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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SYSTEM DESCRIPTION DOCUMENT REVISION HISTORY

1. SDD Title
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00	This document supersedes the previous revision with the document identifier of BCB000000-01717-1705-00030. This document is a complete rewrite of the superceded document, driven mainly by new design and regulatory requirements, and new document development procedures.
00 ICN01	This ICN adds Section 2 (Design Description) to the SDD, deletes the information in Section 1.4, deletes TBV-459 and TBV-3855 from the SDD, adds TBV-4655, updates references in the document and Appendix E, and other changes indicated by revision bars.

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SUMMARY

The Waste Handling Building System provides the space, layout, structures, and embedded subsystems that support waste handling operations. The Waste Handling Building (WHB) is located on the surface within the protected area of the Monitored Geologic Repository (MGR) site. The Waste Handling Building System provides space and layout to support waste handling operations, storage for aging and blending of spent fuel assemblies, staging of waste packages, and storage of empty disposal containers. The Waste Handling Building System also helps maintain a suitable environment for personnel and equipment that supports the waste handling operations; protects the systems within the WHB from natural and induced environments; confines contaminants; provides radiological protection to personnel; and provides space and layout for industrial and radiological safety systems, operations control and monitoring, safeguards and security systems, fire protection systems, ventilation systems, and utilities systems. The WHB also provides the required space and layout for maintenance, tool storage, and administrative and support facilities.

The Waste Handling Building System integrates waste handling systems within its protective structure to support the throughput rates established for waste emplacement. The system also provides shielding, layout, and other design features to limit personnel radiation exposure to levels that are as low as reasonably achievable (ALARA).

The Waste Handling Building System requires interface with MGR systems that perform or support waste handling operations. This system interfaces with the following systems:

- Carrier/Cask Transport System
- Waste Emplacement/Retrieval System
- Site Communications System
- Site Water System
- Emergency Response System
- MGR Site Layout System
- Health Safety System
- Monitored Geologic Repository Operations Monitoring and Control System
- Safeguards and Security System
- Site Generated Radiological Waste Handling System
- Site Generated Hazardous, Nonhazardous, and Sanitary Waste Disposal System
- Pool Water Treatment and Cooling System
- Canister Transfer System
- Assembly Transfer System
- Disposal Container Handling System
- Waste Package Remediation System
- Waste Handling Building Ventilation System
- Waste Handling Building Radiological Monitoring System
- Waste Handling Building Electrical System
- Waste Handling Building Fire Protection System
- Carrier/Cask Handling System

QUALITY ASSURANCE

The quality assurance (QA) program applies to the development of this document. The "SDD Development/Maintenance (Q SDDs) (WP# 16012126M5)" activity evaluation has determined the development of this document to be subject to "Quality Assurance Requirements and Description" requirements. This document was developed in accordance with AP-3.11Q, "Technical Reports."

1. SYSTEM FUNCTIONS AND DESIGN CRITERIA

The functions and design criteria for the system are identified in the following sections. Throughout this document the term "building" or "system" shall be used to indicate the Waste Handling Building System. The system architecture and classification are provided in Appendix B.

1.1 SYSTEM FUNCTIONS

1.1.1 The system provides the required space, layout, and structures to support and optimize the waste handling operations for expected waste throughputs.

1.1.2 The system protects the WHB structures, systems, and components (SSCs) from the external environments.

1.1.3 The system helps maintain worker and public radiation doses ALARA.

1.1.4 The system helps limit the spread of contamination within the facility.

1.1.5 The system provides safe work areas with a suitable environment for personnel and equipment to support operations, maintenance, and other activities.

1.1.6 The system provides the required space and layout in support of emergency plans.

1.1.7 The system provides the required space and layout in support of access control requirements.

1.1.8 The system provides the required space and layout for equipment storage.

1.1.9 The system limits the probability and consequences of off-normal conditions and design basis events.

1.1.10 The system provides features that facilitate decontamination and decommissioning at repository closure.

1.1.11 The system provides space and layout to support inspection, testing, calibration, and maintenance activities.

1.1.12 The system provides chilled water, hot water, potable water, industrial air, and instrument air as required to support waste handling operations.

1.1.13 The system interfaces with the MGR systems as required to support all waste handling and related operations.

1.1.14 The system facilitates decommissioning of the WHB.

1.2 SYSTEM DESIGN CRITERIA

This section presents the design criteria for the system. Each criterion in this section has a corresponding Criterion Basis Statement in Appendix A that describes the need for the criterion as well as a basis for the performance parameters imposed by the criterion. Each criterion in this section also contains bracketed traces indicating traceability, as applicable, to the functions (F) in Section 1.1, the "Monitored Geologic Repository Requirements Document" (MGR RD), and "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." In anticipation of the interim guidance being promulgated as a Code of Federal Regulations, it will be referred to as "10 CFR 63" in this system description document. For the applicable version of the codes, standards, and regulatory documents, refer to Appendix E.

1.2.1 System Performance Criteria

1.2.1.1 The system shall provide space, layout, and structures as required to support and optimize dry handling of high-level radioactive waste in the WHB for expected waste throughputs.

[F 1.1.1][MGR RD 3.2.C, 3.2.E]

1.2.1.2 The system shall provide space, layout, and structures as required to support and optimize wet handling of high-level radioactive waste (i.e., pool structure and systems) in the WHB for expected waste throughputs.

[F 1.1.1][MGR RD 3.2.C, 3.2.E]

1.2.1.3 The system shall provide space, layout, and structures as required for staging, laydown, and storage of equipment and tools within specific areas of the WHB.

[F 1.1.1, 1.1.8][MGR RD 3.2.C]

1.2.1.4 The system shall provide space and layout as required to support maintenance activities of the systems that support waste handling operations.

[F 1.1.1, 1.1.11][MGR RD 3.1.G, 3.2.C]

1.2.1.5 The system shall provide space, layout, and structures as required for preparation and staging of canisters, waste packages, and empty disposal containers in the WHB.

[F 1.1.1][MGR RD 3.1.G, 3.2.C]

1.2.1.6 The system shall provide space, layout, and administrative support facilities for personnel performing operations, maintenance, and other activities in the WHB.

[F 1.1.1, 1.1.5, 1.1.6, 1.1.7][MGR RD 3.1.G, 3.2.C]

1.2.1.7 The system shall be designed to facilitate collection and transfer of solid and liquid low-level waste (with no mixing with non-contaminated systems) for processing in the Waste Treatment Building.

[F 1.1.1, 1.1.4, 1.1.13][MGR RD 3.1.G, 3.2.C, 3.3.E]

1.2.1.8 The system shall provide space, layout, and structures as required for installation of systems that support the waste handling operations (e.g., Waste Handling Building Ventilation System, Waste Handling Building Electrical System).

[F 1.1.13][MGR RD 3.2.C]

1.2.1.9 The system shall provide utilities (e.g., chilled water, hot water, potable water, industrial and instrument air) as required for personnel and equipment that support waste handling operations and maintenance activities.

[F 1.1.12][MGR RD 3.2.C]

1.2.1.10 The system design shall include provisions for decommissioning and decontamination, including the removal of potentially contaminated SSCs.

[F 1.1.10, 1.1.14][MGR RD 3.1.C, 3.1.G, 3.3.A][10 CFR 63.21(c)(17)]

1.2.1.11 The system shall have an operational life of 40 years.

[F 1.1.1][MGR RD 3.2.C]

1.2.2 Safety Criteria

1.2.2.1 Nuclear Safety Criteria

1.2.2.1.1 The system structure shall be designed to withstand a design basis earthquake of Frequency Category 2 (TBV-1246).

[F 1.1.9][MGR RD 3.1.C, 3.1.G][10 CFR 63.111(a)(2), 63.111(b)(2), 63.112(e)(8)]

1.2.2.1.2 The system shall provide suitable barriers to impede the spread of fires to systems and equipment that are important to confinement.

[F 1.1.9][MGR RD 3.3.A]

1.2.2.1.3 The system shall be designed such that during and after design basis events and off-normal environmental conditions, operation of QL-1 SSCs important to safety is not affected by failure of other SSCs.

[F 1.1.9][MGR RD 3.1.C, 3.1.G][10 CFR 63.111(a)(2), 63.111(b)(2), 63.112(e)(8)]

1.2.2.1.4 The building shall be designed to maintain control of radioactive waste and radioactive effluents.

[F 1.1.4][MGR RD 3.1.C, 3.1.G][10 CFR 63.112(e)(10)]

1.2.2.1.5 The system design shall limit the spread of radioactive contamination by creating confinement zones in the WHB based on isolating activities that have a potential for releases.

[F 1.1.3, 1.1.4, 1.1.5][MGR RD 3.1.C, 3.1.G][10 CFR 63.112(e)(1), 63.112(e)(4)]

1.2.2.1.6 The system shall be designed in accordance with the project ALARA program goals (TBD-406) and the applicable guidelines in "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable" (Regulatory Guide 8.8).

[F 1.1.3][MGR RD 3.1.B, 3.1.C, 3.1.G][10 CFR 63.111(a)(1), 63.112(e)(2), 63.112(e)(3)]

1.2.2.1.7 The system shall be designed for the design basis flood in accordance with the guidelines in Regulatory Guide 1.102, "Flood Protection for Nuclear Power Plants."

[MGR RD 3.1.G]

1.2.2.1.8 The system shall be designed such that during and after applicable design basis events, operation of QL-1 SSCs is not adversely affected.

[F 1.1.9][MGR RD 3.1.C, 3.1.G][10 CFR 63.111(a)(2), 63.111(b)(2), 63.112(e)(8)]

1.2.2.1.9 The system shall be designed to limit the accumulation of radioactive contamination and facilitate decontamination of building components and surfaces.

[F 1.1.3, 1.1.5][MGR RD 3.1.G, 3.3.A]

1.2.2.1.10 The system shall be designed to provide means to control access to high radiation areas and airborne radioactivity areas.

[MGR RD 3.1.C, 3.1.G][10 CFR 63.112(e)(5)]

1.2.2.1.11 The system QL-1 SSCs shall withstand the maximum Tornado wind speed of 189 mph with a corresponding pressure drop of 0.81 psi and rate of pressure drop of 0.3 psi/sec.

[MGR RD 3.1.C, 3.1.G][10 CFR 63.111(a)(2), 63.111(b)(2), 63.112(e)(8)]

1.2.2.1.12 The system QL-1 SSCs shall withstand the Spectrum I or Spectrum II missiles as identified in "MGR Design Basis Extreme Wind/Tornado Analysis," Section 6.3.

[MGR RD 3.1.C, 3.1.G][10 CFR 63.111(a)(2), 63.111(b)(2), 63.112(e)(8)]

1.2.2.2 Non-nuclear Safety Criteria

1.2.2.2.1 The system shall be designed such that floor surfaces upon which transportation casks are loaded and unloaded are flat and at the same level as the top of any railroad track rails.

[F 1.1.5][MGR RD 3.3.A]

1.2.2.2.2 The system shall be designed to permit prompt termination of operations and evacuation of personnel during an emergency.

[MGR RD 3.1.C, 3.1.G][10 CFR 63.112(e)(10)]

1.2.3 System Environment Criteria

1.2.3.1 The system shall be designed such that components susceptible to radiation will not deteriorate excessively when exposed to the radiation environment (TBD-405) in which the component is located.

[F 1.1.5][MGR RD 3.3.A]

1.2.3.2 The non-QL-1 portions of the system affected by wind shall be designed for a wind speed of 121 miles per hour.

[F 1.1.2][MGR RD 3.1.G, 3.3.A]

1.2.3.3 The system shall be designed for an outside temperature environment of 5 degrees F to 117 degrees F.

[F 1.1.2]

1.2.3.4 The system shall be designed for an environment with a maximum daily snowfall of 10 inches and maximum snowfall accumulation of 17 inches.

[F 1.1.2][MGR RD 3.1.G, 3.3.A]

1.2.3.5 The system shall be designed for the ambient relative humidity environment defined in Table 1.

Table 1. Ambient Relative Humidity Environment

Parameter	Value
Annual mean value	28%
Minimum summer mean value	13%
Maximum winter mean value	46%

[F 1.1.2]

1.2.3.6 The system shall be designed for an environment with a maximum annual precipitation of 10 inches and maximum daily precipitation of 5 inches.

