteria contained in ANSI/ANS57.9 dated 1992, has been reviewed for implementation in the CSB design. An application evaluation against the requirements of standard ANSI/ANS-57.9 was included in Addendum 3 of Attachment 1 to FDH-9761261 R4 dated January 20, 1998. The information provided a listing of those ANSI 57.9 items relevant to nuclear safety which are not in the CSB design, and justification for not including them, and a listing of 57.9 items which were included as criteria independently of ANSI 57.9. An earlier review of ANSI 57.9 identified an additional requirement from section 6.17.1.1(1) to increase the dead load of structures by +5%.</p> <p>The MHM design was found to be consistent with requirements of the 57.9 standard.</p>
29	<p>Identify SSCs important to safety in accordance with 10 CFR 72.3. Once SSCs are identified as having a function</p>	C	<p>The CSB FSAR HNF-3553, Annex A, Rev. 0 in Chapter A4.0, Tables A4-1 Safety Class SSCs, and</p>

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	<p>meeting the definition of important to safety, impose the requirements for SSCs important to safety specified in 10 CFR 72.</p> <p>A graded approach is applied to an SSC important to safety by using the guidance provided in NUREG/CR-6407, <i>Classification of Transportation Packaging and Dry Spent Fuel Storage Systems</i>, as follows.</p> <ul style="list-style-type: none"> • Category A – Critical to Safe Operation SSCs in this category include those whose failure or malfunction could directly result in a condition adverse to public health and safety. Important to safety SSCs in this category are classified as safety class as defined by DOE Order 6430.1A, with the additional requirements therein. • Category B - Major Impact on Safety SSCs in this category include those whose failure or malfunction could indirectly result in a condition adversely affecting co-located worker health and safety. Note that from the definition of Category C, Category B is understood to include events that could significantly damage the MCO without severe impact to public health and safety. SSCs in this category are classified as safety significant as defined in DOE-STD- 		<p>Table A4-3 Safety Significant SSCs reflect the NRC equivalency important-to-safety classifications for CSB SSCs per the definitions contained in HNF-SD-SNF-DB-003, Rev. 4A.</p> <p>Important-to-safety features for the CSB are the receiving crane hook and position interlocks (Category A), and all of the reinforced concrete construction for the below grade vault and at grade and above grade structures whose function is to ensure cooling and maintain MCOs in a criticality-safe array (including the 226 tubes). Category B items are those associated with cask lid removal. See CSB FSAR, HNF-3553, Annex A, Rev. 0, Tables A4-1 Safety Class SSCs and Table A4-3 Safety Significant SSCs for a complete listing. ITS Category C features are also identified in the CSB FSAR (HNF-3553, Annex A, Rev 0. Chapter 2.</p> <p>Important-to-safety features on the MHM are the seismic trip panel, the interlocks preventing shear and collisions, the MCO hoist and the MCO grapple. The overall machine is structurally important to safety (ITS Category B) to prevent a collapse impacting the deck.</p>

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	<p>3009-94.</p> <ul style="list-style-type: none"> • Category C - Minor Impact on Safety SSCs whose failure or malfunction would not significantly reduce the containment and would not be likely to create a situation adversely affecting public or co-located workers' health and safety. <p>Address worker safety issues through the use of DOE orders and standards.</p> <p>(References: 10 CFR 72.3, "Definitions," 10 CFR 72.106, "Controlled area of an ISFSI or MRS," and 10 CFR 72.122, "Overall requirements")</p>		

B, and C

*ALARA = as low as reasonably achievable.**ASME = American Society of Mechanical Engineers.**CFR = Code of Federal Regulations.**CSB = Canister Storage Building.**CVD = Cold Vacuum Drying (Facility).**DOE = U.S. Department of Energy.**FRS = fuel retrieval system.**IEEE = Institute of Electrical and Electronic Engineering.**MCO = multicanister overpack.**NRC = U.S. Nuclear Regulatory Commission.**PHMC = Project Hanford Management Contractor.**SAR = safety analysis report.**SNF = spent nuclear fuel.**SSC = structure, system, and component.*

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Name	MSIN	Text with All Attach.	Text Only	Attach/Appendix Only	EDT/ECN Only

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A. S. Daughtridge	R3-86	X			
L. J. Garvin	R3-26	X			
S. B. Harrington (5)	R3-26	X			
P. G. LeRoy	R3-11	X			