DOE/RW-0420

Office of Civilian Radioactive Waste Management

Monitored Retrievable Storage System Requirements Document

Revision 1

(C00000000-00811-1708-00002)

March 1994

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

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DOE/RW-0420

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U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, DC 20585

Office of Civilian Radioactive Waste Management

WBS: 9.2.1
QA: QA
Page: 1 Of: 5

BCCB CHANGE DISPOSITION SUMMARY RECORD

1. BCP NUMBER	REV.	3. ORIGINATOR'S NAME	5. CHANGE LEVEL	6. PRIORITY LEVEL	7. DISPOSITION DATE
BCP-00-94-0001	00	D. Shelor / R. Milner	☐ 0 ☑ 1 ☐ 2 ☐ 3	☐ ROUTINE ☐ FIELD ☑ PRIORITY ☐ EMERGENCY ☐ URGENT	
2. DATE REC'D		4. ORIGINATOR'S ORGANIZATION			8. BCP TYPE
02/02/94		RW-30 / RW-40			☑ TECHNICAL ☐ MANAGEMENT ☐ DEVIATION ☐ ADMINISTRATIVE

9. BCP DESCRIPTION/TITLE

Revision 01 of the CRWMS Requirements Document (CRD) and System Requirements Documents (SRDs).

10. DISPOSITION RECOMMENDATION: ☐ ESAAB ☑ PROGRAM ☐ PO YMP ☐ PO MRS PROJECT ☐ FIELD ☐ CONTRACTOR _____

BOARD MEMBER SIGNATURE	RECOMMENDATIONS (See Block 10 Instructions)
L. Barrett, RW-2	
D. Horton, RW-3	
J. Saltzman, RW-4	
J. Saltzman, RW-5	
S. Rousso, RW-10	
R. Nelson, RW-20 SEE ATTACHMENT	
D. Shelor, RW-30	
R. Milner, RW-40	
S. Rousso, RW-50	

DIRECTIVE

11. CHANGE DISPOSITION: * SEE BLOCK 13
☑ APPROVE ☐ DEFER*
☒ APPROVE WITH CONDITIONS*
☐ DISAPPROVE* ☐ CANCEL*

12. BCCB CHAIRMAN SIGNOFF:
PRINT _____
SIGN _____ DATE 2/10/94

13. CHAIRMAN'S JUSTIFICATION/CONDITIONS/LIMITATIONS

The MPC concept will be implemented as the primary alternative but will not preclude other operational concepts.

The BCP will be effective when the Decision Memorandum for the incorporation of the Multi-Purpose Canister (MPC) is approved.

☐ See Continuation Page ____

14. BCCB DIRECTIVE/IMPLEMENTING INSTRUCTIONS FOR DOCUMENT(s)

SEE ATTACHMENT

☐ See Continuation Page ____

15. BCCB DIRECTIVE/IMPLEMENTING INSTRUCTIONS FOR AFFECTED CONFIGURATION ITEM(s)

N/A

☐ See Continuation Page ____

Office of Civilian Radioactive Waste Management

WBS: 9.2.1
QA: QA
Page: 1a of 5

BCCB CHANGE DISPOSITION SUMMARY RECORD

1. BCP NUMBER / REV.	3. ORIGINATOR'S NAME	5. CHANGE LEVEL	6. PRIORITY LEVEL	7. DISPOSITION DATE
BCP (X)-94-0001 / 00	D. Shelor / R. Milner	[ ] 0 [X] 1 [ ] 2 [ ] 3	[ ] ROUTINE [X] PRIORITY [ ] URGENT [ ] FIELD [ ] EMERGENCY	
2. DATE REC'D	**4. ORIGINATOR'S ORGANIZATION**			**8. BCP TYPE**
02/02/94	RW-30 / RW-40			[X] TECHNICAL [ ] MANAGEMENT [ ] DEVIATION [ ] ADMINISTRATIVE

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S. Rousso, RW-10	
R. Nelson, RW-20	Robert M Nelson Jr
D. Shelor, RW-30	
R. Milner, RW-40	
S. Rousso, RW-50	

DIRECTIVE

11. CHANGE DISPOSITION:
[ ] APPROVE [ ] DEFER* * SEE BLOCK 13
[X] APPROVE WITH CONDITIONS*
[ ] DISAPPROVE* [ ] CANCEL*

12. BCCB CHAIRMAN SIGNOFF:
PRINT
SIGN DATE

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SEE ATTACHMENT

[ ] See Continuation Page

15. BCCB DIRECTIVE/IMPLEMENTING INSTRUCTIONS FOR AFFECTED CONFIGURATION ITEM(s)

N/A

[ ] See Continuation Page

Directive (continued)
BCP-00-94-0001, Rev. 00

14. The following documents shall be transmitted by the PBCCB Executive Secretary in accordance with applicable approved procedures for controlled distribution in a timely manner:

    (1) A00000000-00811-1708-00003, Rev. 1, DOE/RW-0406P, Civilian Radioactive Waste Management System Requirements Document (CRD);

    (2) E00000000-00811-1708-00001, Rev. 1, DOE/RW-0351P, Waste Acceptance System Requirements Document (WA-SRD);

    (3) D00000000-00811-1708-00002, Rev. 1, DOE/RW-0425, Transportation System Requirements Document (Trans-SRD);

    (4) C00000000-00811-1708-00002, Rev. 1, DOE/RW-0420, Monitored Retrievable Storage System Requirements Document (MRS-SRD); and

    (5) B00000000-00811-1708-00002, Rev. 1, DOE/RW-0404P, Mined Geologic Disposal System Requirements Document (MGDSRD).

Documents contained in the following actions are affected by incorporation of the MPC system into the CRD and the SRDs (1 through 5 above). The scheduling of subsequent changes to the following documents shall be implemented either by including change(s) into the next planned document revision (per document), or changing the document(s) through the Document Change Notice (DCN) process. These changes shall be coordinated with current FY94 budget availability and document revision schedules. The decision as to which process is used (Revision vice DCN) will depend on extent of change and timing as it pertains to effective change implementation. It shall be left to the discretion of the PBCCB Executive Secretary in coordination with document authors and cognizant AD/ODs as to which change process to employ.

All actions shall be assigned an action item identifier and shall be forwarded to each AD/OD for implementation. A formal transmittal of action item assignments will be transmitted by the PBCCB Secretary within 10 working days of approval of BCP-00-94-0001.

Action Items shall be tracked through closure by the PBCCB Secretariat Administrator.

Directive (continued)
BCP-00-94-0001, Rev. 00

(A) RW-30 is responsible for the following actions:

(1) Review the Program Management System Manual, DOE/RW-0043, Rev. 5 Program Structure to determine necessary changes appropriate for the MPC. Incorporate identified changes into the next planned revision (Rev. 6) of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s);

(2) Review DOE/RW-0051P, Rev. 2, OCRWM Systems Engineering Management Plan. The section titled "The Application of Systems Engineering to CRWMS Development" shall be revised to reflect development of the MPC - related systems. Also review the balance of the document for other changes resulting from the approval of BCP-00-94-0001. Incorporate necessary changes into the next planned revision (Rev. 3) of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s); and

(3) Update the CRWMS Interface Specification, A00000000-00811-6300-00001, to incorporate descriptions of interfaces that will change because of incorporation of the MPC system into the CRWMS technical baseline. Incorporate changes into the next planned revision of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s).

(4) Prepare record packages for this BCP and collect all documentation that supports the MPC decision including the Decision Memoranda and all significant conceptual studies and analyses to provide to RW-20.

DIRECTIVE (continued)
BCP-00-94-0001. Rev. 00

(B) RW-20 is responsible for the following actions:

(1) Review DOE/ RW-0223, Rev. 3, Program Cost and Schedule Baseline, for changes to scope with respect to establishment of the MPC - based technical baseline and its impact to the YMSC MSA. Provide necessary changes to RW-10 for incorporation into the next planned revision (Rev. 4) of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s). RW-20 shall contact the PBCCB Executive Secretary when this action is completed.

(2) RW-20 shall re-evaluate its cost and schedule milestones at the Project level and incorporate changes as necessary resulting from changes to the Program Cost and Schedule Baseline and approval of BCP-00-94-0001.

(3) Review DOE/RW-0313P, Yucca Mountain Site Characterization Project Plan, for necessary changes to site characterization resulting from approval of this BCP. Incorporate changes into the next planned revision of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s).

(4) Ensure compliance with 10CFR60.21c and submit supporting record package for inclusion in the YMPO local records center to support future LA activities.

(C) RW-40 is responsible for the following actions:

(1) Review DOE/ RW-0223, Rev. 3, Program Cost and Schedule Baseline, for changes to scope with respect to establishment of the MPC - based technical baseline and its impact to the MRS MSA. Provide necessary changes to RW-10 for incorporation into the next planned revision of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s).

DIRECTIVE (continued)
BCP-00-94-0001. Rev. 00

(2) Review C00000000-00811-4600-00004, MRS Project Plan dated 10/02/92. Change the cost, schedule and scope baselines for Key Decision (KD) # 1 to reflect the MPC system. The MRS mission described in KD # 0 may need to be re-defined. Incorporate required changes into the next planned revision of the document. If changes are not extensive, a DCN shall be distributed to effect the change(s).

(3) RW-40 shall re-evaluate its cost and schedule milestones at the Project level and incorporate changes as necessary resulting from changes to the Program Cost and Schedule Baseline and approval of BCP-00-94-0001.

(D) RW-10 is responsible for the following action(s):

(1) Modify DOE/RW-0325P, Program WBS Dictionary to incorporate the MPC system.

(2) Coordinate with RW-20 to complete actions prescribed in section (B) (1) and (B) (2) above.

(3) Coordinate with RW-40 to complete actions prescribed in section (C)(1), (C) (2), and (C)(3) above.

Project Level MPC System Incorporation Actions

(E) RW-40 shall perform the following actions:

RW-40 shall review baseline documentation and ensure that documents reflect changes resulting from BCP-00-94-0001 approval. RW-40 shall ensure that Project level technical baseline documentation reflects changes in the Program level CRD and SRDs.

(F) The Yucca Mountain Site Characterization Project Office shall perform the following actions:

The YMP Project Office shall review baseline documentation and ensure that documents reflect changes resulting from BCP-00-94-0001 approval. The YMP Project Office shall ensure that Project level technical baseline documentation reflects changes in the Program level CRD and SRDs.

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
PROGRAM CHANGE CONTROL BOARD
REVISION/CHANGE RECORD

(1) **DOCUMENT NUMBER:** DOE/RW-0420/C00000000-00811-1708-00002
(2) **DOCUMENT TITLE:** Monitored Retrievable Storage System Requirements Document

(3) REVISION DATE/ NUMBER	(4) BCP NUMBER	(5) REVISION/CHANGE DESCRIPTION	(6) PAGES AFFECTED
Rev. 1 March 1994	BCP-00-94-0001	Incorporate the Multi-Purpose Canister (MPC) concept into the CRWMS technical baseline.	All

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1. SCOPE

1.1 IDENTIFICATION

This Monitored Retrievable Storage System Requirements Document (MRS-SRD) describes the functions to be performed and technical requirements for a Monitored Retrievable Storage (MRS) facility subelement and the On-Site Transfer and Storage (OSTS)[1] subelement. The MRS facility subelement provides for temporary storage, at a Civilian Radioactive Waste Management System (CRWMS) operated site, of spent nuclear fuel (SNF) contained in an NRC-approved Multi-Purpose Canister (MPC) storage mode, or other NRC-approved storage modes. The OSTS subelement provides for transfer and storage, at Purchaser sites, of spent nuclear fuel (SNF) contained in MPCs. Both the MRS facility subelement and the OSTS subelement are in support of the CRWMS.

In this document the MRS facility subelement will be synonymous with the MRS facility, and the OSTS subelement will be referred to as the OSTS. Both the MRS facility and OSTS are part of the MRS system element and are discussed in more detail as part of the system architecture in Section 3.1.

The development and control of the MRS-SRD is subject to the Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM) *Quality Assurance Requirements and Description* (QARD) (DOE/RW-0333P). As part of the technical requirements baseline, it is also subject to Baseline Management Plan controls. The MRS-SRD has been revised in accordance with the *CRWMS M&O Technical Document Preparation Plan (TDPP) for the Revision of System Requirements Documents.*

1.2 PURPOSE OF CRWMS REQUIREMENTS DOCUMENTS

1.2.1 CRWMS Requirements Hierarchy

The OCRWM Program Management System Manual (PMSM) (DOE/RW-0043) and OCRWM Systems Engineering Management Plan (SEMP) (DOE/RW-0051) establish the technical document hierarchy (hierarchy of technical requirements and configuration baseline documents) for the CRWMS program. Figure 1-1 illustrates the program-level system requirements documents from the hierarchy. This set of documents establishes requirements to be addressed in the design of the system elements, including the MRS system element.

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[1] The design and certification of the OSTS are presumed to be the responsibility of the CRWMS. The procurement and operation of the OSTS are presumed to be at the discretion of the Purchaser.

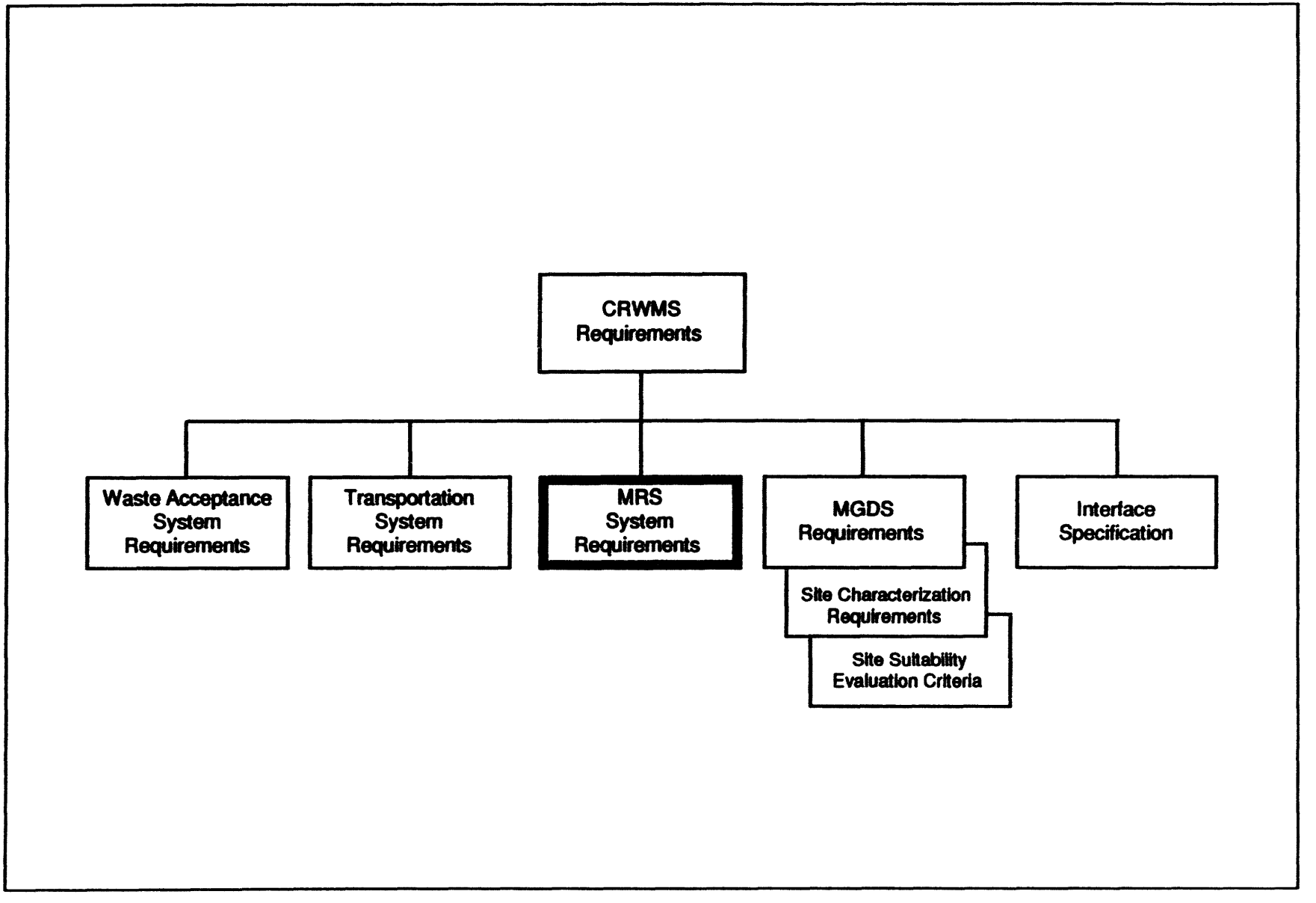

Figure 1-1. Program-Level System Requirements Documents

Many of the technical requirements for the CRWMS are documented in a variety of federal regulations, DOE directives and orders, and other Government documents. The *CRWMS Requirements Document* (CRD) (Reference 2.4.2.A) establishes the top-level technical requirements for the entire program by summarizing the source documentation which must be addressed and by deriving requirements not covered in the regulations, but necessary to accomplish the CRWMS mission. The CRD also defines the CRWMS by identifying top-level functions for each element, defining top-level system architecture of the CRWMS, and by allocating the functions and requirements to the architectural elements of the system, including the MRS system element. In doing so, the CRD establishes the basis for the requirements to be addressed and expanded in the MRS-SRD and requirements documents for the other elements.