[F 1.1.2][MGR RD 3.1.G, 3.3.A]

1.2.3.7 The system shall be designed to withstand a frost line depth of 15 inches below the undisturbed ground surface.

[MGR RD 3.3.A]

1.2.4 System Interfacing Criteria

1.2.4.1 The system shall interface with the Carrier/Cask Transport System for size, weight, and operating envelopes of casks and carriers.

[F 1.1.13]

1.2.4.2 The system shall interface with the Waste Emplacement/Retrieval System for size, weight, and operating envelopes of the waste package transporter.

[F 1.1.13]

1.2.4.3 The system shall interface with the Site Communications System for equipment installation and routing of communication lines requirements.

[F 1.1.13]

1.2.4.4 The system shall interface with the Site Water System for water storage and piping distribution requirements for fire protection; utility; heating, ventilation, and air conditioning; pool; and other requirements within the WHB.

[F 1.1.13]

1.2.4.5 The system shall interface with the Emergency Response System for space and layout, and equipment installation and cable routing requirements.

[F 1.1.13]

1.2.4.6 The system shall interface with the MGR Site Layout system for location and integration requirements of the WHB with other MGR facilities.

[F 1.1.13]

1.2.4.7 The system shall interface with the Health Safety System for space and layout and equipment installation requirements.

[F 1.1.13]

1.2.4.8 The system shall interface with the MGR Operations Monitoring and Control System for space and layout and equipment installation and cable routing requirements.

[F 1.1.13]

1.2.4.9 The system shall interface with the Safeguards and Security System for control of physical access into and within the WHB; and installation of barriers, equipment, cable, and other requirements.

[F 1.1.13]

1.2.4.10 The system shall interface with the Site Generated Radiological Waste Handling System for storage and transfer requirements of the radiological waste.

[F 1.1.13]

1.2.4.11 The system shall interface with the Site Generated Hazardous, Nonhazardous, and Sanitary Waste Disposal System for equipment and piping installation requirements.

[F 1.1.13]

1.2.4.12 The system shall interface with the Pool Water Treatment and Cooling System for space, layout, shielding, structural requirements, and sizing of the pool and equipment installation and piping routing requirements.

[F 1.1.13]

1.2.4.13 The system shall interface with the Canister Transfer System for operating envelope and structural support requirements.

[F 1.1.13]

1.2.4.14 The system shall interface with the Assembly Transfer System for operating envelope, structural support, and pool sizing requirements.

[F 1.1.13]

1.2.4.15 The system shall interface with the Disposal Container Handling System for space and layout, and operating envelope and structural support requirements.

[F 1.1.13]

1.2.4.16 The system shall interface with the Waste Package Remediation System for space and layout, and operating envelope and structural support requirements.

[F 1.1.13]

1.2.4.17 The system shall interface with the Waste Handling Building Ventilation System for space and layout requirements, equipment and ductwork installation requirements, chilled water piping distribution requirements, WHB zone locations and pressures, and temperature and humidity requirements.

[F 1.1.13][MGR RD 3.1.G]

1.2.4.18 The system shall interface with the Site Radiological Monitoring System for space and layout and equipment installation and cable routing requirements.

[F 1.1.13]

1.2.4.19 The system shall interface with the Waste Handling Building Electrical System for space and layout requirements, equipment installation and conduit routing requirements, and power distribution requirements for the systems in the WHB.

[F 1.1.13]

1.2.4.20 The system shall interface with the Waste Handling Building Fire Protection System for space and layout requirements, equipment installation and piping routing requirements, wall and door fire rating requirements, fire exit requirements, and drainage requirements.

[F 1.1.13][MGR RD 3.1.G]

1.2.4.21 The system shall interface with the Carrier/Cask Handling System for operating envelope and structural support requirements.

[F 1.1.13]

1.2.5 Operational Criteria

1.2.5.1 The system SSCs affecting waste throughput shall have a minimum inherent availability of 0.9941 (TBV-4655).

[F 1.1.1][MGR RD 3.3.A]

1.2.5.2 The system SSCs that are important to safety shall be designed to permit periodic inspection, testing, and maintenance as necessary to ensure their continued functioning and readiness.

[F 1.1.11][MGR RD 3.1.C, 3.1.G][10 CFR 63.112(e)(13)]

1.2.6 Codes and Standards Criteria

1.2.6.1 The system design shall comply with the applicable sections of "Occupational Safety and Health Standards" (29 CFR 1910).

[MGR RD 3.1.E]

1.2.6.2 The system design shall comply with the applicable sections of "Safety and Health Regulations for Construction" (29 CFR 1926).

[MGR RD 3.1.F]

1.2.6.3 The system design shall comply with the applicable sections of "Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)"

(ANSI/ANS-57.7-1988) and "Design of an Independent Spent Fuel Storage Installation (Water-Basin Type)" (Regulatory Guide 3.49).

[MGR RD 3.1.G, 3.3.A]

1.2.6.4 The system design shall comply with the applicable sections of "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992) and "Design of an Independent Spent Fuel Storage Installation (Dry Storage)" (Regulatory Guide 3.60).

[MGR RD 3.1.G, 3.3.A]

1.2.6.5 The system design shall comply with the applicable sections of "Standard Guide for Design of Equipment for Processing Nuclear and Radioactive Materials" (ASTM C 1217-92).

[MGR RD 3.3.A]

1.2.6.6 The system design shall comply with the applicable sections of "Specification for Radiation Shielding Materials" (ANSI/ANS-6.4.2-1985).

[MGR RD 3.3.A]

1.2.6.7 The system design shall comply with the applicable sections of the "1997 Uniform Building Code" (Volume 1, "Administrative, Fire- and Life-Safety, and Field Inspection Provisions").

[MGR RD 3.3.A]

1.2.6.8 The system design shall comply with the applicable sections of the "1997 Uniform Building Code" (Volume 2, "Structural Engineering Design Provisions").

[MGR RD 3.3.A]

1.2.6.9 The system design shall comply with the applicable sections of the "1997 Uniform Building Code" (Volume 3, "Material, Testing and Installation Standards").

[MGR RD 3.3.A]

1.2.6.10 The system design shall comply with the applicable sections of "Life Safety Code" (NFPA 101).

[MGR RD 3.3.A]

1.2.6.11 The system design shall comply with the applicable sections of "Addenda to Energy Conservation in New Building Design" (ANSI/ASHRAE/IES 90A-a-1987).

[MGR RD 3.3.A]

1.2.6.12 The system design shall comply with the applicable sections of "IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities" (IEEE Std 739-1995).

[MGR RD 3.3.A]

1.2.6.13 The system design shall comply with the applicable sections of "Minimum Design Loads for Buildings and Other Structures" (ANSI/ASCE 7-95).

[MGR RD 3.1.G, 3.3.A]

1.2.6.14 The system design shall comply with the applicable sections of "Physical Protection of Plants and Materials" (10 CFR 73).

[MGR RD 3.1.D]

1.2.6.15 The system shall comply with the applicable provisions of "Standards for Protection Against Radiation" (10 CFR 20).

[MGR RD 3.1.B]

1.2.6.16 The system design shall comply with the applicable sections of the "Uniform Plumbing Code."

[MGR RD 3.3.A]

1.2.6.17 The system design shall comply with the applicable sections of "National Electrical Code" (NFPA 70).

[MGR RD 3.3.A]

1.2.6.18 The system design shall comply with the applicable sections of "Electrical Safety Requirements for Employee Workplaces" (NFPA 70E).

[MGR RD 3.3.A]

1.2.6.19 The system design shall comply with the applicable sections of "National Electrical Safety Code" (IEEE C2-1997).

[MGR RD 3.3.A]

1.2.6.20 The system design shall comply with the applicable sections of "Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-97) and Commentary - ACI 349R-97."

[MGR RD 3.3.A]

1.2.6.21 The system design shall comply with the applicable sections of "Standard Specification for Structural Concrete" (ACI 301-1996).

[MGR RD 3.3.A]

1.2.6.22 The system design shall comply with the applicable sections of "Structural Welding Code - Steel" (ANSI/AWS D1.1:1998).

[MGR RD 3.3.A]

1.2.6.23 The system design shall comply with the applicable sections of "American National Standard for Nuclear Facilities – Steel Safety-Related Structures for Design Fabrication and Erection" (ANSI/AISC N690-1984).

[MGR RD 3.3.A]

1.2.6.24 The system design shall comply with the applicable sections of "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)" (ASME NOG-1-1995).

[MGR RD 3.3.A]

1.2.6.25 The system design shall comply with the applicable sections of "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (NUREG-0800).

[MGR RD 3.1.G, 3.3.A]

1.2.6.26 The system shall be designed in accordance with the applicable sections of "Department of Defense Design Criteria Standard, Human Engineering" (MIL-STD-1472E).

[MGR RD 3.3.A]

1.2.6.27 The system shall be designed in accordance with the applicable sections of "Human Factors Design Guidelines for Maintainability of Department of Energy Nuclear Facilities" (UCRL-15673).

[MGR RD 3.3.A]

1.2.6.28 The system shall be designed in accordance with the applicable sections of "Human-System Interface Design Review Guideline " (NUREG-0700).

[MGR RD 3.1.G, 3.3.A]

1.2.6.29 The system shall be designed in accordance with the applicable sections of "Safety Color Code" (ANSI Z535.1-1998), "Environmental and Facility Safety Signs" (ANSI Z535.2-1998), "Criteria for Safety Symbols" (ANSI Z535.3-1998), "Product Safety Signs and Labels" (ANSI Z535.4-1998), and "Accident Prevention Tags (for Temporary Hazards)" (ANSI Z535.5-1998).

[MGR RD 3.3.A]

1.2.6.30 The system shall be designed in accordance with the applicable sections of "Accessible and Usable Buildings and Facilities" (CABO/ANSI A117.1-1992) and "Americans With Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities" (36 CFR 1191, Appendix A).

[MGR RD 3.3.A]

1.2.6.31 The system shall be designed in accordance with the applicable sections of "American National Standard for Human Factors Engineering of Visual Display Terminal Workstations" (ANSI/HFS 100-1988), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 3: Visual Display Requirements" (ISO 9241-3), and "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 8: Requirements for Displayed Colours" (ISO 9241-8).

[MGR RD 3.3.A]

1.2.6.32 The system shall be designed in accordance with the applicable sections of "Guidelines for Designing User Interface Software" (ESD-TR-86-278), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 10: Dialogue Principles" (ISO 9241-10), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 14: Menu Dialogues" (ISO 9241-14), and "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 15: Command Dialogues" (ISO 9241-15).

[MGR RD 3.3.A]

1.2.6.33 The system shall comply with the applicable assumptions contained in the "Monitored Geologic Repository Project Description Document."

1.2.6.34 The system design shall comply with the applicable requirements of "Spent Fuel Storage Facility Design Basis" (Regulatory Guide 1.13).

[MGR RD 3.1.G]

1.2.6.35 The design of concrete shielding structures shall comply with the applicable sections of "Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants" (ANSI/ANS-6.4-1997).

[MGR RD 3.1.G, 3.3.A]

1.2.6.36 The SSCs shall be coated in accordance with applicable requirements in "Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants" (ASTM D5144-97).

[MGR RD 3.3.A]

1.2.6.37 The system design shall comply with the applicable requirements in "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA 801).

[MGR RD 3.3.A]

1.2.6.38 The system shall comply with the applicable sections of "Standard Review Plan for Spent Fuel Dry Storage Facilities" (NUREG-1567).

[MGR RD 3.1.G]

1.3 SUBSYSTEM DESIGN CRITERIA

There are no subsystem design criteria for this system.

1.4 CONFORMANCE VERIFICATION

This section will be provided in a future revision.

2. DESIGN DESCRIPTION

Section 2 of this SDD summarizes information contained in other references. By assembling system specific information contained elsewhere (i.e., analyses, technical reports, etc.), Section 2 provides insight into the current state of the design of this system. However, due to the nature of design development, the information contained in this section will continue to change as the design matures.

2.1 SYSTEM DESIGN SUMMARY

The system design summary provided below is based on Section 6.2.7 of "WHB/WTB Space Program Analysis for Site Recommendation."

The Waste Handling Building (WHB) is located on the surface within the protected area of the Monitored Geologic Repository (MGR) site. The WHB system provides space and layout to support waste handling operations, staging of waste packages (WPs), and storage of empty disposal containers (DCs).

The WHB system also helps maintain a suitable environment for personnel and equipment that support the waste handling operations; protects the systems within the WHB from natural and induced environments; confines contaminants; provides radiological protection to personnel; and provides space and layout for industrial and radiological safety systems, operations control and monitoring, safeguards and security systems, fire protection systems, ventilation systems, and utilities systems. The WHB also provides the required space and layout for maintenance, tool storage, and personnel administrative and support facilities.

The WHB system integrates waste handling systems within its protective structure to support the throughput rates established for waste emplacement. The system also provides shielding, layout, and other design features to help limit personnel radiation exposure to levels that are as low as reasonably achievable.

2.2 DESIGN ASSUMPTIONS

In addition to the design criteria defined in Section 1, the following assumptions were used to develop the design concept and features:

2.2.1 Shielding wall thickness is based on the radiological safety requirements (Attachment II of "WHB/WTB Space Program Analysis for Site Recommendation").

2.3 DETAILED DESIGN DESCRIPTION

The detailed design description provided here is based on Sections 6.2.1, 6.2.2, and 6.2.7 of the "WHB/WTB Space Program Analysis for Site Recommendation".

The WHB is located on the North Portal pad. The North Portal pad is located along the western margin of Midway Valley, at the eastern base of Exile Hill. It is an area of approximately 800 to 1,200 ft by 600 to 700 ft of man-made fill sloping roughly 2 degrees to the east, and is situated at approximately 3,670 to 3,683 ft elevation. Exploratory Studies Facility (ESF) tunnel muck piles along the eastern side of the North Portal pad rise to approximately 3,700 ft elevation. The eastern part of the WHB footprint is in the area of the present muck piles.

The preliminary building design is shown in Figures 1 and 2 (Figures I-4 and I-9 of "WHB/WTB Space Program Analysis for Site Recommendation"). The WHB is about 600 ft wide and 700 ft long, with finished floor elevation at 3,682 ft. While most of the WHB has no floor area below the finished floor elevation, the base of the mat for the pools and pool treatment equipment room is over 50 ft below finished floor elevation.

Pool Storage Building (PSB) modules will be constructed west of and adjacent to the WHB, near the Assembly Transfer System (ATS) line unloading pools, and will be connected via underwater transfer canals.

The outside plan dimensions of a PSB module is 280 ft long by 194 ft wide, with common water-cooling and purification equipment located between the pools. The internal dimensions of each pool are 36.5 ft wide by 160 ft long and 50 ft deep.

The PSB superstructure modules will be steel-framed buildings with insulated metal clad siding. The clear space of 38 ft above the pool deck is required for operations. A floor above the pool area will house the heating, ventilation, and air-conditioning (HVAC) equipment. The total height of the steel frame structure will be approximately 70 ft above the ground. The structure is considered safety-related and will require design to preclude collapse during a design basis event following Nuclear Regulatory Commission criteria for nuclear facilities.

The water pools will require thick concrete walls lined with stainless steel plates to ensure no loss of water. Wall thickness will be determined by lateral loads from earthquakes, hydrodynamic forces from sloshing water during earthquake ground motion, potential cask drops, and other possible accidents. The stainless steel liners will be the primary containment with leak detection systems. The concrete walls of the water pools will serve as secondary containment.

The primary factor for sizing of the structural system is expected to be the need for radiation shielding. Areas requiring radiation shielding will require 5-ft thick concrete walls up to a height of 30 ft above the operating floor. Above 30 ft, the wall thickness can be stepped down to approximately 3 ft up to the rooftop (see assumption 2.2.1).

The roof structures will act as both shielding and tornado-generated missile barriers. Because the radiation shielding requirements will decrease due to distance from the source on the floor, it is assumed that the roof structure will be a

concrete slab 8 to 10 inches thick supported by steel beams and the concrete walls. The 8- to 10-inch thick slab is based on shielding design for tornado missile protection in similar facilities containing nuclear material. The walls and roof structures will result in loads of more than 50,000 lbs per ft of wall over one half of the building.

Two transfer corridors with overhead cranes are required for moving equipment to the hot support area for repair work. One transfer crane operates above the wet- and dry-process DC load areas, and the other crane will operate over the WP remediation area. Since radiation shielding is not required for the corridors, the structural systems can consist of structural steel beams, columns, and bracing with insulated heavy metal clad siding.

The superstructure of the dry process cask preparation areas, wet process pool areas, cask preparation areas, equipment and tool rooms, and the carrier bay will be insulated heavy metal clad structural steel framing since there are no shielding requirements. However, heavy floor loads will be present in the carrier bay area from railcars and trucks. The roof areas of the tertiary confinement exhaust, tertiary confinement supply, tertiary confinement recirculating, primary and secondary confinement supply room, and primary and secondary confinement exhaust will be the supporting HVAC equipment. Since these areas have no radiation shielding requirements, the superstructure will be structural steel framing with metal siding and roofing. The column spacing would be in the range from 16 to 30 ft, resulting in steel columns supporting elevated equipment floors, overhead cranes, and roof structures.

The WHB structure will be supported on a 5 ft thick reinforced-concrete slab. Although the locations where the estimated loads would be applied have not been finalized, based on wall/roof loading of 50 kips per ft of 5 ft thick wall, and the load distribution attributed to the 5 ft thick slab on grade, it is estimated that the load transmitted from the slab to the soil will be on the order of 3 kips per sq ft, including 0.75 ksf for the mass of the 5 ft thick slab on grade.

The cold support facility consists of administrative offices and laboratories for the WHB operations. This is a commercial type facility without radiation shielding requirements. The first floor of this two-story steel-framed structure with sheet metal siding will be a slab on grade. Steel beams and columns will support the concrete slab of the second floor and the metal deck roof. The cold support structure will be separated from the WHB to avoid interaction between the two structures during an earthquake.

The carrier washdown and empty DC preparation buildings are industrial type facilities without radiation shielding requirements. They will be constructed of light steel framing with sheet metal siding. Rail and truck transporters will be bringing empty DCs into these buildings. The floor slab will be designed for the rail and truck wheel loads and the storage of empty DCs.

The WHB will be seismically isolated from the waste treatment building, located to the north, to avoid structural interaction during an earthquake. The design for natural phenomena hazards, such as earthquakes, tornadoes, and wind, will be completed in a future analysis.

2.3.1 Primary Areas

The following primary systems receive, lift, unload, handle, load, package, and deliver high-level waste forms to the subsurface repository:

Assembly Transfer System
Canister Transfer System
Carrier/Cask Handling System
Disposal Container Handling System
Waste Package Remediation System

2.3.1.1 Assembly Transfer System

The ATS is the area where the fuel assemblies are unloaded, repackaged, and transported to and from the pools. The ATS area consists of a cask unloading area, DCs loading area, fuel-unloading and blending pools area, and nonstandard fuel handling room.

2.3.1.2 Canister Transfer System

The Canister Transfer System (CTS) is the area in the WHB where disposable canisters are unloaded from transportation casks, staged, and loaded into DCs for sealing and subsequent emplacement. The CTS consists of the cask transfer corridor area, the airlock and cask preparation and decontamination area, canister transfer cells, off normal canister transfer tunnel and handling cell, and the canister transfer cell maintenance bay.

2.3.1.3 Carrier/Cask Handling System

The Carrier/Cask Handling System (CCHS) is the area where loaded casks are delivered for transfer to the ATS or the CTS, and empty casks are loaded for off-site shipment.

2.3.1.4 Disposal Container Handling System

The Disposal Container Handling System (DCHS) is located in the WHB and includes an unshielded empty DC preparation area and shielded hot cells for DC handling, welding, and transfer to the subsurface. Separate areas are provided for crane, welder, and manipulator maintenance bays. The areas operate concurrently to meet DCHS throughputs and to support DCHS maintenance.

2.3.1.5 Waste Package Remediation System

The Waste Package Remediation System is the area in the WHB where defective or abnormal DCs and WPs are repaired and processed.

2.3.2 Primary Support Areas

2.3.2.1 Operating Galleries

The primary waste handling areas discussed in Section 2.3.1 support different hot cells where remote operations are used exclusively. Operator viewing and station controlling are strategically located outside the various hot cells to meet functional and safety requirements. The operator stations are placed in operating galleries adjacent to each hot cell window or viewing port.

2.3.2.2 Equipment Transfer Corridors

The purpose of the equipment transfer corridors is to facilitate equipment movement in and out of the maintenance bays and adjacent hot cells. The functional space requirements mandated the design layout to integrate two equipment transfer corridors into the overall WHB in order to provide access to the primary area hot cells where maintenance bays are used for equipment repair, replacement, and recovery operations.

2.3.2.3 Contaminated Equipment Rooms

Two contaminated equipment rooms are required to interface with the equipment transfer corridors discussed in Section 2.3.2.2. The purpose of the two rooms is to stage contaminated equipment for repair, replacement, and, decontamination. New equipment is moved into the rooms prior to transfer into the hot cell maintenance bays using the equipment transfer corridors.

2.3.2.4 Low-Level Waste Collection and Packaging

Low-level wastes (LLW) collection and packaging consists of dry solid and liquid LLW. The dry solid LLW is collected and packaged in designated rooms and the liquid LLW is collected in collection sumps and staging tanks.

2.3.2.5 Maintenance Equipment Storage

The maintenance equipment storage is located adjacent to the contaminated equipment rooms. This room is required to support contaminated equipment removal, repair, and routine maintenance activities. The area contains space for storage, staging, handling of replacement parts and components, and equipment to be installed in the WHB.

2.3.2.6 Welder Material Storage

The welder material storage room is the local source for the consumable materials for DC inner and outer lid welds. Consumable materials are electrodes, weld wire, and miscellaneous weld material supplies.

2.3.2.7 Maintenance Shop

The maintenance shop provides for maintenance of equipment that is used in the radiological controlled area of the WHB facility.

2.3.2.8 Tool Storage

Adjacent to the carrier bay in the WHB is the tool room that provides storage for tools required for the operation and support of the CCHS, ATS, and CTS. The tool room contains space for storage of remote tools, hand tools, and special tools unique to the different carriers, casks, and canisters.

2.3.2.9 Forklift Staging and Servicing

Forklift staging and servicing areas are provided in the WHB for internal operations requiring the use of different forklift vehicles to handle the various loading dock shipments.

2.3.2.10 Disposal Container Handling Cell Welder Maintenance Bay

The DC handling cell and the maintenance bay are located directly adjacent to each other for efficient maintenance operations. To reduce welder maintenance bay radiation levels, the DC handling cell is shielded to provide radiation protection for the maintenance bay. Thick walls and shielded access doors facilitate weld and non-destructive examination equipment transfers to and from the DC handling cell.

2.3.2.11 Disposal Container Handling Cell Welder Maintenance Hot Shop

The DC handling cell welder maintenance hot shop will be used to perform contact maintenance on the welders and any associated contaminated equipment or components.

2.3.2.12 Waste Handling Operations Center

The waste handling and operations center monitors and controls the primary activities and systems throughout the WHB. The equipment in this room is able to observe key process areas throughout the facility. The monitoring equipment will also monitor or control automatic process systems including feed material and product data collection.

2.3.2.13 Pool Support Areas

Areas near the ATS, including pools and canals, are used for the opening of casks and for the removal and transfer of fuel assemblies to and from the pools and to the assembly drying area. Four large pools are utilized for blending of assemblies.

2.3.2.14 Facility Support Areas

The WHB contains functional areas within the facility required to support the primary systems operations. These areas are located east of the access corridor and include radiation protection, security, operations, administration, and maintenance.

2.3.2.15 Heating, Ventilation, and Air-conditioning Equipment Areas

The HVAC equipment room(s) house the majority of the HVAC equipment such as refrigeration machines, high-efficiency particulate air filter plenums, air handling units, fans, pumps, ductwork systems, and auxiliary equipment such as heat exchangers, electrical panels, instrument control panels, and distribution lines.

2.3.2.16 Miscellaneous Building Support Areas

The WHB contains miscellaneous systems and support areas required for safely managing, maintaining and operating various functional areas throughout the entire structure. These systems include, but are not limited to, fire protection, electrical power, egress circulation, and communication systems.

2.4 COMPONENT DESCRIPTION

This information will be provided in a future revision.

2.5 CRITERIA COMPLIANCE

The surface facility is developed conceptually at this time without criteria compliance analyses. The criteria compliance for this system will be addressed in future issues of this SDD as the design and analysis for the system matures.