1.2.2 Purpose of MRS-SRD

The purpose of the MRS-SRD is to define the top-level requirements for the development of the MRS facility and the OSTS consistent with the CRD. These requirements include design, operation, and decommissioning requirements to the extent they impact on the physical development of the MRS facility and the OSTS. The document also presents an overall description of the MRS facility and the OSTS, their functions (derived by extending the functional analysis documented by the Physical System Requirements (PSR) Store Waste Document), their segments, and the requirements allocated to the segments. In addition, the top-level interface requirements of the MRS facility and the OSTS are included. As such, the MRS-SRD provides the technical baseline for the MRS Safety Analysis Report (SAR) design and the OSTS Safety Analysis Report design.

The SAR design and all subsequent designs must be consistent with the requirements of the MRS-SRD. While the MRS facility and OSTS may evolve and change through the design process, changes must occur in a controlled manner that ensures the CRWMS remains integrated. In doing this, the CRD and MRS-SRD will be revised to capture the changes.

1.3 CRWMS/MRS OVERVIEW

The CRWMS is composed of four system elements. Those elements, as identified in the CRD, are Waste Acceptance, Transportation, MRS, and the Mined Geologic Disposal System (MGDS). Separate system-level requirements documents are written for each system element. In addition, the MRS System Element includes two subelements, the MRS facility and the OSTS.

The MRS system element addresses the storage of commercial SNF both at the Purchaser site, not including any existing storage, and at a designated CRWMS MRS facility. The subordinate subelements to the MRS system element address the storage of SNF at the MRS facility, and the storage of SNF at the Purchaser site under the OSTS. The OSTS will be used to perform those operations necessary to transfer SNF from the Purchaser fuel pool into an MPC, to an MPC transportation cask for shipment to an MRS or MGDS, for transfer to an MPC storage mode for storage on-site, and for transfer from an MPC storage mode to an MPC transportation cask for shipment to an MRS or MGDS.

1.3.1 MRS Facility Subelement Mission

The mission of the MRS facility, as an integral part of the CRWMS, is to store SNF resulting from civilian nuclear activities in an NRC-approved MPC storage mode, or other NRC-approved storage modes, with the intent to recover such fuel for eventual disposal in the MGDS. The MPCs would be sealed, metallic canisters maintaining multiple SNF assemblies in a dry, inert environment. MPCs would be placed into an overpack for storage. MPCs are also placed into different overpacks for transportation and disposal at appropriate points in the CRWMS. The MRS facility will receive both SNF and loaded MPCs. All bare SNF received will be loaded into an MPC prior to shipment to the MGDS. The MRS facility provides interim storage of SNF to be performed in a timely manner that protects the health and safety of the public and of workers, and maintains the quality of the environment.

The MRS facility allows the orderly transfer of SNF and/or loaded MPC to CRWMS, demonstrating the Federal Government's ability to accept and manage waste. The institutional and licensing experience gained with the MRS facility will help in developing the MGDS. The MRS facility serves as a flexible link between waste management at Purchaser storage sites and waste disposal operations, thereby increasing flexibility and reliability of the waste management system and minimizing the need for additional SNF storage at Purchaser sites. The MRS facility will reduce non-federal expenses at Purchaser sites in the areas of spent fuel pool maintenance and caretaking operations after reactor shutdown by reducing the quantity of SNF that must remain at reactor sites after shutdown. The MRS facility will provide savings in the costs of consequential delays in total Purchaser facility decommissioning by reducing the length of time that SNF must remain at the facility after shutdown.

1.3.2 MRS Facility Subelement Background

The Nuclear Waste Policy Act of 1982 (NWPA) assigned the DOE responsibility for managing the disposal of SNF and HLW of domestic origin. The process and the schedule for this program were specified initially in the NWPA. In the NWPA, Congress identified that long-term storage of SNF in monitored retrievable storage facilities is an option for providing safe and reliable management of such SNF. Section 142(b) of the Nuclear Waste Policy Amendments Act of 1987 (NWPAA) authorizes the Secretary of Energy to site, construct and operate one MRS facility.

The NWPA defines SNF as the fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing. DOE policy states that the MRS facility is to store only SNF and related non-fuel components. Most SNF will arrive at the MRS already loaded into MPCs, however some may arrive as bare SNF loaded into truck casks or in a storage cask that is certified by the NRC for use in transportation. SNF that is not in MPCs when received will be transferred into MPCs for storage at the MRS facility and transport from the MRS facility to the MGDS for disposal, unless it was received in a licensed storage cask suitable for use in storage at the MRS facility. The MRS facility will transfer SNF from other storage casks into MPCs prior to shipment to the MGDS for disposal.

1.3.3 MRS Facility Subelement Functions

The following list represents the decomposition of the overall function of the MRS facility subelement, Store Waste. These functions are further decomposed in Section 3.1 and described in Appendix A.

A. **Handle SNF or Loaded MPC.** The facility is capable of receiving both truck shipments of SNF or rail shipments of loaded MPCs. Provisions are included to detach incoming tractors or rail engines, substitute site handling vehicles, and inspect the external surfaces of the transportation casks and associated vehicles prior to admission into the protected area. This function also includes removing SNF or a loaded MPC from the transportation cask, placing any bare SNF into an MPC, and placing the loaded MPC in the storage mode, and moving the storage mode to the storage area. Once the MGDS begins accepting waste, this function includes removing SNF from incoming truck transportation casks and transferring it to an MPC either for shipment to the MGDS or for placement into storage. Incoming loaded MPC transportation casks on rail cars would be coupled with others bound for the MGDS or unloaded and the MPC transferred into storage. This function further includes retrieving the loaded storage mode, removing the loaded MPC from the storage mode, and placing the loaded MPC into a transportation cask for shipment to the MGDS. Additionally, some rail casks containing loaded MPCs received from Purchasers may be queued with the outgoing rail casks and, after monitoring, sent directly to the MGDS without opening them at the MRS facility.

B. **Store SNF.** The SNF, in loaded MPCs, is stored in an environment designed to prevent degradation of the SNF and the loaded MPC. This environment provides decay heat removal and maintains SNF containment under all credible accidents, natural phenomena, and events.

C. **Support Storage Operations.** All goods and services necessary to support the operations and maintenance of the MRS facility are provided.

The MRS facility is designed and operated such that the facility can be decommissioned once it is no longer being utilized as a part of the CRWMS. Decommission means to remove (as a facility) safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of license. This means that after all SNF in loaded MPCs have been removed from interim storage at the MRS facility and the facility is no longer needed for the operation of the CRWMS, the facility and site will be decontaminated as necessary, structures will be dismantled as required by the host, the license terminated, and the site returned to its original condition to the extent practical as required by the host and released for unrestricted use. Decommissioning is an activity that is required to be performed on the MRS facility; however, it is not function of the MRS facility. In this document it is treated as a separate phase of the MRS facility life (addressed in Section 3.2.1.5), providing a constraint that constitutes requirements that are applicable to all segments of the MRS facility.

1.3.4 MRS Subelement System Concept

The top-level CRWMS function, "Manage Waste Disposal", means to direct or control any physical activity, operation, or process conducted to accept, transport, store, or dispose of SNF or high-level radioactive waste (HLW). For planning, systems analysis, and conceptual design purposes, Manage Waste Disposal is broken down into four subfunctions that the CRWMS must perform. These are Accept Waste, Transport Waste, Store Waste, and Dispose of Waste. The four corresponding physical system elements of the CRWMS that have been identified to implement these functions are Waste Acceptance, Transportation, MRS, and MGDS. The MRS system element includes the MRS subelement and the OSTS subelement.

Figure 1-2 is a pictorial description of the CRWMS waste flow.

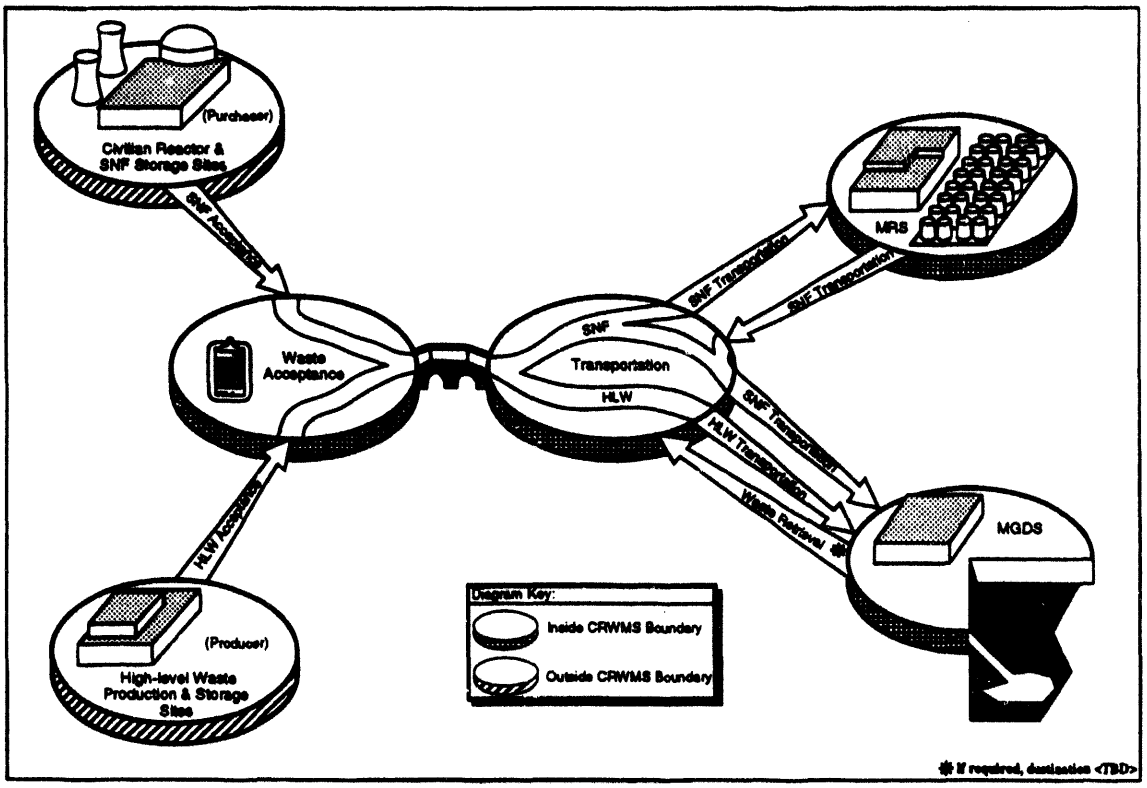

Figure 1-2. Civilian Radioactive Waste Management System Waste Flow

The MRS facility provides temporary storage of SNF in loaded MPCs awaiting disposal in the MGDS. In this role, the MRS facility accepts SNF and loaded MPCs for storage prior to the availability of the MGDS and serves as a storage and staging facility to assist in management of the SNF delivery schedule to the MGDS, after the MGDS becomes operational. Figure 1-2 depicts this role for the MRS facility in CRWMS. In this system, Purchasers that are in close proximity to the MGDS may ship SNF or loaded MPCs directly to the MGDS once the MGDS begins accepting waste.

As stated previously, there are three general functions to be performed at the MRS facility: Handle SNF or Loaded MPCs, Store SNF, and Support Storage Operations. These functions are performed in three areas of operation as described in the following paragraphs. For the purpose of this description, the reference design concept from the *MPC MRS Facility Conceptual Design Report* (Reference 2.5.A), is used.

The Spent Fuel Handling Area is the primary area of operation. Here, the SNF and loaded MPCs are unloaded from the transportation casks received from Purchasers and transferred either to storage casks or to rail casks for shipment to the MGDS. This facility also transfers loaded MPCs from storage casks to rail casks for shipment to the MGDS. Depending on design analysis, rail casks received from the Purchaser may not be unloaded at the MRS facility after the MGDS is operational. Instead, these rail casks will be shipped to the MGDS by dedicated train. The facility also provides the equipment for preparing the low-level radioactive waste generated during operation of the MRS facility for off-site disposal.

The reference design concept assumes that the storage area will consist of a large area containing support pads for storing sealed storage casks. The storage casks are expected to be vertical concrete storage casks that hold loaded MPCs. While this description is for one storage mode, this document contains the requirements for all potential storage modes.

The support functions performed at the MRS facility include administrative and security functions. In addition, the MRS facility is designed to provide incidental maintenance on transportation casks at the transfer facility. Other transportation cask system maintenance, including but not limited to, cask reconfiguration and annual testing as required by the Certificate of Compliance, is performed at the Cask Maintenance Facility (CMF). The CMF and MRS facility will be integrated with the CMF being developed as a segment of the MRS facility.

Figure 1-3 shows a notional layout of the MRS facility.

Although the reference design concept uses separate transportation and storage casks, the design will allow for the receipt and storage of Transportable Storage Casks (TSCs). All handling facilities will be designed to accommodate the TSCs identified in Table 3-4.

1.3.5 OSTS Subelement Mission

The implementation of the MPC concept into the CRWMS will affect the way Purchasers handle and store SNF. The mission of the OSTS is to provide the requisite capabilities to accomplish the transfer and storage of SNF loaded in MPCs at Purchaser sites, which includes handling of empty MPCs in conjunction with SNF transfer.