CRWMS SURFACE NUCLEAR FACILITIES
GENERAL ARRANGEMENT FIGURES

FIGURE LIST

FIGURE	TITLE
I-1	TITLE SHEET
WASTE HANDLING/WASTE TREATMENT BUILDING	
I-2	FLOOR PLAN AT EL. 50+0
I-3	FLOOR PLAN AT EL. 80+0
I-4	FLOOR PLAN AT EL. 100+0
I-5	FLOOR PLAN AT EL. 130+0
I-6	FLOOR PLAN AT EL. 142+0
I-7	FLOOR PLAN AT EL. 173+0
I-8	ROOF PLAN
I-9	BUILDING SECTIONS

ROOM LEGEND

WASTE HANDLING BUILDING

PRIMARY AREAS

CARRIER/CASK HANDLING SYSTEM (CCHS)

H-100A CARRIER BAY

ASSEMBLY TRANSFER SYSTEM (ATS)

H-040 VACUUM PUMP ROOM
H-101 (A,B) CASK AIRLOCK
H-102 (A,A2,B,B2) CASK PREP AND DECONTAMINATION
H-103 (A,B) CASK UNLOAD POOL AREA
H-103 (A1,B1) POOL, STAGING & CASK UNLOAD
H-104 (A,B) INCLINE TRANSFER CANAL
H-105 (A,B) DC LOAD CELL
H-106 (A,B) DC DECONTAMINATION CELL
H-183 FUEL STORAGE POOL AREA
H-183 (A,B,C,D) FUEL BASKET STORAGE POOL
H-183E NON-STANDARD FUEL POOL
H-183 (F,G) FUEL BASKET TRANSFER CANAL
H-183H NON-STANDARD FUEL BASKET TRANSFER CANAL
H-183J NON-STANDARD FUEL HANDLING AREA
H-205 (A,B) ASSEMBLY HANDLING CELL (AHC)
H-206 (A,B) AHC CRANE MAINTENANCE BAY
H-301 (A,B) POOL AREA CRANE MAINT BAY

CANISTER TRANSFER SYSTEM (CTS)

H-100B CASK TRANSFER CORRIDOR
H-103C CANISTER TRANSFER (CT) CELL, LOWER LEVEL
H-103D CANISTER STAGING
H-104C OFF-NORMAL CANISTER TRANSFER TUNNEL
H-107A CASK AIRLOCK
H-108A CASK PREP & DECONTAMINATION
H-205C CANISTER TRANSFER CELL UPPER LEVEL
H-205C1 OFF-NORMAL CANISTER HANDLING CELL
H-209A CT CELL CRANE MAINTENANCE BAY

DISPOSAL CONTAINER HANDLING SYSTEM (DCHS)

H-110 DC HANDLING CELL
H-111 WP TRANSPORTER LOADING CELL
H-112 WP TRANSPORTER AIRLOCK
H-113 LOADED DC STAGING AREA
H-115 EMPTY DC PREPARATION AIRLOCK
H-117 EMPTY DC PREPARATION
H-208 (A,B,C,D,E,F,G,H) WELDER #1-8
H-301 DC HANDLING CELL CRANE MAINTENANCE BAY

WASTE PACKAGE REMEDIATION SYSTEM (WPRS)

H-114 WP REMEDIATION CELL

PRIMARY SUPPORT AREAS

H-116 CONTAMINATED EQUIPMENT ROOM
H-118 (A,B,C,E,F,G,H) OPERATING GALLERY
H-119 WASTE HANDLING OPERATION CNTR
H-120 CONTAMINATED EQUIPMENT & DECONTAMINATION
H-120A STAGING AREA (HOT SUPPORT)
H-122 MAINTENANCE EQUIP STORAGE
H-123 TOOL STORAGE
H-124 MAINTENANCE SHOP
H-125 LLW COLLECTION & PACKAGING
H-126 FORKLIFT STAGING & SERVICING
H-203 WELDER MAINTENANCE BAY
H-207 (A,B,C,D,F,G,H,I,J) OPERATING GALLERY
H-211 WELDER MATERIALS STORAGE
H-213 WELDER MAINTENANCE HOT SHOP
H-402 ASSEMBLY & CANISTER TRANSFER CORRIDOR
H-403 DC HANDLING & WP REMEDIATION EQUIPMENT TRANSFER CORRIDOR

POOL SUPPORT AREAS

H-020 POOL TREATMENT EQUIP ROOM
H-083 POOL TREATMENT EQUIP ROOM
H-084 (A,B) POOL TREATMENT EQUIP ROOM
H-085 CORRIDOR

FACILITY SUPPORT AREAS

MAINTENANCE

H-019 EQUIPMENT MAINTENANCE SHOP
H-019B INSTRUMENT MAINTENANCE SHOP
H-121 SHIPPING & RECEIVING
H-159 TOOL STORAGE
H-160 MAINTENANCE MATERIAL STORAGE
H-161 (A,B) HEPA FILTER STORAGE
H-162 JANITOR CLOSET
H-163 SHIPPING/RECEIVING
H-164 WASTE STAGING
H-165 GAS BOTTLE STORAGE

OPERATIONS

H-016A MEN'S CHANGE ROOM
H-016B WOMEN'S CHANGE ROOM
H-017 (A,B) COVERALL STORAGE
H-133 (A,B) HEALTH PHYSICS LABORATORY
H-134 (A,B,C,D) LABORATORY TECHNICIANS OFFICE
H-135 LABORATORY MATERIAL STORAGE
H-136 FIRST AID ROOM & OFFICE
H-137 OPERATIONS LUNCHROOM
H-138 JANITOR CLOSET

ADMINISTRATION

H-018 (A,B) SUPERVISOR OFFICE
H-018B SUPERVISOR OFFICE
H-139 ENTRY LOBBY
H-140 (A,B) SUPERVISOR OFFICE
H-141 PLNT OPERATIONS MANAGER OFFICE
H-142 (A,B) QA/CC OPERATIONS OFFICE
H-143 (A,B,C,D) OPERATIONS STAFF OFFICE
H-144 STAFF SUPPORT-OPEN OFFICE
H-145 (A,B) SECRETARIAL OFFICE
H-146 (A,B) DOE MANAGER OFFICE
H-147 (A,B,C,D) DOE STAFF OFFICES
H-148 (A,B) DOE STAFF SUPPORT-SECRETARIAL
H-149 DOE STAFF SUPPORT-CLERICAL
H-150 CONFERENCE ROOM
H-151 OPERATIONS CLERK OFFICE
H-151A DOCUMENT CONTROL
H-152 COPY ROOM
H-153 STORAGE ROOM
H-154A RESTROOM, WOMEN
H-154B RESTROOM, MEN
H-155 LUNCHROOM
H-156 JANITOR CLOSET

RADIATION PROTECTION

H-010 REGULATED CHANGE ROOM
H-011 RADIATION PROTECTION PORTAL
H-012 PERSONNEL DECON ROOM
H-013 PERSONNEL RADIATION PROTECTION EQUIPMENT STORAGE
H-014 HEALTH PHYSICS OFFICE
H-015 (A,B) PROTECTIVE CLOTHING STORAGE
H-129 CALIBRATION SHOP
H-302 REGULATED CHANGE ROOM
H-305 REGULATED CHANGE ROOM
H-405 REGULATED CHANGE ROOM

SECURITY

H-130 (A,B) SECURITY PORTAL
H-131 SECURITY ALARM STATION
H-132 (A,B) OFFICE

HVAC EQUIPMENT AREAS

H-157 COLD SUPPORT HVAC
H-171 TERTIARY CONFINEMENT EXHAUST
H-171A ELECTRICAL DISTRIBUTION HVAC
H-171 (B,C) STACK MONITOR ROOM
H-200 TERTIARY CONFINEMENT SUPPLY
H-201 TERTIARY CONFINEMENT EXHAUST/RECIRCULATING
H-204 HYDRONIC EQUIPMENT ROOM
H-300 PRIMARY/SECONDARY CONFINEMENT SUPPLY
H-308 (A,B) PRIMARY CONFINEMENT EMERGENCY SUPPLY
H-383A FUEL STORAGE POOL TERTIARY CONFINEMENT SUPPLY
H-383B FUEL STORAGE POOL TERTIARY CONFINEMENT EXHAUST
H-400 SECONDARY CONFINEMENT EXHAUST
H-400A PRIMARY CONFINEMENT EXHAUST
H-400 (B,C) EMERGENCY CONFINEMENT EXHAUST

MISCELLANEOUS BUILDING SUPPORT AREAS

AIRLOCK AND VESTIBULE

H-086 VESTIBULE
H-100C ACCESS CORRIDOR
H-100 (D,E,F) VESTIBULE
H-101 (D,E,F,G,H) AIRLOCK
H-116A ACCESS CORRIDOR
H-183K VESTIBULE
H-217 AIRLOCK
H-220 AIRLOCK
H-223 VESTIBULE
H-228 VESTIBULE
H-303 AIRLOCK
H-304 VESTIBULE
H-307 AIRLOCK
H-309 ACCESS CORRIDOR
H-310 VESTIBULE
H-312 VESTIBULE
H-313 VESTIBULE
H-317 VESTIBULE
H-404 AIRLOCK
H-406 AIRLOCK
H-407 AIRLOCK

COMMUNICATIONS

H-170 COMMUNICATION ROOM

CORRIDORS & HALLWAYS

H-050 CORRIDOR
H-051 CORRIDOR
H-052 CORRIDOR
H-053 CORRIDOR
H-054 CORRIDOR
H-120B CORRIDOR
H-127 ACCESS CORRIDOR
H-128 ACCESS CORRIDOR
H-181 ACCESS CORRIDOR
H-182 ACCESS CORRIDOR
H-218 ACCESS CORRIDOR
H-219 ACCESS CORRIDOR
H-221 ACCESS CORRIDOR
H-224 ACCESS CORRIDOR
H-225 ACCESS CORRIDOR
H-226 ACCESS CORRIDOR
H-227 ACCESS CORRIDOR
H-306 ACCESS CORRIDOR
H-314 ACCESS CORRIDOR
H-315 ACCESS CORRIDOR
H-316 ACCESS CORRIDOR
H-401 (A,B,C,D,E,F) ACCESS CORRIDOR

ELECTRICAL

H-168 ELECTRICAL POWER DISTRIBUTION
H-169 (A,B) EMERGENCY GENERATOR
H-172 (A,B) SAFETY ELECTRICAL EQUIPMENT

FIRE PROTECTION

H-167 (A,B,C,D,E,F,G) FIRE RISER
H-267 (C,D,E,F) FIRE RISER
H-367G FIRE RISER

PIPE CHASE

H-075 PIPE CHASE

WASTE TREATMENT BUILDING

PROCESS AREA

T-101 SOLID LLW PROCESSING
T-102 CHEMICAL LIQUID LLW PROCESSING
T-103 RECYCLABLE LIQUID LLW PROCESSING
T-104 MIXED & HAZARDOUS WASTE STAGING

FACILITY SUPPORT AREA

SECURITY

T-105 SECURITY PORTAL
T-106 SECURITY PORTAL
T-107 OFFICE

OPERATIONS

T-108 PARTS STORAGE
T-109 MEN'S CHANGE ROOM
T-110 WOMEN'S CHANGE ROOM
T-111 COVERALL STORAGE
T-112 LUNCHROOM
T-113 (A,B) JANITOR CLOSET
T-114 FORKLIFT STAGING
T-115 SHIPPING/RECEIVING
T-129 FORKLIFT CORRIDOR

ADMINISTRATION

T-116 NOT USED
T-117 SUPERVISOR OFFICE
T-118 SUPERVISOR OFFICE
T-119 PLANT MANAGER OFFICE
T-120 PLANT MANAGEMENT SUPERVISOR OFFICE
T-121 STAFF SUPPORT-OPEN OFFICE
T-122 HEALTH PHYSICS OFFICE
T-123 QA OFFICE
T-124 INVENTORY CONTROL OFFICE
T-125 COPY/STORAGE ROOM
T-126 INSTRUMENT CALIBRATION
T-130 VESTIBULE

HVAC EQUIPMENT AREAS

T-200 FACILITY SUPPORT AREA HVAC
T-201 PROCESS AREA HVAC SUPPLY
T-202 PROCESS AREA HVAC EXHAUST

BUILDING SUPPORT AREAS

FIRE PROTECTION

T-127 (A,B) FIRE RISER ROOM

ELECTRICAL

T-203 ELECTRICAL POWER DISTRIBUTION
T-204 ELECTRICAL SWITCHGEAR

COMMUNICATIONS

T-128 COMMUNICATION ROOM

FIGURE 1
WASTE HANDLING/WASTE TREATMENT BLDG
TITLE SHEET

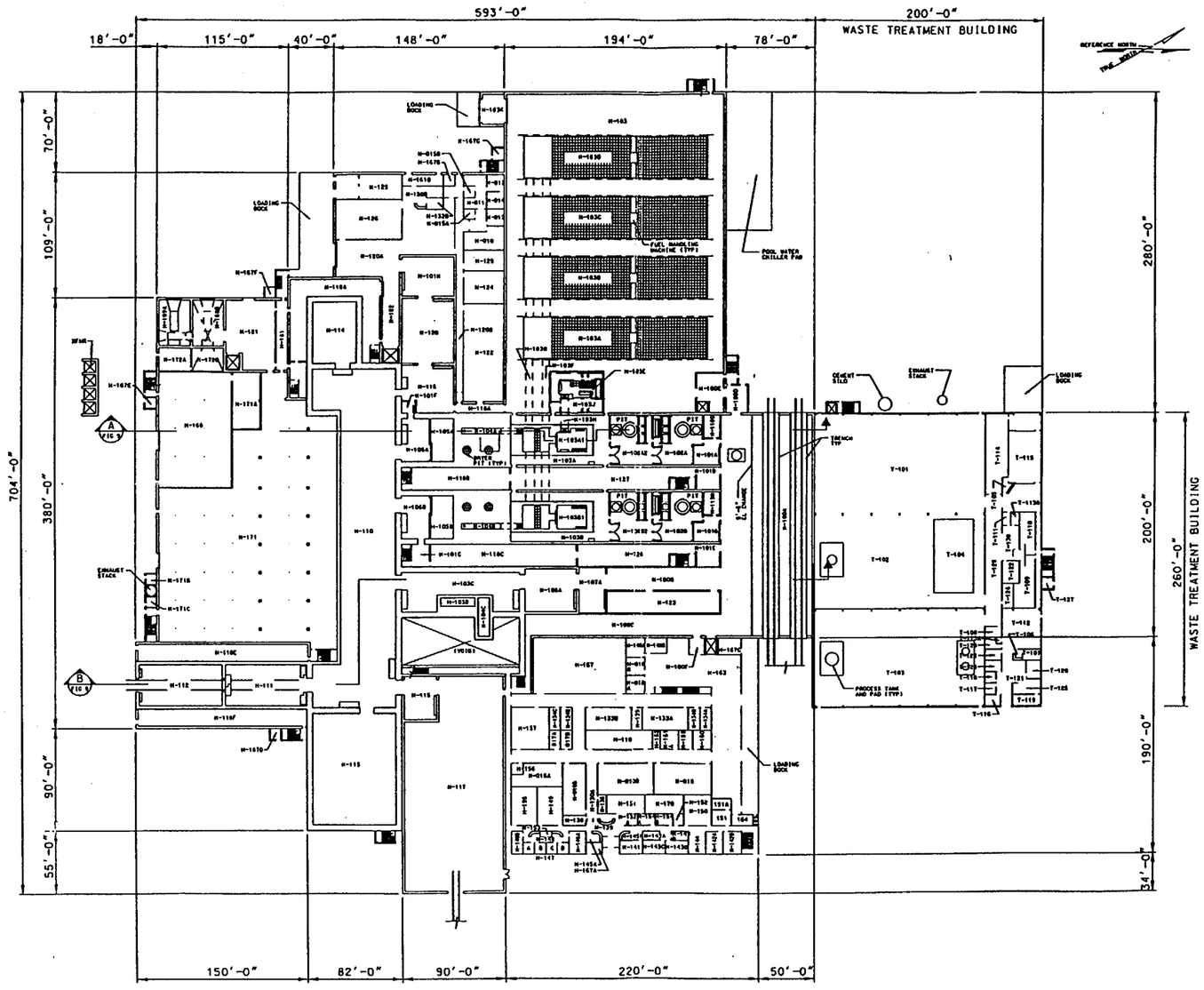

FIGURE 2
WASTE HANDLING/WASTE TREATMENT BLDG
FLOOR PLAN AT EL. 100+0

3. SYSTEM OPERATIONS

This section will be completed in a later revision.

4. SYSTEM MAINTENANCE

This section will be completed in a later revision.

APPENDIX A CRITERION BASIS STATEMENTS

This section presents the criterion basis statements for criteria in Section 1.2. Descriptions of the traces to "Monitored Geologic Repository Requirements Document" (MGR RD) and "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada" are shown as applicable. In anticipation of the interim guidance being promulgated as a Code of Federal Regulations, it will be referred to as "10 CFR 63" in this system description document.

1.2.1.1 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for designing a facility that can support and optimize the high-level radioactive waste (dry) handling operations for expected waste throughputs. This criterion is needed to support MGR RD 3.2.C which requires the MGR be capable of receiving, packaging, emplacing, and isolating nuclear waste; and MGR RD 3.2.E which requires system capability to include design capacity, equipment availability, and process efficiency (i.e., optimization).

II. Criterion Performance Parameter Basis

N/A

1.2.1.2 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for designing a facility that can support the high-level radioactive waste (wet) handling operations for expected waste throughputs. This criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste; and MGR RD 3.2.E which requires system capability to include design capacity, equipment availability, and process efficiency (i.e., optimization).

II. Criterion Performance Parameter Basis

N/A

1.2.1.3 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing space, layout, and structures in the WHB for laydown and storage of equipment in support of the waste handling operations. This criterion is needed to support MGR RD 3.2.C which requires the MGR be capable of receiving, packaging, emplacing, and isolating nuclear waste.

II. Criterion Performance Parameter Basis

N/A

1.2.1.4 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing space and layout in the WHB to support maintenance activities of the systems that support waste handling operations. This criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste.

This criterion supports MGR RD 3.1.G and Guidance Statement 6.8g2 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.1.5 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing space, layout, and structures in the WHB for preparation and staging canisters, empty disposal containers, and waste packages (loaded and welded disposal containers) in support of the throughput rates. This criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste at specified rates.

This criterion supports MGR RD 3.1.G.

II. Criterion Performance Parameter Basis

N/A

1.2.1.6 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing space, layout, and administrative support facilities in the WHB for personnel performing operations, maintenance, and other activities in support of the waste handling operations. This criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.8g2 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.1.7 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for facilitating collection and transfer of solid and liquid low-level waste generated in the WHB during waste handling operations. There shall be no mixing of contaminated waste with non-contaminated systems (e.g., sewer system, water systems, building drain system). This criterion directly supports MGR RD 3.3.E, which requires the MGR to be capable of managing site-generated waste, and indirectly supports MGR RD 3.2.C, which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g10, 6.6g13, 6.6g14, 6.6g15, and 6.13g17 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.1.8 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing space, layout, and structures in the WHB for installation of systems that support waste handling operations. This criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste.

II. Criterion Performance Parameter Basis

N/A

1.2.1.9 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the requirement for providing utilities (e.g., chilled water, hot water, potable water, industrial and instrument air) as required for personnel and equipment that support waste handling operations and maintenance activities. This

criterion is needed to support MGR RD 3.2.C which requires the MGR to be capable of receiving, packaging, emplacing, and isolating nuclear waste.

II. Criterion Performance Parameter Basis

N/A

1.2.1.10 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system to incorporate features that facilitate decontamination and decommissioning. This criterion is based on 10 CFR 63.21(c)(17) which requires the content of the license application to include a safety analysis report with "A description of design considerations that are intended to facilitate permanent closure and decontamination or dismantlement of surface facilities."

This criterion which also supports MGR RD 3.3.A is based on the requirement in "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992), Section 6.14, which requires incorporating features to facilitate decommissioning. According to this standard, "Provisions shall be made to facilitate decontamination of structures and equipment, minimize the quantity of radioactive wastes and contaminated equipment, and facilitate the removal of radioactive wastes and contaminated materials" when the facility is permanently decommissioned.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g9 and 6.6g10 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.1.11 Criterion Basis Statement

I. Criterion Need Basis

This criterion establishes the operational life of the system. This criterion is required because this system supports the waste handling operations at the repository as required by MGR RD 3.2.C. Additional system operating life that may be needed to support performance confirmation or retrieval operations conducted after cessation of waste emplacement operations is not covered by this criterion. To meet the operational life requirement, system components may require replacement in addition to any required preventive maintenance program.

II. Criterion Performance Parameter Basis

Performance requirement 3.2.C of the MGR RD requires the MGR be capable of receiving, packaging, emplacing, and isolating nuclear waste at the annual rates specified in Table 3-2 of the MGR RD. Table 3-2 of MGR RD indicates that waste receipt will commence in the year 2010 and is expected to be completed by the year 2041, spanning a total of 32 years. To account for future potential schedule fluctuations caused by uncertainties in waste remediation, early receipt, and plant life extensions, a 25 percent margin is added, resulting in an operational life of 40 years.

1.2.2.1.1 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system to withstand a design basis earthquake. This criterion is based on 10 CFR 63.112(e)(8), which requires the performance analysis of SSCs that are important to safety to include consideration of the "Ability of structures, systems, and components to perform their intended safety functions, assuming the occurrence of design basis events."

This requirement is also intended to help meet the overall geologic operations area performance objectives in 10 CFR 63.111(a)(2) and 10 CFR 63.111(b)(2), which state, respectively: "During normal operations, and for Category 1 design basis events, the annual dose to any real member of the public, located beyond the boundary of the preclosure controlled area shall not exceed a total effective dose equivalent (TEDE) of 0.25 mSv (25 mrem)," and, "The geologic repository operations area shall be designed so that taking into consideration Category 2 design basis events and until permanent closure has been completed, no individual located on, or beyond, any point on the boundary of the preclosure controlled area, will receive the more limiting of a TEDE of 0.05 Sv (5 rem), or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The lens dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem)."

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g4 and 6.14g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

The frequency category of the earthquake applicable to this system is based on engineering judgment at this time and is therefore TBV.

1.2.2.1.2 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry standards.

This criterion is based on the requirement in "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992), Section 5.9.4, which requires providing suitable barriers to impede the spread of fires to systems and equipment that are important to confinement.

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.3 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system SSCs important to safety not to be affected by the failure of other SSCs during a design basis event. This criterion is based on 10 CFR 63.112(e)(8) which requires the performance analysis of the SSCs that are important to safety to include consideration of the "Ability of structures, systems, and components to perform their intended safety functions, assuming the occurrence of design basis events."

This requirement is also intended to help meet the overall geologic operations area performance objectives in 10 CFR 63.111(a)(2) and 10 CFR 63.111(b)(2), which state, respectively: "During normal operations, and for Category 1 design basis events, the annual dose to any real member of the public, located beyond the boundary of the preclosure controlled area shall not exceed a TEDE of 0.25 mSv (25 mrem)," and "The geologic repository operations area shall be designed so that taking into consideration Category 2 design basis events and until permanent closure has been completed, no individual located on, or beyond, any point on the boundary of the preclosure controlled area, will receive the more limiting of a TEDE of 0.05 Sv (5 rem), or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The lens dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem)."

This criterion supports the requirement of MGR RD 3.1.G and Guidance Statement 6.6g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.4 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system to help maintain control of radioactive waste and radioactive effluents. This criterion is based on 10 CFR 63.112(e)(10), which requires the performance analysis of SSCs that are important to safety to include consideration of "Means to control radioactive waste and radioactive effluents..."

MGR RD 3.1.G requires compliance with applicable codes, standards, and regulations.

This criterion is also based on the requirement in "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992), Section 6.6.1.2, which requires design of sumps and drains to prevent unmonitored or uncontrolled release of radioactive liquid waste.

This criterion supports the requirements of Guidance Statements 6.6g6, 6.6g13, 6.6g15, and 6.13g17 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.5 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the WHB to incorporate design features that limit the impact of waste handling operations on contamination control. This criterion is based on 10 CFR 63.112(e)(1) and (e)(4) which require the performance analysis of SSCs that are important to safety to include consideration of "Means to limit concentration of radioactive material in air," and "Means to monitor and control the dispersal of radioactive contamination."

MGR RD 3.1.G requires compliance with applicable codes, standards, and regulations.

This criterion is also based on the requirement in "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992), Section 6.13.6, which requires zoning radiation and contamination areas according to anticipated levels of radiation or contamination in each area. Access to these areas will be controlled and ventilation pressure zones created (through interface with the WHB Ventilation System) to prevent the spread of contamination.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g6 and 6.6g12 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.6 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. MGR RD 3.1.B and 10 CFR 63.111(a)(1) require compliance with "Standards for Protection Against Radiation" (10 CFR 20). Section 1101(b) of 10 CFR 20 states: "The licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to the members of the public that are as low as is reasonably achievable (ALARA)."