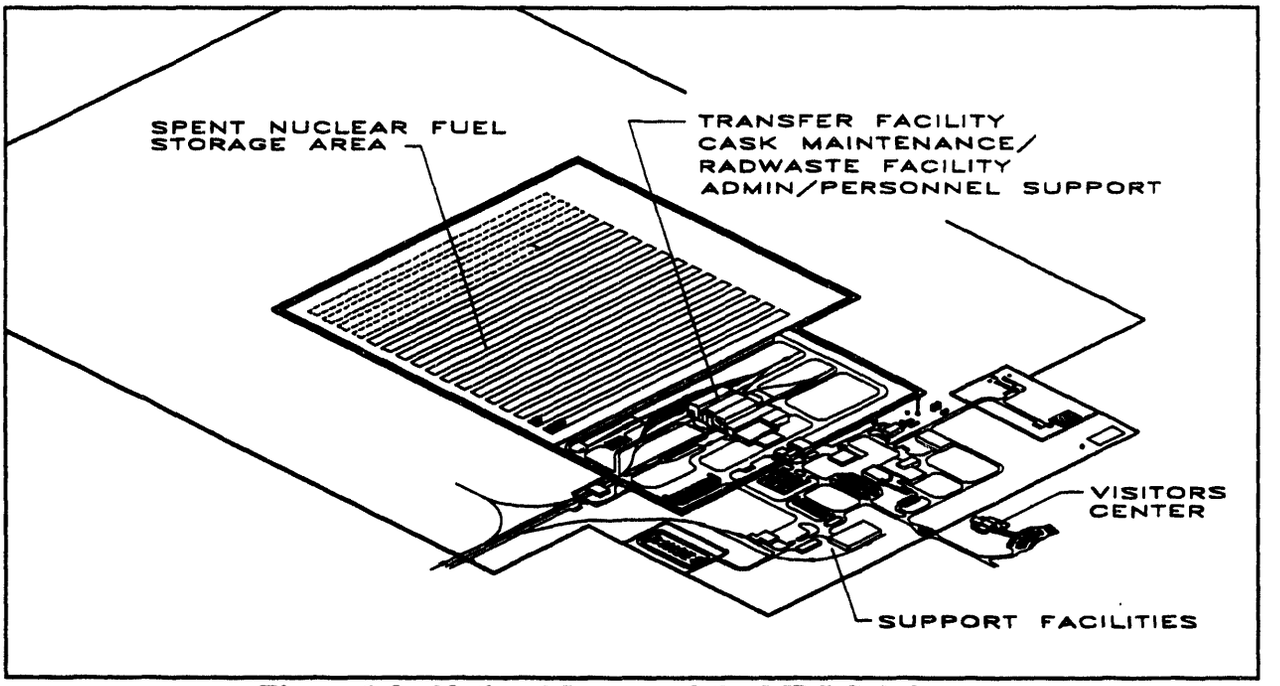

Figure 1-3. Notional Layout of the MRS Subelement

1.3.6 OSTS Subelement Background

During 1992, system studies were initiated to evaluate the feasibility of using MPCs to handle SNF throughout the CRWMS. In March 1993, the M&O completed *A Preliminary Evaluation of Using Multi-Purpose Canisters Within the Civilian Radioactive Waste Management System.* Based on this study, DOE directed the M&O to complete a near-term implementation program evaluation to enable DOE to make a final decision regarding integration of MPCs into the CRWMS. This program included the development of the design and system engineering requirements, conceptual level designs, specifications, cost estimates and schedules for MPCs, and all elements of the program impacted by the use of MPCs including transportation casks, MRS facilities, waste packages, repository and utility transfer systems.

The MPC development program was to fully integrate the MPC concept from waste acceptance through disposal. The OSTS design will be developed in conjunction with the CRWMS to ensure that the MPC concept is utilized prior to waste acceptance.

The potential advantages of an MPC-based CRWMS include, the use of MPCs for dry storage at Purchaser sites. There are 121 Purchaser facilities, and the goal of the OSTS is to assure each Purchaser has the opportunity to utilize the MPC system. In addition, the functions for use in the transfer of bare SNF transfer into an SNF transportation cask or MPC and MPC transportation cask were included for completeness in identifying requirements resulting from the Purchaser interface. These functions are not part of the OSTS, but are allocated to the Transportation System Element and are addressed in the Transportation SRD. The design effort concentrated on the requirements of the Purchasers and their ability to utilize the MPC. The OSTS will enable Purchasers to store MPCs in a licensed storage mode design licensed under

10CFR72 Subpart K and provide the ability to retrieve the MPC from the storage mode and transfer it into a transportation cask without requiring the use of the fuel pool.

1.3.7 OSTS Subelement Functions

The following list represents the decomposition of the Perform Transfer and Storage Operations function. The OSTS is used to perform functions A, B, and C. Function D is performed by the Purchaser without the OSTS. These functions are further decomposed in section 3.1 and described in Appendix A.

A. **Transfer SNF into an MPC in Fuel Pool.** The SNF is loaded into an MPC contained within an MPC transfer cask in the fuel pool. The loaded MPC and MPC transfer cask is removed from the fuel pool. The MPC is then loaded into an MPC transportation cask for shipment to the MRS or MGDS, or movement to on-site dry storage. This function is performed by Purchasers able to load an MPC in the fuel pool, but are unable to load the MPC in the MPC transportation cask or storage mode in the fuel pool.

B. **Transfer SNF into an MPC Outside of Fuel Pool.** The SNF is loaded into an SNF transfer device in the fuel pool and prepared for dry transfer to an MPC contained in an MPC transportation cask or MPC transfer cask. The loaded SNF transfer device is unloaded into the combined MPC and MPC transportation cask, or MPC and MPC transfer cask, through dry cask-to-cask transfer. The loaded MPC is contained within an MPC transportation cask for shipment by rail to the MRS facility or MGDS.[1] The loaded MPC may also be contained in an MPC transfer cask for transfer to the storage mode. This function is performed by Purchasers unable to load an MPC in the fuel pool.

C. **Store MPC On-Site.** The MPC contained in the MPC transfer cask is moved to a storage mode. The MPC is transferred to the storage mode, where it is maintained for a period of time. The MPC is retrieved and transferred directly to a transportation cask or indirectly through a MPC transfer cask. This function is perform by Purchasers storing MPCs on-site.

D. **Transfer SNF into a Transportation Cask in Fuel Pool.** SNF is loaded into a transportation cask in the fuel pool. The transportation cask may be either an MPC transportation cask or an SNF transportation cask. This function does not utilize any OSTS equipment. Transportation is responsible for the ancillary equipment necessary for SNF transfer to transportation cask subsystems in the fuel pool. This function is performed by Purchaser able to load an MPC in an MPC transportation cask in the fuel pool, or loading a SNF transportation cask in the fuel pool.

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[1] Some loaded MPC transportation cask systems may be transported from Purchasers by heavy-haul truck or barge to a rail siding.

The OSTS is designed by OCRWM, and procured and operated by the Purchaser such that the OSTS can be decommissioned once it is no longer being utilized. This means that after all SNF has been removed from interim storage, and the transfer and storage equipment and facilities are no longer needed, the OSTS will be decontaminated as necessary. Structures will be dismantled as required by the Purchaser license, the license terminated, and the site returned to the condition required by the Purchaser license. Decommissioning is an activity that is required to be performed on the OSTS, however, it is not a function of the OSTS. In this document it is treated as a separate phase of the OSTS life (addressed in Section 3.2.1.9), providing a constraint that constitutes requirements applicable to all segments of the OSTS.

1.3.8 OSTS Subelement System Concept

The OSTS enables the Purchasers, where MPCs in either transportation casks or storage modes cannot be loaded in the fuel pool, to utilize MPCs for shipment to a CRWMS facility or on-site storage. The transfer of SNF to MPCs may utilize an SNF transfer device or an MPC transfer cask for dry transfer. SNF transfer and storage operations at the Purchaser site are based on four concepts, three of which the OSTS will be utilized for: Transfer of SNF to an MPC Transfer Cask; Transfer SNF to an SNF Transfer Device; MPC Storage; Transfer SNF to a Transportation Cask. The use and configuration of each of these four concepts would be dependent on individual Purchaser needs and limitations. The four possible concepts are discussed in more detail in the following paragraphs.

A. Transfer of SNF to a MPC Transfer Cask concept would be utilized by a Purchaser where existing equipment is capable of placing the MPC and MPC Transfer cask directly into the fuel pool for SNF transfer. The loaded MPC is transferred to either an MPC transportation cask or a storage mode for on-site storage.

B. Transfer SNF to an SNF Transfer Device concept applies to those Purchasers unable to lift an MPC with an MPC transfer cask or MPC transportation cask. The SNF is loaded directly into an SNF transfer device, which is in the fuel pool. The SNF is then transferred into an MPC in either an MPC transfer cask or MPC transportation cask, using a dry cask-to-cask transfer method. The loaded MPC is then either shipped to a CRWMS facility or stored on-site using the Transfer to MPC Transfer Cask concept.

C. The MPC Storage concept is applicable to those Purchasers that have the desire and capability to store MPCs on-site. The MPC is transferred from a loaded MPC transfer cask to a storage mode. The MPC transfer cask could be used for moving the MPC from the storage mode to a MPC transportation cask for shipment to the MRS facility or the MGDS.

D. The Transfer SNF to a Transportation Cask concept is utilized by Purchasers that have the ability to load a transportation cask in the fuel pool. If the Purchaser is not able to load an MPC in an MPC transportation cask in the fuel pool, an SNF LWT transportation cask may be used. This concept does not utilize the OSTS, and is based on existing Purchaser equipment and Transportation supplied ancillary equipment.

1.4 DOCUMENT ORGANIZATION AND DESCRIPTION

1.4.1 Document Organization

This MRS-SRD is organized as follows:

A. **Section 1: Scope.** This section presents the system overview including the MRS facility and OSTS mission and system concept.

B. **Section 2: Applicable Documents.** This section identifies documents which are specifically related to various requirements of the MRS facility and OSTS Subelement. The documents are included to provide requirement traceability to the source documents and are not to be incorporated as requirements themselves.

C. **Section 3: Requirements.** Except for the preparation for operation requirements in Section 5 and the information in Appendices A and B, this section contains all requirements of the MRS facility and OSTS Subelement at the system-level and begins with a system definition. Performance characteristics and design and construction criteria are presented. Specialty engineering and logistics requirements are addressed along with requirements for documentation, personnel, and training. A breakout of requirements for each segment follows those requirements. Qualification requirements, including requirements for quality assurance, are also provided.

D. **Section 4: Conformance Verification.** This section addresses conformance verification and includes a cross reference matrix to define how conformance with each requirement of Sections 3 and 5 is to be verified.

E. **Section 5: Preparation for Operations.** This section contains requirements for preparation of the system for acceptance and operations.

F. **Section 6: Notes.** This section contains material that is explanatory in nature and is non-binding on the MRS and OSTS Subelements development.

G. **Appendices:** Data included in the appendices are binding with regard to MRS and OSTS Subelements requirements and may be changed only through the formal document change procedures. This document includes two appendices:

Appendix A MRS and OSTS Subelements Function Descriptions
Appendix B Allocation of Functions to Architecture

1.4.2 Description

As stated earlier, the central purpose of the MRS-SRD is to establish requirements for the MRS facility and the OSTS. As indicated in the outline in Section 1.4.1, Section 3 of the document is the primary source of the requirements, although some appear in Section 5 and in the Appendices. The requirements and source documents allocated to the MRS facility and the OSTS by the CRD are addressed, many in expanded form. Requirements are included which have been derived to meet the system mission. In some cases, to provide consistent requirements throughout CRWMS, the CRD has applied the relevant technical content of regulatory requirements for another element (the MGDS for example) to the MRS facility and the OSTS. These derived requirements are based on the judgement of the document preparation team and are documented on Issue Clarification and Derived Requirements Documentation Forms included in the Quality Assurance (QA) records for the CRD.

Section 3.1 establishes the description of the system in terms of functions and physical segments and the relationship between the two. Sections 3.2 to 3.6 and 3.9 address requirements important to the design of the MRS and OSTS Subelements in terms of interfaces, specialty engineering disciplines (e.g., safety, human factors, environmental, value engineering and security), construction standards, and logistics. Section 3.7 contains requirements associated with specific MRS and OSTS Subelements segments.

The statement of a requirement is followed by reference to the original source document from which the requirement is traced, in square brackets (e.g., [10CFR72.194] or [CRD]). Complete traceability to the CRD is provided in the matrices of Section 6. When the MRS-SRD is the authority, the requirement is followed with "[Derived]" and the requirement and rationale are documented on Issue Clarification and Derived Requirements Documentation Forms included in the QA records for the MRS-SRD.

A fundamental approach of the MRS-SRD is to reword the requirements as necessary into statements of clear engineering direction which are verifiable and do not depend upon the context in which they were originally presented. At times this may involve interpretation of requirements. It may also involve establishing performance requirements. Inasmuch as the MRS and OSTS Subelements project is evolving, some of this can only be done on an iterative basis. A site for the MRS facility has to be located and approved, studies and analyses have to be completed, decisions must be made, and issues have to be resolved with the Nuclear Regulatory Commission (NRC). As a result, some requirements in early versions of requirements documents contain specifics still to be determined and are labeled **<TBD>**. These statements provide a place holder and ensure that the requirements are developed and traceable through the requirements documents. In other instances, engineering judgement and currently available information may permit a value to be stated for use in design. Because these values are based on assumed operations, they are subject to change as the total system becomes more well defined, and are labeled **<TBR>**. These requirements were coordinated with the MRS facility and the OSTS design organization and other affected organizations to ensure a consistent approach. The values are to be used by the design organization for the design. The **<TBR>** serves as a flag to indicate that these requirements impact other elements and may change based on CRWMS decisions.

Therefore, the designers are encouraged to provide a design around these issues that affords as much flexibility for change as is practical.

Because the DOE is committed to siting the MRS facility through the negotiation process, additional requirements may be imposed on the MRS facility by the eventual host through that negotiation process. Until the site is selected and all host requirements identified, designs for the MRS facility must remain flexible.

Although the operation of the OSTS is outside the scope of CRWMS, the design and certification is being undertaken to ensure that the MPC concept is usable by a maximum number of purchasers. In keeping with this philosophy, the design for the OSTS must be flexible so as to be adaptable to meet the needs of individual purchasers using the system.

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2. APPLICABLE DOCUMENTS

The documents identified in this section are specifically referred to or have provided the basis for requirements contained in the MRS-SRD. These documents are not to be incorporated as requirements themselves.

For each document, the issue in effect on the date of approval of the MRS-SRD forms a part of the MRS requirements to the degree specified herein. Each project-level Design Requirements Document (DRD) is to use revisions and issues of source documents in effect on the date of approval of that DRD.

Section 2.5 identifies reference materials that have not been used as sources of requirements, but are provided here for reference.

2.1 FEDERAL LAWS AND DOCUMENTS

2.1.1 Laws, Statutes, U. S. Codes, and Treaties

A.	7USC136 et seq.	Federal Insecticide, Fungicide, and Rodenticide Act of 1988
B.	15USC2601 et seq.	Toxic Substances Control Act
C.	29USC651 et seq.	Occupational Safety and Health Act
D.	33USC1251 et seq.	Clean Water Act of 1977 (CWA)
E.	42USC300f et seq.	Safe Drinking Water Act
F.	42USC7401 et seq.	Clean Air Act
G.	42USC10101 et seq.	Nuclear Waste Policy Act of 1982 and Nuclear Waste Policy Amendments Act of 1987

2.1.2 Code of Federal Regulations and Executive Orders

A.	10CFR20	Standards for Protection against Radiation
B.	10CFR51	Environmental Protection Regulation for Domestic Licensing and Related Regulatory Functions
C.	10CFR71	Packaging and Transportation of Radioactive Material

D.	10CFR72	Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste
E.	10CFR73	Physical Protection of Plants and Materials
F.	10CFR75	Safeguards on Nuclear Material - Implementation of US/IAEA Agreement
G.	10CFR100	Reactor Site Criteria
H.	10CFR961	Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste
I.	10CFR1022	Compliance with Floodplains/Wetlands Environmental Review Requirements
J.	29CFR1910	Occupational Safety and Health Standards
K.	29CFR1926	Safety and Health Regulations for Construction
L.	29CFR1960	Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters
M.	33CFR323	Permits for Discharges of Dredged or Fill Material into Waters of the United States
N.	40CFR50	National Primary and Secondary Ambient Air Quality Standards
O.	40CFR60	Standards of Performance for New Stationary Sources
P.	40CFR61	National Emission Standards for Hazardous Air Pollutants
Q.	40CFR122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
R.	40CFR136	Guidelines Establishing Test Procedures for the Analysis of Pollutants
S.	40CFR141	National Primary Drinking Water Regulations

T.	40CFR142	National Primary Drinking Water Regulations Implementation	I
U.	40CFR144	Underground Injection Control Program	I
V.	40CFR165	Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers	I
W.	40CFR191	Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes	I
X.	40CFR261	Identification and Listing of Hazardous Waste	I
Y.	40CFR262	Standards Applicable to Generators of Hazardous Waste	I
Z.	40CFR264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	I
AA.	40CFR265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	I
AB.	40CFR268	Land Disposal Restrictions	I
AC.	40CFR280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)	I
AD.	49CFR172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements	I I I
AE.	49CFR174	Carriage by Rail	I
AF.	49CFR177	Carriage by Public Highway	I
AG.	Exec. Order 11988	Floodplain Management	I
AH.	Exec. Order 12196	Occupational Safety and Health Programs for Federal Employees	I

2.1.3 Other Documents, Orders, and Directives

A.	DOE Order 1324.2A	Records Disposition
B.	DOE Order 3790.1A	Federal Employees Occupational Safety and Health Program
C.	DOE Order 4330.4A	Maintenance Management Program
D.	DOE Order 4700.1	Project Management System
E.	DOE Order 6430.1A	General Design Criteria
F.	DOE/RW-0239	DOE Position on the MRS Facility
G.	DOE/RW-0247	Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program
H.	DOE/RW-0316P	Draft Mission Plan Amendment September 1991
I.	DOE/RW-0333P	OCRWM Quality Assurance Requirements and Description
J.	DOE/RW-0406	Civilian Radioactive Waste Management System Requirements (CRD) (A00000000-00811-1708-00003)
K.	DOE/RW-0412	1992 Annual Capacity Report
L.	Fed-Std-795	Uniform Federal Accessibility Standards
M.	GSA-FSS-W-A-450/1-17	General Service Administration Interim Federal Specification
N.	MOA NS/RW	Memorandum of 4/16/92 on Nuclear Safety Requirements
O.	NRC Regulatory Guide 1.76	Design Basis Tornado for Nuclear Power Plants
P.	NUREG 0700	Guidelines for Control Room Design Reviews
Q.	NUREG 0800	Standard Review Plan

2.2 STATE LAWS AND TRIBAL LAWS

<TBD>

2.3 LOCAL ORDINANCES

<TBD>

2.4 NON-GOVERNMENT DOCUMENTS

2.4.1 National and International Standards

A.	AASHTO GDHS-84	A Policy on Geometric Design of Highways and Streets
B.	ACI 349	Code Requirements for Nuclear Safety Related Concrete Structures
C.	ACI 515.1R-79(85)	Guide to the Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
D.	ANSI/ANS 6.4	Guidelines on the Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants
E.	ANSI C2	National Electric Safety Code
F.	AREA	Manual for Railway Engineering (Fixed Properties)
G.	ANSI/ASCE 7-88	Minimum Design Loads in Buildings and Other Structures
H.	BIA 7-F	Dampproofing and Waterproofing Masonry Walls
I.	CMAA-70	Crane Manufacturer's Association of America Specification for Electric Overhead Traveling Cranes
J.	NCMA TEK-55	Waterproof Coatings for Concrete Masonry
K.	NCMA TEK-121	Waterproofing Concrete Masonry Basements and Earth-Sheltered Structures
L.	UBC	Uniform Building Code

2.4.2 Other Publications

A.	A00000000-01717 -6700-00001	Concept of Operations for the Multi-Purpose Canister System

B.	A00000000-01717 -2200-00001	Operational Throughput for the Multi-Purpose Canister System
C.	UCRL 15910	Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards
D.	UCRL 53526	Natural Phenomena Hazards Modeling Project: Extreme Wind/Tornado Hazard Models for Department of Energy Sites

2.5 OTHER REFERENCES

In addition to the above source references, the following documents were used as reference material for the initial development of this document:

A.	A00000000-01717 -4600-00009	CRWMS M&O Technical Document Preparation Plan (TDPP) for the Revision of System Requirements Documents, Revision 2
B.	A0000001-01717 -5705-SSSSD	Volume II.C - MPC MRS Facility Conceptual Design Report, Rev. 0 (Draft), September 30, 1993
C.	A0000001-01717 -5705-SSSSE	Volume II.D - Utility Transfer System (UTS) Conceptual Design Report - Utility Transfer System, Rev. 0 (Draft), September 30, 1993
G.	ACI 318-89	Building Code Requirements for Reinforced Concrete
H.	ANSI/ASA 38	Evaluation of Human Exposures to Whole Body Vibration
I.	ANSI/HFS Std. 100-1988	American National Standard for Human Factors Engineering of Visual Display Terminal Workstations
J.	ANSI/NFPA 70	National Electrical Code
K.	DOD-HDBK-743A	Anthropometry of U.S. Military Personnel
L.	DOE/RW-0043	OCRWM Program Management System Manual (PMSM) Revision 5
M.	DOE/RW-0051	OCRWM Systems Engineering Management Plan (SEMP) Revision 2

N.	DOE/RW-0319	Physical System Requirements - Store Waste, Revision 1
O.	DOE/RW-0334P	Physical System Requirements - Overall System, Revision 0
P.	DOE/RW-0351	Waste Acceptance System Requirements Document (WA-SRD), Rev. 1 (E00000000-00811-1708-00001)
Q.	DOE/RW-0352	Physical System Requirements - Transport Waste, Revision 0
R.	DOE/RW-0381P	OCRWM Baseline Management Plan, Revision 0
S.		Transportation System Requirements Document (Trans-SRD), Rev. 1 (D00000000-00811-1708-00002)
T.		Mined Geologic Disposal System Requirements Document (MGDS-RD), Rev. 1 (B00000000-00811-1708-00002)
U.	DOE Order 4010	Value Engineering
V.	Memorandum 2/15/91	U.S. Government Memorandum to RW-13 from RW-1
W.	MIL-STD-1388-1A	Logistic Support Analysis
X.	MIL-STD-1388-2A	Requirements for a Logistic Support Analysis Record
Y.	MIL-STD-1472D	Human Engineering Design Criteria for Military Systems, Equipment, and Facilities
Z.	MTR 10090 (ESD-TR-86-278)	Guidelines for Designing User Interface Software
AA.	NRC Regulatory Guide 8.8	Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable
AB.	NRC Regulatory Guide 8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable

	AC.	5USC500 et seq.	Administrative Procedure, General Provisions
	AD.	10CFR9	Public Records
	AE.	10CFR19	Notices, Instructions, and Reports to Workers; Inspections
	AF.	42USC4001 et seq.	National Flood Insurance Act

3. REQUIREMENTS

3.1 SYSTEM DEFINITION

Sec. 142(b) of the NWPAA authorizes the siting, construction, and operation of one MRS facility.

The MRS facility must perform certain functions to meet the requirements of the NWPA and NWPAA. Consistent with the requirements of Section 141(b)(1) of the NWPA, the MRS facility shall:

A. Receive and accommodate SNF resulting from civilian nuclear activities

B. Permit continuous monitoring, management and maintenance of stored SNF for the foreseeable future

C. Provide for the ready retrieval of stored SNF for disposal

D. Safely store such SNF as long as may be necessary by maintaining the MRS facility by appropriate means, including replacement.

The OSTS facilitates the loading of commercial SNF to be transported, stored, and disposed of safely. The OSTS addresses MPC-related systems to be used at the Purchaser facilities prior to shipment to a CRWMS facility.

The functions, function flow diagrams, N-Square diagrams, system description, cross reference of the allocation of functions to segments, and assumptions are contained in the following sections.

3.1.1 MRS System Functions - Store Waste

The MRS System Element Function 1.3 Store Waste addresses the transfer of SNF to MPCs, and possible storage of commercial SNF at the Purchaser sites, using MPCs, and storage at a designated CRWMS MRS facility. The subordinate functions to Store Waste address the storage of SNF at the MRS facility through function 1.3.1 Store Waste at the MRS, and the transfer and storage of SNF at the Purchaser site placed under function 1.3.2 Perform Transfer and Storage Operations. The Perform Transfer and Storage Operations function also includes those operations necessary to transfer SNF from the Purchaser fuel pool into an MPC for storage site or transport, or to transfer the SNF for direct shipment to the MRS facility or MGDS. The Perform Transfer and Storage Operations functions are not performed within the CRWMS and are included in the MRS-SRD to allow for the development of the OSTS only.

3.1.1.1 MRS Subelement Functions - Store Waste at the MRS

With the mission of the MRS facility as stated in Section 1.3.1, the functional analysis then identifies the essential functions the system element must perform. Those functions are discussed in this section.

The overall function of the MRS facility is to Store Waste at the MRS. This function includes the activities necessary to meet the requirements for providing storage for SNF, contained in MPCs, in a manner that protects the health and safety of the public and maintains the quality of the environment, with the intent to retrieve the SNF for subsequent disposal.

3.1.1.2 OSTS Functions - Perform Transfer and Storage Operations

The top-level functions allocated to the OSTS are the Perform Transfer and Storage Operations. The Perform Transfer and Storage Operations function satisfies the mission of the OSTS as stated in Section 1.3.5. This function delineates the operations of transferring SNF from the Purchaser fuel pool into an MPC or directly into a SNF transportation cask for shipment. The MPC may be in an MPC transfer cask when loaded. The MPC would then be transferred to an MPC transportation cask or readied for movement to the storage mode. The SNF also may be loaded into an SNF transfer device in the fuel pool for dry transfer to either the MPC transfer cask or the MPC transportation cask. The loaded MPC would be stored on-site in an NRC-approved storage mode if not shipped directly to a CRWMS facility.

3.1.1.3 MRS System Functions List

Functions flowing from the Store Waste function are listed in Table 3-1. The reference numbers following the function title are the function numbers used with the function descriptions contained in Appendix A, MRS Function Descriptions. The reference numbers are provided for identification of level of indenture and are not intended to prescribe a sequencing of the identified functions. The functions of 1.3 Store Waste are subdivided to address the OSTS and MRS facility separately. Function 1.3.1 Store Waste at the MRS addresses the MRS facility, and function 1.3.2 Perform Transfer and Storage Operations addresses the OSTS. Function 1.3.1.3 was originally identified as Decommission MRS facility; however as was discussed in Section 1.3.3, decommissioning is not a function of the MRS facility in its role within CRWMS. All requirements associated with decommissioning are identified in Section 3.2.1.5. Function 1.3.1.4.1 was identified in the functional analysis to be Construct Storage Facilities. This function is design specific and therefore has been deleted from the function list.

Table 3-1. MRS System Element Function List

Function Title	Reference Number
Store Waste	1.3
MRS Subelement Functions	
Store Waste at the MRS	1.3.1
Handle SNF or Loaded MPC	1.3.1.1
Receive Loaded/Unloaded Transportation Cask Subsystem	1.3.1.1.1
Accept Transportation Cask/Transporter	1.3.1.1.1.1
Detach Prime Mover	1.3.1.1.1.2
Inspect Transportation Cask/Transporter	1.3.1.1.1.3
Move Transportation Cask/Transporter to Parking Area	1.3.1.1.1.4
Move Cask/Transporter inside Controlled Area	1.3.1.1.1.5
Move Off-normal Transportation Cask/Transporter to Holding	1.3.1.1.1.6
Move Suspect Transportation Cask/Transporter to Holding	1.3.1.1.1.7
Process Off-normal Transportation Cask/Transporter	1.3.1.1.1.8
Process Suspect Transportation Cask/Transporter	1.3.1.1.1.9
Park Transportation Cask/Transporter	1.3.1.1.2
Prepare SNF or Loaded MPC for Storage	1.3.1.1.3
Remove Loaded Transportation Cask from Transporter	1.3.1.1.3.1
Prepare Loaded Transportation Cask for Transfer	1.3.1.1.3.2
Remove SNF or Loaded MPC from Loaded Transportation Cask	1.3.1.1.3.3
Verify SNF or Loaded MPC Identity and Condition	1.3.1.1.3.4
Prepare Unloaded Transportation Cask for Return to Service	1.3.1.1.3.5
Move TSC/Transporter to Storage Area	1.3.1.1.3.6
Move TSC from Transporter to Storage Fixture	1.3.1.1.3.7
Return Transporter to Debarkation	1.3.1.1.3.8
Transfer SNF or Loaded MPC into Storage	1.3.1.1.4
Configure Storage Mode	1.3.1.1.4.1
Place SNF or Loaded MPC into Storage Mode	1.3.1.1.4.2
Close MPC and/or Storage Mode	1.3.1.1.4.3
Move Loaded Storage Mode to Storage Location	1.3.1.1.4.4
Emplace Loaded Storage Mode into Storage	1.3.1.1.4.5
Retrieve SNF or MPC from Storage	1.3.1.1.5

Table 3-1. MRS Function List (Continued)

Function Title	Reference Number
Retrieve Loaded Storage Mode from Storage	1.3.1.1.5.1
Move Loaded Storage Mode into Transfer Area	1.3.1.1.5.2
Open Storage Mode	1.3.1.1.5.3
Remove SNF or MPC from Storage Mode	1.3.1.1.5.4
Verify SNF or MPC Identity and Condition	1.3.1.1.5.5
Handle Unloaded Storage Mode	1.3.1.1.5.6
Recover SNF from Off-Normal MPC	1.3.1.1.5.7
Prepare SNF or MPC for Transport	1.3.1.1.6
Retrieve Unloaded Transportation Cask	1.3.1.1.6.1
Prepare Unloaded Transportation Cask for Loading	1.3.1.1.6.2
Place SNF or Loaded MPC into Transportation Cask	1.3.1.1.6.3
Prepare Loaded Transportation Cask Subsystem for Transport	1.3.1.1.6.4
Prepare Cask/Transporter for Release from Site	1.3.1.1.6.5
Store SNF	1.3.1.2
Maintain SNF Integrity	1.3.1.2.1
Maintain Storage System Containment	1.3.1.2.2
Monitor SNF Storage System	1.3.1.2.3
Monitor Radiological/Thermal Condition	1.3.1.2.3.1
Account for SNF	1.3.1.2.3.2
Support Storage Operations	1.3.1.4
Provide Operations Support	1.3.1.4.2
Provide Utilities	1.3.1.4.2.1
Provide HVAC	1.3.1.4.2.2
Provide Central Stores	1.3.1.4.2.3
Provide On-Site Transportation	1.3.1.4.2.4
Provide Technical Services	1.3.1.4.2.5
Acquire Off-Site Services	1.3.1.4.2.6
Maintain Operating Facilities	1.3.1.4.3
Maintain Equipment	1.3.1.4.3.1
Maintain Buildings	1.3.1.4.3.2
Maintain Site	1.3.1.4.3.3

Table 3-1. MRS Function List (Continued)