The requirement for compliance with the ALARA principles is also based on 10 CFR 63.112(e)(2) and (e)(3), which require the performance analysis of SSCs that are important to safety to include consideration of the "Means to limit the time required to perform work in the vicinity of radioactive materials," and "Suitable shielding."

MGR RD 3.1.G requires compliance with applicable codes, standards, and regulations. Compliance with "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be as Low as is Reasonably Achievable" (Regulatory Guide 8.8) is invoked because this regulatory guide is one of the primary regulatory documents that addresses ALARA and is acceptable to the Nuclear Regulatory Commission. This regulatory guide provides guidelines on achieving occupational ALARA goals during the planning, design, and operations phases of a nuclear facility. According to Section B of this guide, "Effective design of facilities and selection of equipment for systems that contain, collect, store, process, or transport radioactive material in any form will contribute to the effort to maintain radiation doses to station personnel ALARA." Section C.2 addresses facility and equipment design features. The design process of each system must include an evaluation of the applicable requirements in Section C.2 of Regulatory Guide 8.8.

In addition to compliance with the applicable guidelines in Regulatory Guide 8.8, the design of the system must meet the project ALARA program goals. The project ALARA program will include both qualitative and quantitative goals. Regarding the ALARA program of a licensee, Section C.1.a.(2) of Regulatory Guide 8.8 states: "The policy and commitment should be reflected in written administrative procedures and instructions for operations involving potential exposures of personnel to radiation and should be reflected in station design features. Instructions to designers, constructors, vendors, and station personnel specifying or reviewing station features, systems, or equipment should reflect the goals and objectives to maintain occupational radiation exposures ALARA."

This criterion supports the requirements of Guidance Statements 6.6g7, 6.6g12, 6.10g1, and 6.11g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

The project ALARA program goals are TBD.

1.2.2.1.7 Criterion Basis Statement

I. Criterion Need Basis

This criterion invokes the requirement for designing the WHB to withstand a design basis flood in accordance with "Flood Protection for Nuclear Power Plants" (Regulatory Guide 1.102).

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.3g1, 6.3g2, 6.3g3, 6.5g1, 6.6g3, 6.13g6, 6.13g7, 6.13g9, and 6.14g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.8 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the QL-1 SSCs to perform during and after design basis events, as required. This criterion is based on 10 CFR 63.112(e)(8) which requires the performance analysis of SSCs that are important to safety to include consideration of the "Ability of structures, systems, and components to perform their intended safety functions, assuming the occurrence of design basis events."

This requirement is also intended to help meet the overall geologic operations area performance objectives in 10 CFR 63.111(a)(2) and 10 CFR 63.111(b)(2) which state, respectively: "During normal operations, and for Category 1 design basis events, the annual dose to any real member of the public, located beyond the boundary of the preclosure controlled area shall not exceed a TEDE of 0.25 mSv (25 mrem)," and "The geologic repository operations area shall be designed so that taking into consideration Category 2 design basis events and until permanent closure has been completed, no individual located on, or beyond, any point on the boundary of the preclosure controlled area, will receive the more limiting of a TEDE of 0.05 Sv (5 rem), or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The lens dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem)."

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g8, 6.13g1, 6.13g9, 6.13g10, 6.13g12, and 6.14g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.9 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

This criterion establishes the requirement for reducing the accumulation of fixed radioactive contamination and decontamination of building components and surfaces. This is a personnel radiological safety requirement based on "Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)" (ANSI/ANS-57.7-1988, Section 6.8.2.1), which requires minimizing personnel exposure through proper selection of materials that can be readily decontaminated, use of coatings and finishes, and minimizing crevices where radioactive materials may accumulate.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.6g14 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.10 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion is based on the requirement in 10 CFR 63.112(e)(5) which requires the performance analysis of SSCs that are important to safety to include consideration of the means to control access to high radiation areas or airborne radioactivity areas.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g7 and 6.6g17 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System.

II. Criterion Performance Parameter Basis

N/A

1.2.2.1.11 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system to have the capability to perform its important to safety functions during and after design basis events, as required. This criterion is based on 10 CFR 63.112(e)(8) which requires the performance analysis of SSCs that are important to safety to include consideration of the "Ability of structures, systems, and components to perform their intended safety functions, assuming the occurrence of design basis events." The specific Design Basis Event is the Tornado winds.

This requirement is also intended to help meet the overall geologic operations area performance objectives in 10 CFR 63.111(a)(2) and 10 CFR 63.111(b)(2), which state, respectively: "During normal operations, and for Category 1 design basis events, the annual dose to any real member of the public, located beyond the boundary of the preclosure controlled area shall not exceed a TEDE of 0.25 mSv (25 mrem)," and "The geologic repository operations area shall be designed so that taking into consideration Category 2 design basis events and until permanent closure has been completed, no individual located on, or beyond, any point on the boundary of the preclosure controlled area, will receive the more limiting of a TEDE of 0.05 Sv (5 rem), or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The lens dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem)."

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.13g5 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

The maximum Tornado wind speed, pressure drop, and pressure drop rate were obtained from "MGR Design Basis Extreme Wind/Tornado Analysis," Section 7.

1.2.2.1.12 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for the system to have the capability to perform its important to safety functions during and after design basis events, as required. This criterion is based on 10 CFR 63.112(e)(8) which requires the performance analysis of SSCs that are important to safety to include consideration of the "Ability of structures, systems, and components to perform their intended safety functions, assuming the occurrence of design basis events." The specific Design Basis Event is the Tornado-generated missiles.

This requirement is also intended to help meet the overall geologic operations area performance objectives in 10 CFR 63.111(a)(2) and 10 CFR 63.111(b)(2), which state, respectively: "During normal operations, and for Category 1 design basis events, the annual dose to any real member of the public, located beyond the boundary of the preclosure controlled area shall not exceed a TEDE of 0.25 mSv (25 mrem)," and "The geologic repository operations area shall be designed so that taking into consideration Category 2 design basis events and until permanent closure has been completed, no individual located on, or beyond, any point on the boundary of the preclosure controlled area, will receive the more limiting of a TEDE of 0.05 Sv (5 rem), or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The lens dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem)."

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.6g2, 6.13g9, 6.13g10, and 6.14g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.2.2.1 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

This criterion establishes a personnel safety requirement based on "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992, Section 6.1.1.1.3), which states: "The floor space upon which highway vehicles are loaded and unloaded should be flat and level. Any surface between railroad tracks, except for flange grooves, should be at the same level as the rails and surrounding floor."

II. Criterion Performance Parameter Basis

N/A

1.2.2.2.2 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion is based on the requirement in 10 CFR 63.112(e)(10) which requires the performance analysis of SSCs that are important to safety to include consideration of the means to permit prompt termination of operations and evacuation of personnel during an emergency.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.6g17 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.3.1 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

This criterion establishes the requirement for equipment environmental compatibility. This criterion is based on the requirement in "Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)" (ANSI/ANS-57.7-1988, Section 6.9.2), which states: "System components shall be designed and qualified to operate within environmental limits established for their location within the installation including but not limited to temperature, humidity, and radiation levels for the applicable performance requirements."

II. Criterion Performance Parameter Basis

The radiation environment is TBD.

1.2.3.2 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

This criterion establishes the wind environment for the non-QL-1 portions of the system. Proper consideration of wind is required to ensure that buildings and structures can withstand the wind forces and are adequately protected. This requirement is supported by "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992, Section 6.6.1.1), which requires consideration of all loads and load combinations in the design of structures whose failure can damage the fuel or equipment that is important to confinement.

According to Section 6.5 of the standard for "Minimum Design Loads for Buildings and Other Structures" (ANSI/ASCE 7-95), the basic wind speed is to be used in the determination of the design wind loads for all buildings and structures. A similar discussion is provided in Sections 1615, 1616, and 1618 of the "1997 Uniform Building Code" (Volume 2, "Structural Engineering Design Provisions").

This criterion also supports the requirements of MGR RD 3.1.G and Guidance Statements 6.13g2 and 6.13g4 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

The wind speed is obtained from "MGR Design Basis Extreme Wind/Tornado Analysis," Section 7.

1.2.3.3 Criterion Basis Statement

I. Criterion Need Basis

Temperature is considered to be one of the primary environmental parameters that can affect component performance or result in advanced degradation. To ensure proper performance, many manufacturers specify the temperature environment in which the component must operate. This criterion establishes the outdoor temperature environment in which SSCs are expected to operate.

II. Criterion Performance Parameter Basis

The extreme outside temperature range of 5 degrees F to 117 degrees F is based on the annual extreme minimum and maximum temperatures for the nine meteorological monitoring sites located in the Yucca Mountain area. Locations of the nine sites are shown in Figure 2-1 of the "Engineering Design Climatology and Regional Meteorological Conditions Report." Extreme temperatures (and other data) are in Tables A-1 through A-9 of the report.

The collected temperature data in Tables A-1 through A-9 are based on 11 years of monitoring at Sites 1-5 and four years of monitoring at Sites 6-9. Site 1 data are typically more representative of the nine sites because Site 1 is closest to the repository. However, due to the limited number of years that data was collected, the lowest and highest recorded temperatures for all nine sites are used to bound the extreme temperature range. Site 5 has the lowest recorded temperature of -13.1 degrees C, and Site 9 has the highest of 45.1 degrees C. This temperature range was conservatively expanded to -15 degrees C (5 degrees F) to 47 degrees C (117 degrees F).

1.2.3.4 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

Snowfall is one of the design parameters needed for exposed structures to ensure external loadings are considered. This requirement is supported by "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992, Section 6.6.1.1) which requires consideration of all loads and load combinations in the design of

structures whose failure can damage the fuel or equipment that is important to confinement.

This criterion supports the requirement of MGR RD 3.1.G and Guidance Statement 6.6g5 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

The "Engineering Design Climatology and Regional Meteorological Conditions Report" includes snowfall information for sites in the general area of the Yucca Mountain that are deemed adequate for bounding the snowfall environment for the Yucca Mountain site. The closest of these sites is Desert Rock Airport, south of Mercury. Snowfall data are also included for Tonopah. Although Desert Rock is closer to Yucca Mountain, the elevation of Tonopah is more representative of the elevation at the Yucca Mountain site (5,426 ft for Tonopah based on Table 1 of Chapter 24 of "Fundamentals," and 4,850 ft for Yucca Mountain based on Table 2-1 of the climatology report). Therefore, data for Tonopah is considered to be the conservative bound for Yucca Mountain.

Table A-14 of the "Engineering Design Climatology and Regional Meteorological Conditions Report" provides daily maximum and monthly maximum snowfall data. The maximum daily snowfall for Tonopah is 10 in. (rounded up from 9.7 in.). The monthly snowfall is used to establish and bound the maximum snowfall accumulation. This is based on the conservative nature of the maximum monthly snowfall and the consideration that all of the monthly snowfall occurs in a short period of time with no reduction for melting. The maximum monthly snowfall for Tonopah is 17 inches (Table A-14).

1.2.3.5 Criterion Basis Statement

I. Criterion Need Basis

Humidity is a primary environmental parameter that can affect component performance and anticipated life expectancy. This criterion establishes the external humidity environment at the site.

II. Criterion Performance Parameter Basis

The humidity values are taken from the "Engineering Design Climatology and Regional Meteorological Conditions Report," Table A-1, Site 1 (NTS-60). Using Site 1 data is appropriate because the site is the closest and most representative of the North Portal, South Portal, and ventilation shafts. The annual mean humidity for Site 1 is 28 percent, which is the average of the yearly averages for each of the time periods (hour 0400, 1000, 1600, 2200) (from Table A-1). The minimum summer mean humidity for Site 1 is 13 percent, which occurred in the month of June at hour 1600 (from Table A-1). The maximum winter mean humidity for Site 1 is 46 percent (rounded up from 45.9), which occurred in the month of December at hour 0400 (from Table A-1).

1.2.3.6 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards.

Precipitation is an environmental parameter that can affect site drainage and erosion, buried utilities, outdoor equipment seals, and roof drain system sizing. This criterion establishes the rainfall rates through which the WHB must be able to endure and function.