Function Title	Reference Number
Provide Protective Services	1.3.1.4.4
Safeguard SNF	1.3.1.4.4.1
Maintain Physical Security	1.3.1.4.4.2
Maintain Emergency Plan	1.3.1.4.4.3
Provide Emergency Medical Treatment	1.3.1.4.4.4
Provide Fire Protection	1.3.1.4.4.5
Provide Radiological Protection	1.3.1.4.4.6
Provide Environmental Monitoring	1.3.1.4.4.7
Provide QA/QC Services	1.3.1.4.5
Provide Administrative Support	1.3.1.4.6
Provide for Human Resources	1.3.1.4.6.1
Maintain Records	1.3.1.4.6.2
Maintain Institutional and External Relations	1.3.1.4.6.3
Maintain Financial Accounting	1.3.1.4.6.4
Provide Office Space for Regulatory Inspectors	1.3.1.4.6.5
Process Site-Generated Radwaste	1.3.1.4.7
Collect Liquid Radwaste	1.3.1.4.7.1
Collect Solid Radwaste	1.3.1.4.7.2
Treat/Package/Monitor/Ship Radwaste for Off-Site Disposal	1.3.1.4.7.3
Store Packaged Radwaste for Off-site Disposal	1.3.1.4.7.4
Control Site-Generated Wastes Other than Radwaste	1.3.1.4.8
Monitor All Off-Site Releases	1.3.1.4.8.1
Avoid Use of RCRA Listed Materials	1.3.1.4.8.2
Segregate Hazardous Waste Streams	1.3.1.4.8.3
Maintain and Repair Transportation Cask Subsystems	1.3.1.4.9
Maintain and Repair Transportation Casks	1.3.1.4.9.1
Maintain and Repair Ancillary Equipment and Special Tools and Fixtures	1.3.1.4.9.2
Perform Cask Reconfigurations	1.3.1.4.9.3
Manage Transportation Cask Subsystem Inventory	1.3.1.4.9.4
Manage Unloaded Cask Inventory	1.3.1.4.9.5
Manage Transporter Inventory	1.3.1.4.9.6

Table 3-1. MRS Function List (Continued)

Function Title	Reference Number
Manage Ancillary Equipment and Special Tools and Fixture Inventory	1.3.1.4.9.7
Manage Spare Parts and Consumables Inventory	1.3.1.4.9.8
Create and Maintain Records	1.3.1.4.9.9
Manage Transporter Repair and Maintenance	1.3.1.4.9.10
OSTS Subelement Functions	
Perform Transfer and Storage Operations	1.3.2
Transfer SNF into an MPC in Fuel Pool	1.3.2.1
Transfer SNF into an MPC in Transfer Cask in Fuel Pool	1.3.2.1.1
Transfer Loaded MPC from MPC Transfer Cask into MPC Transportation Cask Outside of Fuel Pool	1.3.2.1.2
Transfer SNF into an MPC Outside of Fuel Pool	1.3.2.2
Transfer SNF in Fuel Pool into SNF Transfer Device	1.3.2.2.1
Transfer SNF from SNF Transfer Device into an MPC in MPC Transportation Cask Outside of Fuel Pool	1.3.2.2.2
Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool	1.3.2.2.3
Store MPC On-Site	1.3.2.3
Transfer MPC from MPC Transfer Cask to Storage Mode	1.3.2.3.1
Conduct Storage Mode Operations	1.3.2.3.2
Transfer MPC from Storage to MPC Transportation Cask	1.3.2.3.3
Transfer SNF into Transportation Cask in Fuel Pool	1.3.2.4
Transfer SNF into an MPC in MPC Transportation Cask in Fuel Pool	1.3.2.4.1
Transfer SNF into SNF Transportation Cask in Fuel Pool	1.3.2.4.2

3.1.2 MRS Functional Relationships

Although there are many tools available, the functional identification is accomplished in this document by the use of function flow diagrams to depict function sequencing and primary relationships and by the use of N-Square diagrams to identify inputs and outputs of a function. It must be kept in mind that the system engineering process is iterative. Each design phase involves functional analysis to progressively more detail. Functions identified in this document are the system level functions required to meet the mission.

Figure 3-1 shows the function flow diagram for the CRWMS at the system level. Figure 3-2 shows the function flow diagram for the fourth level indenture, which identifies the top level MRS facility functions. Figure 3-3 shows the function flow diagram for the OSTS functions, as identified to the fourth level of indenture. Figures 3-4, 3-5 and 3-6 show the N-Square diagrams for these same functions. Numbers in each function block correspond to appropriate function numbers as identified in Table 3-1. Additional function flow diagrams and N-Square diagrams are contained in Appendix A.

The function flow diagrams identify the primary interactions between the functions in receiving, handling, storing, retrieving, and shipping SNF and loaded MPCs. Additional function interactions are identified on the N-square diagrams. On the N-square diagrams, the MRS facility functions appear in the bold outlined boxes on the diagonal. The double-lined boxes on the diagonal identify an interface with a function external to the MRS facility. Inputs to a function appear in the column above and below the function. Outputs from a function appear in the row to the left and right of a function.

The function flow diagrams are used in allocating functions to appropriate segments described in Section 3.1.3. Section 3.1.4 summarizes this allocation process.

3.1.3 System Description

The MRS facility is an integral part of the total CRWMS in which all system elements, subelements, segments, and subsystems and facilities are optimized as parts of a single system. The MRS facility is an in-line facility that will receive commercial SNF and MPCs loaded with commercial SNF, provide a limited amount of storage, provide staging for transportation to the MGDS, and perform other functions if determined necessary or desirable by future federal mandates, studies, analyses, operational requirements, etc. The top level architecture for the MRS system element is depicted in Figure 3-7. Figure 3-8 shows the MRS facility architecture, and the architecture for the OSTS is depicted in Figure 3-9.

The MRS facility is composed of the following segments:

A. Site Development
B. Utilities
C. Security Facilities
D. Preparation and Transfer
E. Storage Mode Facility
F. Site Vehicles
G. Support Facilities
H. Cask Maintenance Facility.

The segments are described in Section 3.7.1 of this document. These segments are integrated in design, construction, and operation to ensure compliance with all requirements.

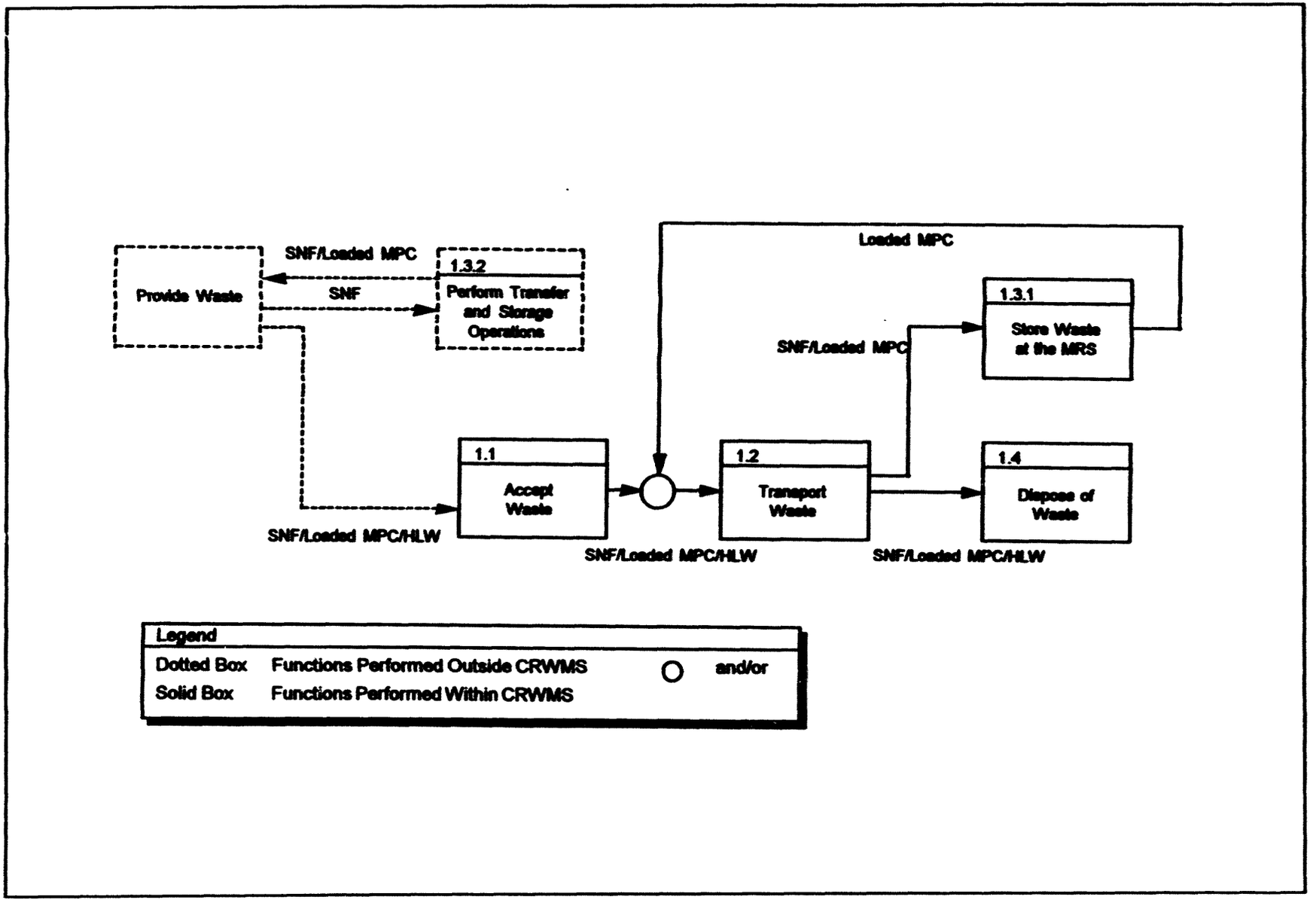

Figure 3-1. 1. Manage Waste Disposal Function Flow Diagram

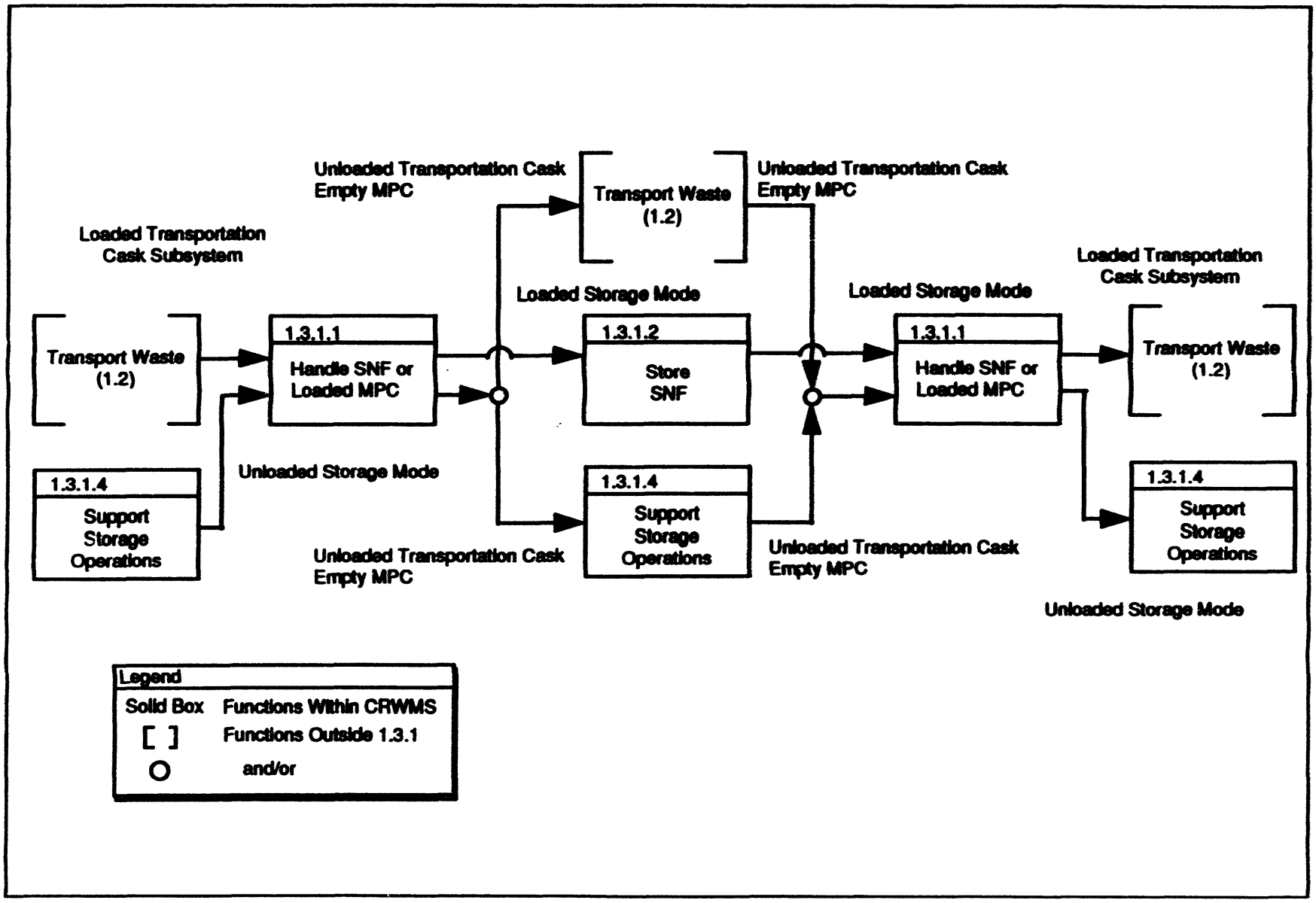

Figure 3-2. 1.3.1 Store Waste at the MRS Function Flow Diagram

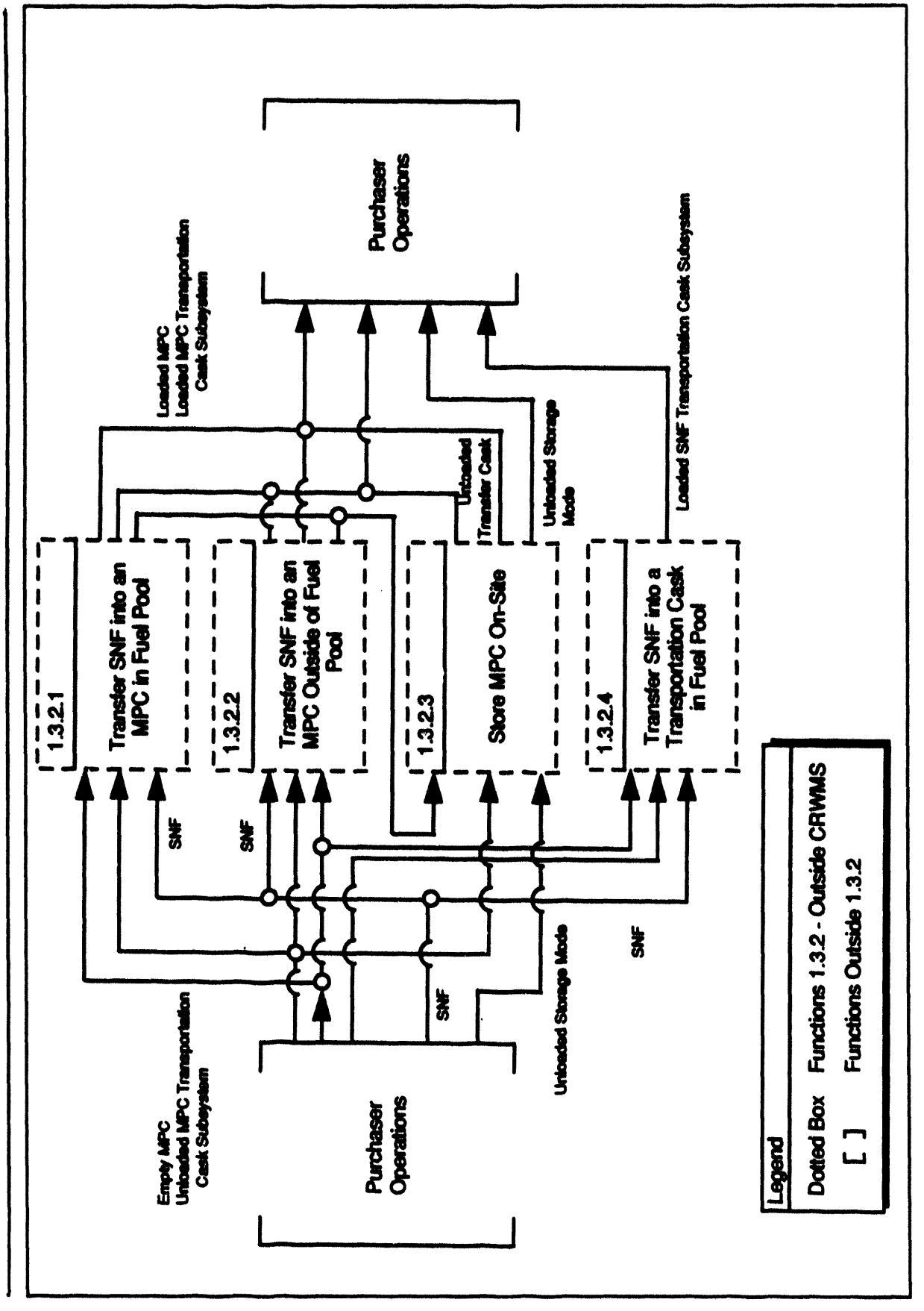

Figure 3-3. 1.3.2 Perform Transfer and Storage Operations Function Flow Diagram

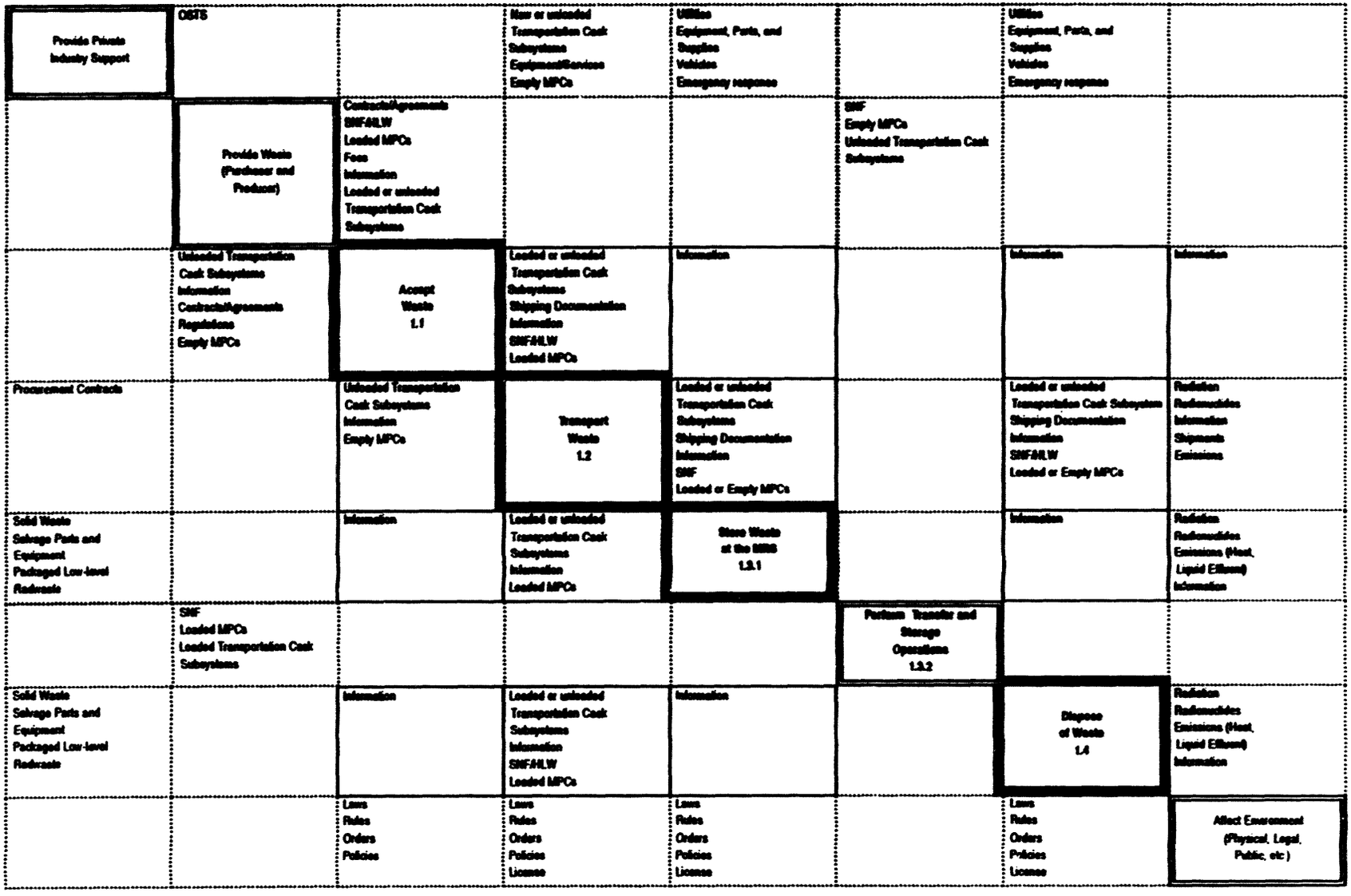

Figure 3-4. N-Square Chart for 1. Manage Waste Disposal

Functions Outside CRWMS				Legal, regulatory, and licensing constraints Equipment, parts, tools, and supplies Vehicles, Utilities, Services
	Functions Outside Store Waste at the MRS 1.3.1	SNF Loaded MPCs Transportation cask subsystems Prime movers Reports & documentation		Reports Guidelines Data Empty MPCs
Radiation Radionuclides Heat	SNF Loaded MPCs Transportation cask subsystems Prime movers	**Handle SNF or Loaded MPC 1.3.1.1**	Loaded storage mode & transporter	Unloaded transportation cask subsystems, Used parts and equipment, Low-level radwaste, Solid and liquid wastes, Hazardous waste, Reports, data, & information, Unloaded storage mode, Storage mode transporter
Radiation Radionuclides Heat		Loaded storage mode & transporter	**Store SNF 1.3.1.2**	Used parts and equipment, Low-level radwaste, Solid and liquid wastes, Hazardous waste, Reports, data, & information, Storage mode transporter
Radiation Radionuclides Heat Packaged low-level radwaste Solid waste Liquid effluent Packaged hazardous waste Information, reports, & data Emissions Salvage parts & equipment	Reports & documentation Guidelines Data	Procedures & guidelines Unloaded storage mode & transporter Maintenance, tools, supplies Utilities R.P. & Technical services Emergency response Reports, data, & information Security Unloaded transportation cask subsystems Empty MPCs	Procedures & guidelines Maintenance, tools, supplies Utilities R.P. & Technical services Emergency response Storage mode transporter Reports, data, & information Security	**Support Storage Operations 1.3.1.4**

Figure 3-5. N-Square Chart for 1.3.1 Store Waste at the MRS

Purchaser	• SNF • Unloaded MPC Transfer Cask • Empty MPCs • Unloaded MPC Transportation Cask Subsystems	• SNF • Unloaded SNF Transfer Device • Empty MPCs • Unloaded MPC Transfer Cask • Unloaded MPC Transportation Cask Subsystems	• SNF • Storage Mode • Unloaded MPC Transfer Cask • Empty MPCs • Unloaded MPC Transportation Cask Subsystems	• SNF • Empty MPC • Unloaded Transportation Cask Subsystems
• Unloaded MPC Transfer Cask • Loaded MPCs • Loaded MPC Transportation Cask Systems	**Transfer SNF into a MPC in Fuel Pool 1.3.2.1**		• Loaded MPC • Loaded MPC Transfer Cask	
• Unloaded SNF Transfer Device • Loaded MPCs • Loaded MPC Transportation Cask Subsystems		**Transfer SNF into a MPC Outside of Fuel Pool 1.3.2.2**	• Loaded MPC • Loaded MPC Transfer Cask	
• Unloaded MPC Transfer Cask • Storage Mode • Loaded MPCs • Loaded MPC Transportation Cask Subsystems			**Store MPC On-Site 1.3.2.3**	
• SNF • Loaded MPC • Loaded Transportation Cask Subsystems				**Transfer SNF into a Transportation Cask in Fuel Pool 1.3.2.4**

Legend: Dotted Line - Outside CRWMS Boundary Double Box - Functions Performed Outside CRWMS Solid Line - Within CRWMS Boundary
Thick Box - Functions Performed Within CRWMS

Figure 3-6. N-Square Chart for 1.3.2 Perform Transfer and Storage Operations

The OSTS segments are as follows:

A. On-Site Transfer Segment
B. On-Site Storage Segment
C. Bare SNF Transfer Segment

The OSTS segments are described in Section 3.7.2 of this document. These segments are integrated in design and operation to ensure compliance with all requirements.

3.1.4 Function to Architecture Cross-Reference

The function flow diagrams are used in defining the "functional areas" identified in Section 3.1.3 as segments. The functional areas are groupings of similar functions with like environmental control requirements. The requirements for these areas are reviewed and the segments are defined.

Section 3.7 and Appendix B identify functions to be performed by each of the segments of the MRS facility and the OSTS.

3.1.5 Major Considerations and Assumptions

Generally, the following assumptions are intended to provide guidance to proceed with design activities, and are based on informed technical opinion, preliminary study results, and accumulated institutional experience.

3.1.5.1 Siting Considerations

Pending the siting of the MRS facility, requirements from State or Tribal Law, or from the host community, along with requirements for the MRS facility to interface with local utility services, to plan for the availability of access roads and rail lines, and to coordinate plans with local law enforcement agencies, fire and emergency response organizations, or others are not defined. These will be added at a later date.

3.1.5.2 Cask Maintenance Facility

A. The CMF is provided to maintain the transportation casks and to periodically test those casks for continued NRC certification. It has been decided by DOE that the CMF and MRS facility are integrated, with the CMF being developed as a segment of the MRS facility. [United States Government Memorandum dated February 15, 1991 to RW-13 from RW-1][1] [A00000001-01717-5705-SSSSD]

[1] The bracketed text identifies the source for the basis of the assumption.