II. Criterion Performance Parameter Basis

The maximum annual precipitation is derived from the "Engineering Design Climatology and Regional Meteorological Conditions Report," p. 4-10 and Figure 4-3. The report identifies maximum annual precipitation that ranges from 1 to 10 in. for the period of 1949 to 1995. The bounding maximum annual precipitation of 10 in. is taken from the Amargosa Farms site. The Amargosa Farms site is deemed appropriate in the report based on its proximity to Yucca Mountain (p. 2-5, second paragraph).

The maximum daily precipitation is derived from the "Engineering Design Climatology and Regional Meteorological Conditions Report," p. 4-21, last paragraph. The reference paragraph states: "The conclusion from the statistical analyses of observed and estimated precipitation data performed for this report indicate that the maximum daily precipitation within 50 km of Yucca Mountain is not expected to exceed five inches."

This criterion also supports the requirements of MGR RD 3.1.G and Guidance Statement 6.6g5 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

1.2.3.7 Criterion Basis Statement

I. Criterion Need Basis

This criterion supports conformance with MGR RD 3.3.A which requires compliance with applicable industry codes and standards. The "1997 Uniform Building Code" (Volume 2, "Structural Engineering Design Provisions") requires footings and foundations to extend below the frost line. Frost line is one of the external environmental parameters that can affect the foundation and footing design for structures that must be embedded in the ground. The supporting surface for footings, foundations, and other buried items must lie below the frost line to prevent damage to structures from the effects of heaving caused by freezing and thawing of the soil.

II. Criterion Performance Parameter Basis

Section 1806 of the "1997 Uniform Building Code" (Volume 2, "Structural Engineering Design Provisions") requires footings and foundations to extend below the frost line, but

provides no values for frost line depth. However, Table 18-I-C of the above code requires a minimum depth of 12 in. for footings and foundations. Section 1804.1.3 and Figure 1804.1 of the "Standard Building Code" provide a 10 in. depth for average annual frost penetration at the Yucca Mountain Site, and a 12 in. depth for the average annual frost penetration for the state of Nevada. In addition, Section 1804.1.3 of the "Standard Building Code" requires a minimum depth of 12 in. for foundations below finish grade. Therefore, a 15 in. frost line depth below the undisturbed ground surface is specified, which bounds the values identified in the various sources. This value is consistent with Section 7.5.6 of "Preliminary Geotechnical Investigation For Waste Handling Building, Yucca Mountain Site Characterization Project," which recommends a depth of 15 in. for frost penetration for the WHB site.

1.2.4.1 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space, layout, and structures to support receipt, loading, and unloading of the casks. Therefore, interface with the Carrier/Cask Transport System is required for size, weight, and operating envelopes of casks and carriers.

II. Criterion Performance Parameter Basis

N/A

1.2.4.2 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space, layout, and structures to support waste emplacement in the repository. Therefore, interface with the Waste Emplacement System is required for size, weight, and operating envelopes of disposal containers and transporters.

II. Criterion Performance Parameter Basis

N/A

1.2.4.3 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space to support communication requirements for the WHB. Therefore, interface with the Site Communication System is required for equipment installation requirements and routing of communication lines.

II. Criterion Performance Parameter Basis

N/A

1.2.4.4 Criterion Basis Statement

I. Criterion Need Basis

WHB utilities; fire protection; heating, ventilation, and air-conditioning; pool; and other systems within the WHB have water supply requirements. Therefore, interface with the Site Water System is required for space, layout, and structures to support piping distribution and water storage requirements.

II. Criterion Performance Parameter Basis

N/A

1.2.4.5 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space and layout to support emergency response requirements for the WHB. Therefore, interface with the Emergency Response System is required for space and layout and equipment installation requirements and routing of cables.

II. Criterion Performance Parameter Basis

N/A

1.2.4.6 Criterion Basis Statement

I. Criterion Need Basis

The system interfaces with other structures at the MGR site to support waste receipt and emplacement. Therefore, interface with the MGR Site Layout system is required for location of the WHB and integration requirements with other MGR facilities.

II. Criterion Performance Parameter Basis

N/A

1.2.4.7 Criterion Basis Statement

I. Criterion Need Basis

Operations within the WHB require radiological control and maintaining a safe work environment for the personnel in the WHB. Therefore, interface with the Health Safety System is required for space, layout, and structures to support equipment installation and routing of conduits.

II. Criterion Performance Parameter Basis

N/A

1.2.4.8 Criterion Basis Statement

I. Criterion Need Basis

Operations, monitoring, and control of the systems located within the WHB and many systems located outside of the WHB will be performed in the WHB. Therefore, interface with the Monitored Geologic Repository Operations Monitoring and Control System is required for space, layout, and structures to support equipment installation requirements and routing of conduits.

II. Criterion Performance Parameter Basis

N/A

1.2.4.9 Criterion Basis Statement

I. Criterion Need Basis

Special security and access requirements will be imposed on personnel entering and exiting the WHB. Therefore, interface with the Safeguards and Security System is required for space, layout, and structures to support equipment installation and cable routing requirements, and control of access, installation of physical barriers, and other security system requirements.

II. Criterion Performance Parameter Basis

N/A

1.2.4.10 Criterion Basis Statement

I. Criterion Need Basis

Low-level waste will be generated as a result of waste handling operations in the WHB. Therefore, interface with the Site Generated Radiological Waste Handling System is required for storage and transfer requirements of the site-generated waste.

II. Criterion Performance Parameter Basis

N/A

1.2.4.11 Criterion Basis Statement

I. Criterion Need Basis

Hazardous, non-hazardous, and sanitary waste will be generated as a result of waste handling operations in the WHB. Therefore, interface with the Site Generated Hazardous, Nonhazardous, and Sanitary Waste Disposal System is required for storage, treatment, and transfer requirements of these types of wastes.

II. Criterion Performance Parameter Basis

N/A

1.2.4.12 Criterion Basis Statement

I. Criterion Need Basis

Waste handling operations in the WHB require handling of the spent nuclear fuel assemblies. Therefore, interface with the Pool Water Treatment and Cooling System is required for space, layout, shielding, and structural requirements for the pool, equipment installation, and pipe routing.

II. Criterion Performance Parameter Basis

N/A

1.2.4.13 Criterion Basis Statement

I. Criterion Need Basis

Receipt, handling, and disposal of spent nuclear fuel canisters will be performed in the WHB. The system provides the required space, layout, and structures to support canister-handling operations. Therefore, interface with the Canister Transfer System is required for size, weight, and operating envelopes of canisters, cranes, and other components associated with the Canister Transfer System.

II. Criterion Performance Parameter Basis

N/A

1.2.4.14 Criterion Basis Statement

I. Criterion Need Basis

Receipt, handling, and disposal of spent nuclear fuel assemblies will be performed in the WHB. The system provides the required space, layout, and structures to support assembly-handling operations, including the pool for wet handling and storage of assemblies in the pool. Therefore, interface with the Assembly Transfer System is

required for size, weight, and operating envelopes of the fuel assemblies, cranes, and other components associated with the Assembly Transfer System.

II. Criterion Performance Parameter Basis

N/A

1.2.4.15 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space, layout, and structures to handle the disposal containers. Therefore, interface with the Disposal Container Handling System is required for size, weight, and operating envelopes of disposal containers, cranes, and other equipment associated with the Disposal Container Handling System.

II. Criterion Performance Parameter Basis

N/A

1.2.4.16 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space, layout, and structures to support waste package remediation. Therefore, interface with the Waste Package Remediation System is required for size, weight, and operating envelopes of waste packages.

II. Criterion Performance Parameter Basis

N/A

1.2.4.17 Criterion Basis Statement

I. Criterion Need Basis

The system houses the Waste Handling Building Ventilation System which is designed to maintain a safe and comfortable environment for personnel, and a suitable environment to support waste handling operations. Therefore, the system interfaces with the Waste Handling Building Ventilation System for building zone locations and pressures, temperature and humidity requirements, chilled water piping distribution requirements, and the required space, layout, and structures for heating, ventilation, and air conditioning equipment and ductwork installation.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.14g4 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.4.18 Criterion Basis Statement

I. Criterion Need Basis

The system houses the radiation monitoring equipment in support of the waste handling operations. The system interfaces with the Waste Handling Building Radiological Monitoring System for space, layout, and structures for radiation monitoring equipment and cable routing requirements.

II. Criterion Performance Parameter Basis

N/A

1.2.4.19 Criterion Basis Statement

I. Criterion Need Basis

Systems located within the WHB require electric power to perform and support the waste handling operations. Therefore, interface with the Waste Handling Building Electrical System is required for equipment installation, cable routing, and power distribution requirements.

II. Criterion Performance Parameter Basis

N/A

1.2.4.20 Criterion Basis Statement

I. Criterion Need Basis

The Waste Handling Building Fire Protection System will be housed within the WHB. The system interfaces with the Waste Handling Building Fire Protection System for space, layout, and structures to support equipment installation and piping distribution requirements, wall and door fire rating requirements, fire exit installation, and drainage requirements following system discharge.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.14g4 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.4.21 Criterion Basis Statement

I. Criterion Need Basis

The system provides the required space, layout, and structures to support arrival and departure of the carriers and unloading, loading, and handling of the shipping casks. Therefore, interface with the Carrier/Cask Handling System is required for size, weight, and operating envelopes of carriers and casks.

II. Criterion Performance Parameter Basis

N/A

1.2.5.1 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires system design to address availability for systems that have the potential to affect throughput.

II. Criterion Performance Parameter Basis

The value for the system availability is from Table 7.2-1 of "Bounded Minimum Inherent Availability Requirements for the System Description Documents." This value is from an uncontrolled source and is therefore TBV.

1.2.5.2 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.C requires compliance with 10 CFR 63. This criterion establishes the requirement for designing the SSCs important to safety to provide the "Means to inspect, test, and maintain structures, systems, and components important to safety, as necessary, to ensure their continued functioning and readiness" based on the requirement in 10 CFR 63.112(e)(13).

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.6g14 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.1 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.E requires compliance with applicable sections of "Occupational Safety and Health Standards" (29 CFR 1910).

II. Criterion Performance Parameter Basis

N/A

1.2.6.2 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.F requires compliance with applicable sections of "Safety and Health Regulations for Construction" (29 CFR 1926).

II. Criterion Performance Parameter Basis

N/A

1.2.6.3 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)" (ANSI/ANS-57.7-1988) as applicable to the design of the system. "Design of an Independent Spent Fuel Storage Installation (Water-Basin Type)" (Regulatory Guide 3.49) provides stipulations and exceptions endorsed by the U.S. Nuclear Regulatory Commission (NRC) for use of ANSI/ANS 57.7-1988.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.8g1 and 7.2g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.4 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (ANSI/ANS-57.9-1992) as applicable to the design of the system. "Design

of an Independent Spent Fuel Storage Installation (Dry Storage)" (Regulatory Guide 3.60) provides stipulations and exceptions endorsed by the NRC for use of ANSI/ANS 57.9-1992.

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statements 6.9g1 and 7.3g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.5 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Standard Guide for Design of Equipment for Processing Nuclear and Radioactive Materials" (ASTM C 1217-92) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.6 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Specification for Radiation Shielding Materials" (ANSI/ANS-6.4.2-1985) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.7 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies the "1997 Uniform Building Code" (Volume 1, "Administrative, Fire- and Life-Safety, and Field Inspection Provisions") as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.8 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies the "1997 Uniform Building Code" (Volume 2, "Structural Engineering Design Provisions") as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.9 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies the "1997 Uniform Building Code" (Volume 3, "Material, Testing and Installation Standards") as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.10 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Life Safety Code" (NFPA 101) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.11 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Addenda to Energy Conservation in New Building Design" (ANSI/ASHRAE/IES 90A-a-1987) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.12 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities" (IEEE Std 739-1995) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.13 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Minimum Design Loads for Buildings and Other Structures" (ANSI/ASCE 7-95) as applicable to the design of the system.

This criterion supports the requirement of MGR RD 3.1.G and Guidance Statement 7.4g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.14 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.D requires compliance with applicable sections of "Physical Protection of Plants and Materials" (10 CFR 73).

II. Criterion Performance Parameter Basis

N/A

1.2.6.15 Criterion Basis Statement

I. Criterion Need Basis

This criterion is based on MGR RD 3.1.B which requires compliance with "Standards for Protection Against Radiation" (10 CFR 20).