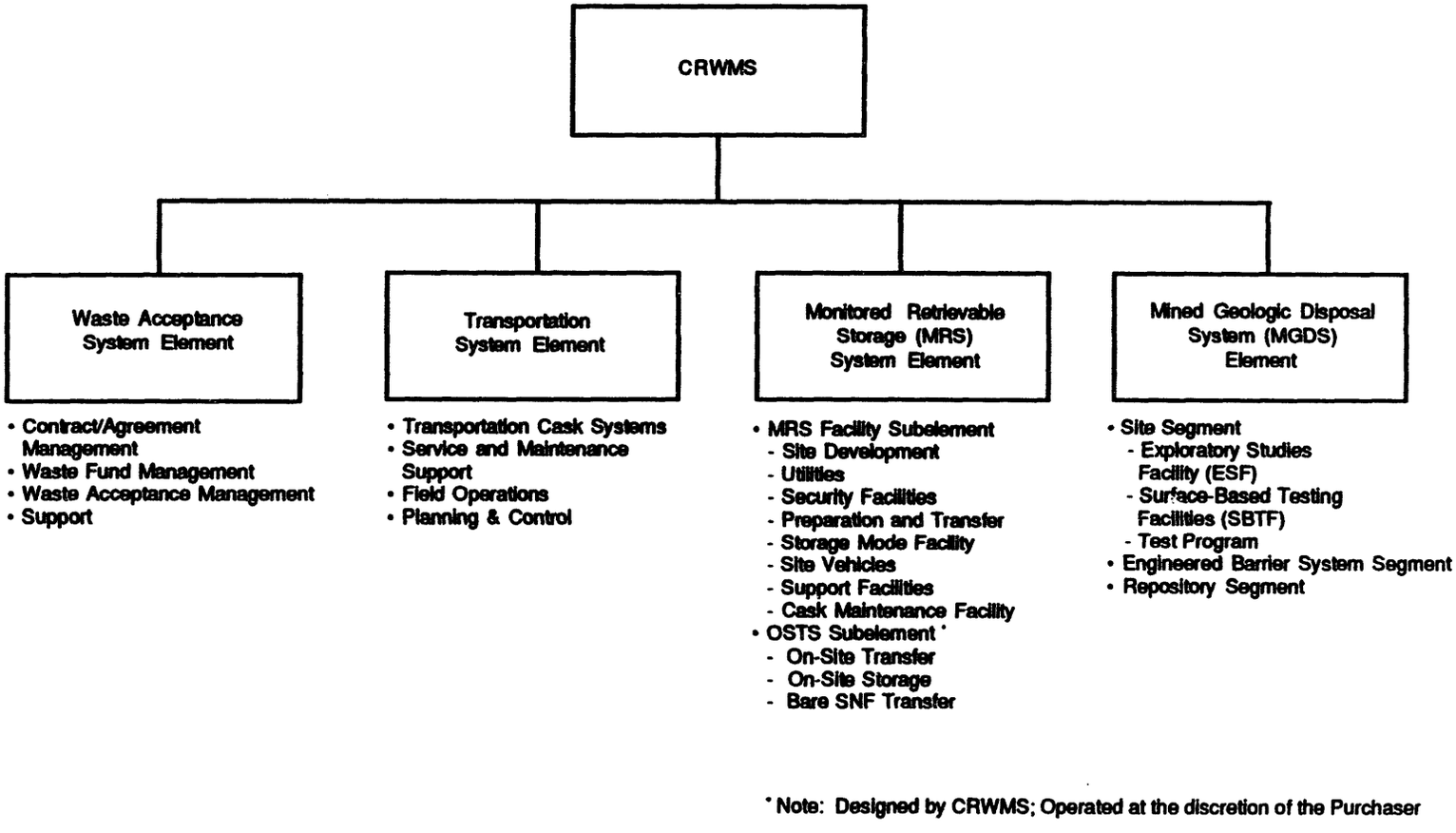

Figure 3-7. CRWMS Architecture

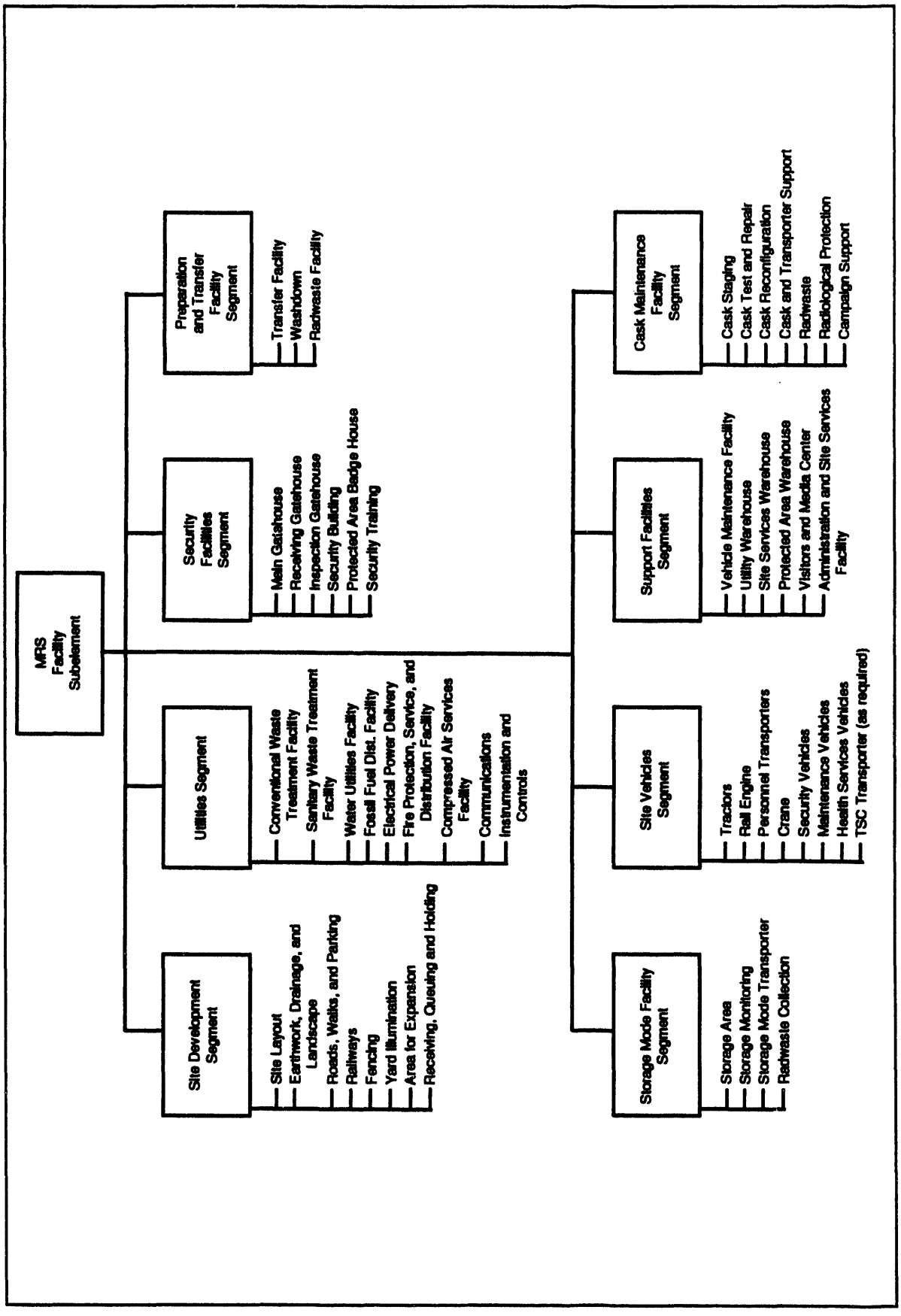

Figure 3-8. MRS Facility Subelement Architecture

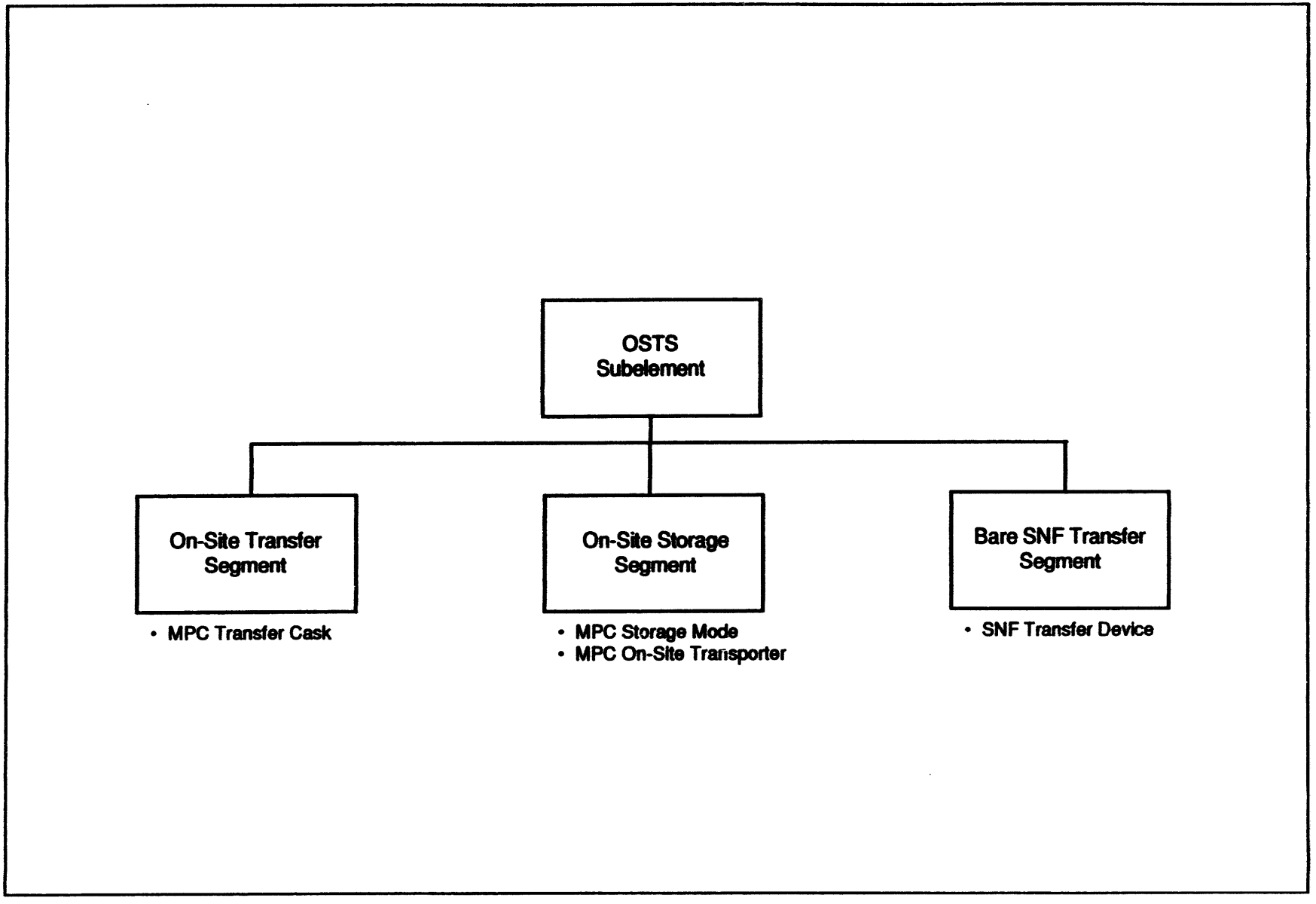

Figure 3-9. OSTS Subelement Architecture

B. The requirements for the CMF are based on the assumption that there will only be one CMF in the CRWMS. If studies show that an additional CMF should be located at the MGDS, then the number of transportation cask subsystems required to be maintained at the MRS facility may be reduced. **<TBR>**

3.1.5.3 Design Capacity

The required average annual capacity of the MRS facility for handling and storage of SNF is based on the following assumptions:

A. Operational availability factors are as stated in this document and are, in turn, based on the historical data for the notional equipment list presented in "Component Descriptions of the Storage-Only MRS and Repository Systems for the FY-90 System Integration Program Studies", JAI-345, September 1990.

B. Before the MGDS first accepts SNF, the design basis for SNF receipt at the MRS facility will be based on maximum receipt in a year of 65% of total weight in pressurized water reactor (PWR) assemblies, or a maximum of 56% in boiling water reactor (BWR) assemblies. Additionally, the design will be based on maximum receipt in a year of 36% of total weight in truck casks, or a maximum of 96% in rail casks. All rail casks are MPC transportation casks. [A00000000-01717-2200-00001]

C. After the MGDS first receives SNF, the design basis for SNF receipt will be based on maximum receipt in a year of 70% of total weight in PWR assemblies, or a maximum of 45% in BWR assemblies. [A00000000-01717-2200-00001]

D. All SNF shipments to the MGDS from the MRS facility will be shipped by rail in MPC transportation casks.

E. The MRS facility will utilize pass-through and flow-through operating strategies.

F. The extent of blending (i.e., the mixing in waste packages of SNF of different thermal outputs) which is required is limited to that which can be accommodated by the waste management process. Thermal loading studies will determine the extent of blending which must occur. If these studies show that significant blending is required, then this assumption will be revised.

G. An MRS facility site obtained through the actions of the Nuclear Waste Negotiator or his Office will have no less stringent limitations placed upon it than those placed upon a mandated site chosen under Title I, Subtitle C, of NWPA.

H. Delivery of SNF in loaded MPCs from the MRS to the MGDS will commence in 2010.

I. Truck casks with capacities of 4 PWR or 9 BWR assemblies will be utilized in the CRWMS.

J. The OCRWM schedule network and this document assume the NWPAA will be revised to allow the MRS facility construction and operation to begin before the NRC issues a license for the construction of a repository. This applies to the acceptance rates currently considered for the CRWMS. However, since NWPAA has not been amended, requirements 3.2.3.2.1.D and 3.2.3.2.1.E identifying the linkage of constructing the MRS with the licensing of the MGDS are included in this document. It is assumed those requirements will be revised with a future NWPA Amendment.

K. The MRS facility operations will commence in the year 2000.

3.1.5.4 Unloaded Transport Cask Storage

It is presumed that the number of transportation cask subsystems in the waste management system will gradually increase as the amount of SNF accepted increases and the number of Purchasers served increases. Before the MGDS first receives waste, the MRS facility will have the capability of providing parking for all transportation cask subsystems from which waste has been removed (unloaded condition) in the waste management system. After the MGDS first receives waste, the MRS facility will have the capability to park all of the truck cask subsystems and one-half of the rail cask subsystems operated by transportation, in the unloaded condition.

3.1.5.5 Operational Control Center Location

A central management and operations control center (CMOCC) will be part of the CRWMS, but its location has not been determined.

3.1.5.6 Storage Mode

A. The reference storage mode used in this document is for illustrative purposes only. Since a final storage technology has not been chosen, requirements pertaining to all technologies referenced in the MPC MRS Conceptual Design Report and the MPC Utility Transfer System Conceptual Design Report have been included.

B. The MRS will provide the capability for storage of 1000 MTU in TSCs and 1000 MTU in loaded MESCs received from the Purchasers. The methods and requirements for handling and storing TSCs and MESCs that differ from those for MPCs will be determined on an individual basis for each NRC approved design used by the Purchaser.

3.1.5.7 Duplication of Requirements

A. This document assumes that for activities and facilities for which the NRC has regulatory authority, the NRC requirements are the only controlling "nuclear safety" requirements. This means that portions of CFRs issued by DOE and DOE Orders that address topics covered by CFRs issued by the NRC are not applicable to the MRS facility. Specifically, DOE Order 5480.11 is not applicable. [MOA NS/RW dated April 16, 1992 to NS-1 from RW-1]

B. This document assumes that for activities and facilities for which the NRC has regulatory authority, the NRC requirements are the only controlling "nuclear safety" requirements. This means that portions of CFRs issued by DOE and DOE Orders that address topics covered by CFRs issued by the NRC are not applicable to the OSTS. The applicability of other DOE Orders to the OSTS will limited to those identifying standard industrial practices. [MOA NS/RW dated April 16, 1992 to NS-1 from RW-1]

3.1.5.8 Low-level Rad-waste Disposal

It is assumed that the MRS facility will be located in a state that is a part of a low-level radioactive waste compact. This will allow for periodic shipments of low-level rad-waste to the compact for disposal. It is assumed that these shipments would be made every six months.

3.1.5.9 SNF Transport

It is assumed that the MPC will not be used at all Purchaser facilities, and therefore the CRWMS must maintain the capability of transporting bare SNF assemblies to the MRS facility or MGDS, and provide for the handling and transfer of bare SNF at both the MRS facility and the MGDS.

3.1.5.10 OSTS

A. The OSTS is currently not part of the CRWMS. However, in order to facilitate Purchaser on-site use of the MPC, OCRWM will provide a design and specifications for equipment that will enable the Purchasers to perform on-site transfer and storage of MPCs.

B. The design and certification of the OSTS are presumed to be CRWMS responsibilities. The procurement and operation are presumed to be Purchaser responsibilities. Requirements related to the OSTS are not to be construed as being levied on the Purchaser, rather they are requirements on the design that may be adopted by the Purchaser to utilize the MPC concept. Final determination of licensing, procurement, and operational responsibilities will be addressed in agreements that are yet to be established with the purchasers.

3.1.5.11 MPC Storage

The MPC and any overpack for storage will constitute the storage mode. The MPC serves as a canister (basket) for the SNF confinement and criticality control.

3.1.5.12 MPC Seal

The MPC may be opened for testing or inspection at the MRS facility; however the design will presume that the MPC will remain sealed at the MRS facility. MPCs may also be opened if they are damaged, to allow for SNF transfer to an undamaged MPC.

3.1.5.13 SNF Ownership

The CRWMS will accept title of the SNF, whether contained in an MPC or not, only at time the of transfer of physical possession. The ownership of the SNF or loaded MPC remains with the Purchaser while it is stored on-site. **<TBR>**

3.1.5.14 Purchaser License Precedence

Transfer operations at the Purchaser facility will be governed by each Purchaser operating license. (Utility licenses are governed by 10CFR50, which is not applicable to the CRWMS.) Some activities related to a cask and MPC that take place in the 10CFR50 licensed fuel building are required by the 10CFR71 (for transportation casks) and 10CFR72 Subpart K (for storage casks) Certificates of Compliance or license. Other activities take place at independent spent fuel storage installations already licensed under 10CFR72 and are required by 10CFR71 for cask handling and existing or modified procedures for 10CFR72. These activities include the closing and sealing of the cask or MPC. Nothing in this requirements document should be construed to countermand any provision of a Purchaser license. The design of the physical equipment of the OSTS will be designed to the criteria of 10CFR72 for storage and to be compatible with the loading requirements of 10CFR71, without conflicting with any provisions of an existing Purchaser license.

3.1.5.15 Design Basis SNF

The MRS facility and the OSTS design will be based on the following design basis SNF characteristics. **<TBR>**

Characteristics	PWR Assembly	BWR Assembly
Maximum length[1] (inches)	180	180
Maximum cross-section[1] (inches)	9 x 9	6 x 6
Reference burnup[2] (MWD/MTU)	40,000	40,000
Initial enrichment[2] (wt% U-235)	3.75	3.75
Minimum decay time (years)	5	5
Minimum decay time for full cask loading (years)	10	10

[1] This dimension includes integral nonfuel components

[2] The combination of reference burnup, initial enrichment, and decay time provides the minimum thermal and radiological conditions to be met in the design.

3.2 CHARACTERISTICS

3.2.1 Performance Characteristics

A. The MRS facility is expected to operate in the following phases:

1. **Initial Operation.** In this phase, SNF and loaded MPCs are being received and stored at the MRS facility but none are being shipped to the MGDS.

2. **Transition Operation.** In this phase, receipt of SNF and loaded MPCs at the MRS facility is ramping up to Steady State levels, while a small amount of SNF in MPCs is beginning to be shipped to the MGDS for disposal.

3. **Steady State Operation.** In this phase, SNF and loaded MPCs are being received from Purchasers while, at the same time, approximately the same amount of SNF in MPCs is being shipped to the MGDS for disposal.

4. **End of Life Cycle Operation.** In this phase, the MRS facility is no longer receiving SNF or loaded MPCs but is shipping loaded MPCs to the MGDS.

5. **Decommissioning.** In this phase, the facility is no longer providing loaded MPC storage and is being decontaminated and/or dismantled so the site can be released for uncontrolled use.

6. **Off-Normal Condition.** In this phase, the facility is operating under one or more accident or unusual condition(s).

B. The OSTS at each Purchaser site, as applicable, is expected to operate in the following phases:

1. **Initial Operation.** In this phase, the OSTS will transfer SNF to MPCs for storage on-site. No SNF or loaded MPCs are loaded into transportation casks for shipment to the MRS or MGDS.

2. **Normal Operation.** In this phase, the OSTS is loading MPCs for shipment to the MRS or MGDS, as well as possible on-site storage. The OSTS normal operation phase will be in parallel with the initial, transition, and steady state operations of the MRS facility as described above.