II. Criterion Performance Parameter Basis

N/A

1.2.6.16 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies the "Uniform Plumbing Code" as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.17 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "National Electrical Code" (NFPA 70) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.18 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Electrical Safety Requirements for Employee Workplaces" (NFPA 70E) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.19 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "National Electrical Safety Code" (IEEE C2-1997) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.20 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-97) and Commentary - ACI 349R-97" as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.21 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Standard Specification for Structural Concrete" (ACI 301-1996) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.22 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Structural Welding Code - Steel" (ANSI/AWS D1.1:1998) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.23 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "American National Standard for Nuclear Facilities - Steel Safety-Related Structures for Design Fabrication and Erection" (ANSI/AISC N690-1984) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.24 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder) (ASME NOG-1-1995) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.25 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.1.G requires compliance with applicable codes, standards, and regulations. This criterion identifies "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (NUREG-0800) as applicable to the design of the system.

II. Criterion Performance Parameter Basis

N/A

1.2.6.26 Criterion Basis Statement

I. Criterion Need Basis

Design, selection, arrangement, configuration, and integration of SSCs involve many elements, including monitoring, operating, maintaining, and observing the facilities and systems. To accomplish an effective and safe work environment, the human-system interface must incorporate human factors engineering (HFE) criteria. Use of "Department of Defense Design Criteria Standard, Human Engineering" (MIL-STD-1472E), in conjunction with the other HFE standards and guidelines cited in this system description document, will provide a human-system interface that maximizes performance and minimizes risk to personnel.

In support of MGR RD 3.3.A, this criterion ensures that the system will be designed to be safely and effectively used by all expected users. The U.S. Department of Energy (DOE) Good Practices Guide "Human Factors Engineering" (GPG-FM-027, paragraph 2.3.1), endorses the use of MIL-STD-1472E (GPG-FM-027 references an earlier version of MIL-STD-1472).

II. Criterion Performance Parameter Basis

N/A

1.2.6.27 Criterion Basis Statement

I. Criterion Need Basis

Maintainability of system equipment involves many factors, including the human-machine interface. This interface must address the design for maintainability through the incorporation of HFE criteria. In support of MGR RD 3.3.A, this criterion ensures that the system will be designed to be safely and effectively maintained through compliance with applicable industry standards. The DOE Good Practices Guide "Human Factors Engineering" (GPG-FM-027, paragraph 2.3.1) endorses the use of "Human Factors Design Guidelines for Maintainability of Department of Energy Nuclear Facilities" (UCRL-15673) for addressing HFE maintainability design criteria.

II. Criterion Performance Parameter Basis

N/A

1.2.6.28 Criterion Basis Statement

I. Criterion Need Basis

Design, selection, arrangement, configuration, and integration of control rooms, operating galleries, and related SSCs (e.g., controls, displays, labels, workspaces, human-computer interfaces) involves many factors, including the human-machine interface. Through compliance with "Human-System Interface Design Review Guideline" (NUREG-0700), in conjunction with other HFE standards and guidelines, this criterion ensures that control rooms, operating galleries, and related SSCs will be designed in a safe and effective manner.

This criterion supports MGR RD 3.3.A. The DOE Good Practices Guide "Human Factors Engineering" (GPG-FM-027, paragraph 2.3.1) supports the use of NUREG-0700. Sections 6.1 through 6.9 provide specific HFE design guidelines for control room elements.

This criterion supports the requirement of MGR RD 3.1.G and Guidance Statement 6.12g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.29 Criterion Basis Statement

I. Criterion Need Basis

Information being communicated by safety signs and tags must be quickly and easily read and uniformly understood. The ANSI Z535 series standards (i.e., "Safety Color Code" (ANSI Z535.1-1998), "Environmental and Facility Safety Signs" (ANSI Z535.2-1998), "Criteria for Safety Symbols" (ANSI Z535.3-1998), "Product Safety Signs and Labels" (ANSI Z535.4-1998), and "Accident Prevention Tags (for Temporary Hazards)" (ANSI Z535.5-1998)) are recognized in the nuclear industry for the design and use of safety signs and tags. In support of MGR RD 3.3.A, this criterion ensures that, when used in conjunction with other HFE standards and guidelines, the design of safety signs and tags will help provide a safer working environment.

II. Criterion Performance Parameter Basis

N/A

1.2.6.30 Criterion Basis Statement

I. Criterion Need Basis

In support of MGR RD 3.3.A, the "Americans With Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities" (36 CFR 1191, Appendix A) provides specific HFE design guidelines for providing personnel with physical disabilities access to and use of system resources. In addition, "Accessible and Usable Buildings and Facilities" (CABO/ANSI A117.1-1992) establishes configurations and design criteria for allowing accessibility to and usability of system components by persons with physical disabilities. When used in conjunction with other HFE standards and guidelines, these codes and standards will ensure a safe and efficient design.

This criterion is not applicable to facility workspaces and activities where physical disabilities endanger the individual or other personnel, preclude execution of tasks, or cannot be economically accommodated.

II. Criterion Performance Parameter Basis

N/A

1.2.6.31 Criterion Basis Statement

I. Criterion Need Basis

Design, selection, and integration of computer display terminals and workstations, equipment, and workspaces involve many factors, including the human-computer interface. "American National Standard for Human Factors Engineering of Visual Display Terminal Workstations" (ANSI/HFS 100-1988), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 3: Visual Display

Requirements" (ISO 9241-3), and "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 8: Requirements for Displayed Colours" (ISO 9241-8) support MGR RD 3.3.A by ensuring that HFE criteria will be incorporated into the selection and design of computer equipment and workspaces through compliance with applicable industry standards. The DOE Good Practices Guide "Human Factors Engineering" (GPG-FM-027, paragraph 2.3.1), endorses use of the ISO 9241 standard. When used in conjunction with other HFE standards and guidelines, these codes and standards will ensure a safe and efficient design.

II. Criterion Performance Parameter Basis

N/A

1.2.6.32 Criterion Basis Statement

I. Criterion Need Basis

Design, selection, and integration of software supporting the user interface in computer systems must consider the characteristics of the user population. In support of MGR RD 3.3.A, the application of "Guidelines for Designing User Interface Software" (ESD-TR-86-278), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 10: Dialogue Principles" (ISO 9241-10), "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 14: Menu Dialogues" (ISO 9241-14), and "Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 15: Command Dialogues" (ISO 9241-15), ensures that HFE criteria will be incorporated into the selection, design, and integration of user interface software.

The DOE Good Practices Guide "Human Factors Engineering" (GPG-FM-027, paragraph 2.3.1), endorses the use of the ISO 9241 standard. When used in conjunction with other HFE standards and guidelines, these codes and standards will ensure a safe and efficient design.

II. Criterion Performance Parameter Basis

N/A

1.2.6.33 Criterion Basis Statement

I. Criterion Need Basis

The "Monitored Geologic Repository Project Description Document" allocates controlled project assumptions to systems. This criterion identifies the need to comply with the applicable assumptions identified in the subject document. The approved assumptions will provide a consistent basis for continuing the system design.

II. Criterion Performance Parameter Basis

N/A

1.2.6.34 Criterion Basis Statement

I. Criterion Need Basis

Compliance with "Spent Fuel Storage Facility Design Basis" (Regulatory Guide 1.13) supports the requirements of MGR RD 3.1.G and Guidance Statement 6.13g5 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.35 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. Compliance with "Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants" (ANSI/ANS-6.4-1997) supports the requirement of MGR RD 3.1.G and Guidance Statement 7.1g1 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System."

II. Criterion Performance Parameter Basis

N/A

1.2.6.36 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants" (ASTM D5144-97) as applicable to the design of the system. This standard addresses special coating requirements for nuclear facilities, such as coatings that facilitate decontamination and coatings that are resistant to radiation.

II. Criterion Performance Parameter Basis

N/A

1.2.6.37 Criterion Basis Statement

I. Criterion Need Basis

MGR RD 3.3.A requires compliance with applicable industry codes and standards. This criterion identifies "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA 801) as applicable to the design of the system. This code invokes

special fire protection system and building arrangement requirements for facilities that handle radioactive materials.

II. Criterion Performance Parameter Basis

N/A

1.2.6.38 Criterion Basis Statement

I. Criterion Need Basis

This criterion supports the requirements of MGR RD 3.1.G and Guidance Statement 6.14g3 from the "MGR Compliance Program Guidance Package for the Waste Handling Building System" which invokes structural design requirements of "Standard Review Plan for Spent Fuel Dry Storage Facilities" (NUREG-1567).

II. Criterion Performance Parameter Basis

N/A

APPENDIX B ARCHITECTURE AND CLASSIFICATION

The System architecture and QA classification are identified in Table 2. The QA classifications are established in "Classification of the MGR Waste Handling Building System."

Table 2. System Architecture and QA Classification

Waste Handling Building System Architecture	QL-1	QL-2	QL-3	CQ
Facility Decontamination		X		
Piped Utility Systems				X
Process Supply Systems				X
Safeguards and Security System				X
Solid Waste Collection				X
Waste Handling Building Structure	X			

APPENDIX C ACRONYMS, SYMBOLS, AND UNITS

C.1 ACRONYMS

This section provides a listing of acronyms used in this SDD.

ALARA	as low as is reasonably achievable
ATS	Assembly Transfer System
CCHS	Carrier/Cask Handling System
CQ	conventional quality
CTS	Canister Transfer System
DC	Disposal Container
DCHS	Disposal Container Handling System
DOE	U.S. Department of Energy
F	Function
HFE	human factors engineering
MGR	Monitored Geologic Repository
MGR RD	Monitored Geologic Repository Requirements Document
NRC	Nuclear Regulatory Commission
PSB	Pool Storage Building
QA	quality assurance
QL	quality level
SSCs	systems, structures, and components
TBD	to be determined
TBV	to be verified
TEDE	total effective dose equivalent
WHB	Waste Handling Building
WP	Waste Package
WTB	Waste Treatment Building

C.2 SYMBOLS AND UNITS

This section provides a listing of symbols and units used in this SDD.

%	percent
C	Celsius
F	Fahrenheit
ft	feet
in.	inches
kips	kilo pounds
km	kilometers
ksf	kilo pounds per square foot
m	meters
mSv	millisievert
sq	square
Sv	sievert
mrem	millirem

APPENDIX D FUTURE REVISION RECOMMENDATIONS AND ISSUES

This appendix identifies issues and actions that require further evaluation. The disposition of these issues and actions could alter the functions and design criteria that are allocated to this system in future revisions to this document. However, the issues and actions identified in this appendix do not require TBDs or TBVs beyond those already identified.

Issue 1 - Resolve outstanding TBDs and TBVs.

Issue 2 - Develop more detailed criteria to address radiological protection/ALARA. The "detailed" criteria should address space allocation and layout criteria. The layout/general arrangement criteria should address locations relative to dose rates and considerations for contamination areas. The space allocation criteria should address the need for Radiological Materials Areas, Health Physics support, and decontamination areas.

Issue 3 - The term "confinement zones" mentioned in criteria 1.2.2.1.7 needs to be defined to prevent confusion in the future.

Issue 4 - This SDD will include the UBC seismic zone to be used for the non QL-1 SSCs when this information is available (requires decision by DOE/M&O).

Issue 5 - The codes and standards referenced in Section 1.2.6 of this SDD should be more detailed regarding their applicability to QL-1 versus non QL-1 SSCs.

APPENDIX E REFERENCES

This section provides a listing of references used in this SDD. References list the Accession number or Technical Information Catalog number at the end of the reference, where applicable.

"1997 Uniform Building Code." Volume 1, "Administrative, Fire- and Life-Safety, and Field Inspection Provisions." International Conference of Building Officials. April 1997. Whittier, California: International Conference of Building Officials. TIC: 233817.

"1997 Uniform Building Code." Volume 2, "Structural Engineering Design Provisions." International Conference of Building Officials. April 1997. Whittier, California: International Conference of Building Officials. TIC: 233818.

"1997 Uniform Building Code." Volume 3, "Material, Testing and Installation Standards." International Conference of Building Officials. April 1997. Whittier, California: International Conference of Building Officials. TIC: 233816.

"Accessible and Usable Buildings and Facilities." Council of American Building Officials. CABO/ANSI A117.1-1992. December 15, 1992. Falls Church, Virginia: American National Standards Institute, Council of American Building Officials. TIC: 208806.

"Accident Prevention Tags (for Temporary Hazards)." National Electrical Manufacturers Association. ANSI Z535.5-1998. 1998. Rosslyn, Virginia: National Electrical Manufacturers Association. TIC: 242949.

"Addenda to Energy Conservation in New Building Design." American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ANSI/ASHRAE/IES 90A-a-1987. 1988. Atlanta, Georgia: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. TIC: 240275.

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