3. **Decommissioning.** In this phase, the OSTS is no longer used and is being decontaminated and/or dismantled so as not to degrade the ability of the Purchaser to decommission the site in accordance with their license.

4. **Off-Normal Operation.** In this phase, the OSTS is operating under one or more accident or unusual condition(s). Off-normal operations may coincide with any of the other three operational phases of the OSTS.

3.2.1.1 MRS Facility Initial Operation Requirements

3.2.1.1.1 SNF and Loaded MPC Receipt

The MRS facility shall be capable of receiving SNF and loaded MPCs for storage beginning in the year 2000 **<TBR>**. [A00000000-01717-6700-00001][1][CRD 3.2.1.1.E]

3.2.1.1.2 Receipt Rate

The MRS facility shall be capable of receiving SNF and loaded MPCs, storing, and shipping MPCs to the MGDS at the rates shown in Table 3-2. [DOE/RW-0412] [A00000000-01717-6700-00001] [A00000000-01717-2200-00001][CRD 3.2.1.C]

Table 3-2. MRS Facility SNF Handling Capacity (Metric Tons of Initial Uranium or Equivalent) <TBR>

	MRS Facility Activity					
Year	Receipt (nom.)*	Pass-through**	Flow-through**	Placement into Storage**	Retrieval from Storage**	Shipment to MGDS (nom.)*
Initial						
1	900	0	0	900	0	0
2	900	0	0	900	0	0
3	900	0	0	900	0	0
4	900	0	0	900	0	0
5	900	0	0	900	0	0
6	900	0	0	900	0	0
7	900	0	0	900	0	0
8	900	0	0	900	0	0
9	900	0	0	900	0	0
10	900	0	0	900	0	0
Transition						
11	1400	0	300	1100	0	300

[1] Indicates the source document for the basis of the requirement.

**Table 3-2. MRS Facility SNF Handling Capacity (Continued)
(MTU or Equivalent) <TBR>**

	MRS Facility Activity					
Year	Receipt (nom.)*	Pass-through**	Flow-through**	Placement into Storage**	Retrieval from Storage**	Shipment to MGDS (nom.)*
12	2000	0	600	1400	0	600
13	2600	0	1200	1400	0	1200
14	3000	0	2000	1000	0	2000
Steady State						
15	3000	300	2700	0	0	3000
16	3000	300	2700	0	0	3000
17	3000	300	2700	0	0	3000
18	3000	300	2700	0	0	3000
19	3000	300	2700	0	0	3000
20	3000	260	2740	0	0	3000
21	3000	250	2750	0	0	3000
22	3000	310	2690	0	0	3000
23	3000	300	2700	0	0	3000
24	3000	350	2650	0	0	3000
25	3000	140	2860	0	0	3000
26	3000	300	2700	0	0	3000
27	3000	290	2710	0	0	3000
28	3000	200	2800	0	0	3000
29	3000	350	2400	0	250	3000
End of Life Cycle						
30	0	0	0	0	3000	3000
31	0	0	0	0	3000	3000

Table 3-2. MRS Facility SNF Handling Capacity (Continued) (MTU or Equivalent) <TBR>

	MRS Facility Activity					
Year	Receipt (nom.)*	Pass-through**	Flow-through**	Placement into Storage**	Retrieval from Storage**	Shipment to MGDS (nom.)*
32	0	0	0	0	3000	3000
33	0	0	0	0	3000	3000
34	0	0	0	0	1900	1900

* Nominal rates are in support of the acceptance rates in the CRD.
** Values in these columns reflect approximate full-cask shipments and whole-fuel-assembly or full MPC receipts, and may not add to nominal values. They are for MRS facility planning purposes only. The ability to provide flowthrough and retrieval from storage must be maintained until the MRS facility is decommissioned.

3.2.1.2 MRS Facility Transition Operation Requirements

The MRS shall be capable of receiving SNF and loaded MPCs, placing loaded MPCs into storage, and flowing through loaded MPCs to the MGDS, at the rates shown in Table 3-2. [DOE/RW-0412][A00000000-01717-6700-00001][A00000000-01717-2200-00001][CRD3.2.1.C]

3.2.1.3 MRS Facility Steady State Operation Requirement

The MRS facility shall be capable of receiving, storing, and retrieving SNF and loaded MPCs, also flowing through loaded MPCs and passing through SNF to the MGDS at the rates shown in Table 3-2. [A000000-01717-6700-00001][A00000000-01717-2200-00001]

3.2.1.4 MRS Facility End of Life Cycle Operation Requirements

The MRS facility shall be capable of retrieving loaded MPCs from storage and shipping it to the MGDS at the rates shown in Table 3-2. [A00000000-01717-6700-00001][A00000000-01717-2200-00001][CRD 3.2.1.C]

3.2.1.5 MRS Facility Decommissioning Requirements

3.2.1.5.1 Design Compatibility

A. The design process for the MRS facility shall evaluate alternative decommissioning methods. An analysis of these methods will be conducted during SAR design. [CRD 3.7.3.2.H]

B. The MRS facility SAR design shall reflect requirements resulting from the decommissioning analysis. A proposed decommissioning plan will be submitted with the License Application for the MRS facility presenting a brief description of the proposed method and the design features incorporated to facilitate decontamination and decommissioning. [10CFR72.30(a)]

3.2.1.5.2 Decommissioning Safety

The design, construction, and operation of the MRS facility shall accommodate decommissioning without endangering the health and safety of the public, compromising the security of the facility, or restricting the ability of the MRS facility to plan for the secure removal of all SNF, which may be loaded in MPCs, from the site prior to decommissioning authorization being granted. [10CFR72.54(d)]

3.2.1.5.3 Site Releasability

The design, operation, and construction of the MRS facility, shall be such that, after decommissioning, the site can be released for unrestricted use. [10CFR72.54(e)(2)]

3.2.1.5.4 Facility Decontamination

The design of the MRS facility shall minimize areas of potential radioactive contamination. In areas of possible radioactive contamination, the design will utilize materials and coatings which facilitate decontamination or the removal of contaminated materials. [10CFR72.130]

3.2.1.5.5 Design Considerations

The design of the MRS facility shall consider inclusion of the features described in DOE Order 6430.1A, Sec. 1300-11.2, in order to facilitate future decommissioning. [DOE Order 6430.1A, Sec. 1300-11.2]

3.2.1.5.6 Facility Dismantling

The MRS facility shall be designed to facilitate dismantling structures and facilities, and returning the site to the greenfield condition to the extent practicable as agreed to by the host. [CRD 3.2.1.2.C]

3.2.1.6 MRS Facility Off-Normal Requirements

3.2.1.6.1 Emergency Accessibility

A. Structures, systems, and components important to safety shall be designed for emergencies. [10CFR72.122(g)]

B. The MRS facility shall provide access to structures, systems, and components important to safety for on-site and off-site emergency response vehicles, equipment and personnel. [10CFR72.122(g)]

3.2.1.6.2 Off-Site Dose Limit

The MRS facility shall be designed, constructed, and operated to provide shielding and containment for radioactive materials such that the maximum individual dose at or beyond the site controlled area boundary, resulting from a design basis accident, is less than five rem to the whole body or any organ. [10CFR72.106(b)]

3.2.1.7 OSTS Initial Operation Requirements

The OSTS shall be capable of beginning MPC loading, handling, and on-site storage by January 31, 1998 **<TBR>**. [NWPA 302(a)(5)][DOE/RW-0412][CRD 3.2.1.C][CRD 3.2.1.1.E]

3.2.1.8 OSTS Normal Operation Requirements

3.2.1.8.1 SNF Storage

The OSTS at each Purchaser facility, as applicable, shall be capable of beginning SNF and/or loaded MPC handling, and on-site storage operations by January 31, 1998 **<TBR>**. [DOE/RW-0412][CRD 3.2.1.C]

3.2.1.8.2 SNF Shipment

The OSTS at each Purchaser facility, as applicable, shall provide the capability of handling SNF and MPCs, retrieving loaded MPCs from storage, and preparing them for transport to support the MRS facility receipt rates described in Table 3-2. [DOE/RW-0412][A00000000-01717-6700-00001][A00000000-01717-2200-00001][CRD 3.2.1.C][CRD 3.2.1.1.E]

3.2.1.9 OSTS Decommissioning Requirements

3.2.1.9.1 Decommissioning Safety

The design of the OSTS shall accommodate decommissioning without endangering the health and safety of the public, compromising the security of the Purchaser facility, or restricting the ability of the Purchaser to plan for the secure removal of all SNF or loaded MPCs from the site prior to decommissioning authorization being granted. [10CFR72.54(d)][CRD 3.2.1.2.B]

3.2.1.9.2 Site Releasability

The design of the OSTS shall allow for decommissioning, so as not to degrade the ability of the Purchaser to decommission the site in accordance with the Purchaser decommissioning plan and license. [10CFR72.54(e)(2)][10CFR72.212(b)(4)][CRD 3.2.1.2.C]

3.2.1.9.3 OSTS Decontamination

The design of the OSTS shall minimize areas of potential radioactive contamination. In areas of possible radioactive contamination, the design will utilize materials and coatings which facilitate decontamination or the removal of contaminated materials. [10CFR72.130][CRD 3.7.3.2.J]

3.2.1.9.4 OSTS Dismantling

The OSTS shall be designed to facilitate dismantling structures and facilities, and not to degrade the ability of the Purchaser to decommission the site in accordance with the Purchaser decommissioning plan and license. [10CFR72.212(b)(4)][CRD 3.2.1.2.C]

3.2.1.10 OSTS Off-Normal Requirements

3.2.1.10.1 Emergency Accessibility

The OSTS shall not impair, at the Purchaser facility, access to structures, systems, and components important to safety for on-site and off-site emergency response vehicles, equipment, and personnel. [10CFR72.122(g)]

3.2.1.10.2 Off-Site Dose Limit

The design of the OSTS shall be such that the Purchaser can operate the OSTS without exceeding the dose limits established by the facility license. [10CFR72.212(b)(4)][CRD 3.2.1.1.G][CRD 3.3.1.B]

3.2.2 Radiological Protection

3.2.2.1 Overall Annual Dose

When evaluating the risks to the health and safety of the public, the annual dose from the MRS facility shall be combined with annual doses from all other nuclear facilities in the area. [10CFR72.122(e)]

3.2.2.2 Annual Public Dose Limit

During normal operations and all anticipated occurrences, the annual dose equivalent to any individual who is located beyond the controlled area shall not exceed 25 mrem (0.25 mSv) to the whole body, 75 mrem (0.75 mSv) to the thyroid, and 25 mrem (0.25 mSv) to any other organ as a result of exposure to planned discharges of radioactive materials, radon and its decay products excepted, to the general environment by the MRS facility, direct radiation from MRS facility operations, and any other radiation from uranium fuel cycle operations within the region. [10CFR72.104(a)] [40CFR191.03(a)]

3.2.2.3 Radiation Protection Program

A. The MRS facility shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of 10CFR20. [10CFR20.1101(a)]

B. The MRS facility shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA). [10CFR20.1101(b)]

3.2.2.4 Occupational Dose Limit for Adults

A. The MRS facility shall be designed and have procedures in place so the occupational dose to adults is equal to or less than the following dose limits: an annual limit the more limiting of total effective dose equivalent of 5 rems (0.05 Sv), or sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 Sv); and annual limits to the lens of the eye, to the skin, and to the extremities, which are an eye dose equivalent of 15 rems (0.15 Sv), and a shallow-dose equivalent of 50 rems (0.50 Sv) to the skin or to any extremity. [10CFR20.1201(a)(1)(2)]

B. The MRS facility shall assess the deep-dose equivalent and shallow-dose equivalent for the part of the body receiving the highest exposure. The MRS facility shall assess the deep-dose equivalent, eye dose equivalent and shallow-dose equivalent from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable. [10CFR20.1201(c)]

3.2.2.5 Occupational Dose Limits for Minors

The MRS facility shall have procedures to limit the annual occupational dose limits for minors to be 10% of the annual dose limits specified for adult workers in Section 3.2.2.4. [10CFR20.1207]

3.2.2.6 Dose Limits to an Embryo/Fetus

The MRS facility shall develop procedures to ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (0.005 Sv). [10CFR20.1208(a)]

3.2.2.7 Public Dose Limits

A. The MRS facility shall be designed and have procedures in place so that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 100 mrem (1 mSv) in a year, exclusive of the dose contribution from the MRS facility disposal of radioactive material into sanitary sewerage in accordance with 10CFR20.2003.[1] [10CFR20.1301(a)(1)]

B. The MRS facility shall be designed and have procedures in place so that the dose in any unrestricted area from external sources does not exceed 2 mrem (0.02 mSv) in any one hour. [10CFR20.1301(a)(2)]

C. If the MRS facility permits members of the public to have access to controlled areas, the limits for members of the public shall continue to be applicable to those individuals. [10CFR20.1301(b)]

3.2.2.8 Compliance with Public Dose Limits

The MRS facility shall show compliance with the annual dose limit in 10CFR20.1301 by demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed operation does not exceed the annual dose limit, or, by demonstrating that the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table 2 of Appendix B to 10CFR20.1001-20.2401, and the dose from external sources, to an individual continually present in an unrestricted area, would not exceed 2 mrem (0.02 mSv) in an hour and 50 mrem (0.5 mSv) in a year. [10CFR20.1302(b)]

3.2.2.9 Surveys

The MRS facility shall be designed to allow personnel ready access to make surveys of radiation levels as required by 10CFR20.1302(a) and 10CFR20.1501(a). [10CFR20.1302(a)] [10CFR20.1501(a)]

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[1] The MRS facility may apply for prior NRC authorization to operate up to an annual dose limit for an individual member of the public of 500 mrem (5 mSv) in accordance with 20CFR1301(c).

3.2.2.10 Radiation Exposure Monitoring

The MRS facility will monitor occupational exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of 10CFR20, including:

A. The MRS facility shall supply and have procedures to require the use of individual monitoring devices by:

1. Adults likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of the limits in 10CFR20.1201(a).

2. Minors and declared pregnant women likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of any of the applicable limits in 10CFR20.1207 or 10CFR20.1208.

3. Individuals entering a high or very high radiation area.

[10CFR20.1502(a)]

B. The MRS facility shall monitor, as specified in 10CFR20.1204, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

1. Adults likely to receive, in 1 year, an intake in excess of 10% of the applicable annual limit on intake ALI(s) in Table 1, Columns 1 and 2, of Appendix B to 10CFR20.1001-10CFR20.2401.

2. Minors and declared pregnant women likely to receive, in 1 year, a committed effective dose equivalent in excess of 0.05 rem (0.5 mSv).

[10CFR20.1502(b)]

3.2.2.11 MRS Facility Exposure Control

A. Radiation protection systems shall be provided for all areas and operations where on-site personnel may be exposed to radiation or airborne radioactive materials. [10CFR72.126(a)]

B. Structures, systems, and components for which operation, maintenance, and required inspections may involve occupational exposure shall be designed, fabricated, located, shielded, controlled, and tested so as to control external and internal radiation exposures to personnel. [10CFR72.126(a)]

C. The design shall include means to prevent the accumulation of radioactive material in those systems requiring access. [10CFR72.126(a)(1)]

D. The design shall include means to decontaminate those systems to which access is required. [10CFR72.126(a)(2)]

E. The design shall include means to control access to areas of potential contamination or high radiation within the MRS facility. [10CFR72.126(a)(3)]

F. The design shall include means to measure and control contamination of areas requiring access. [10CFR72.125(a)(4)]

G. The design shall include means to minimize the time required to perform work in the vicinity of radioactive components, for example, by providing sufficient space for ease of operation and designing equipment for ease of repair and replacement. [10CFR72.126(a)(5)]

H. The design shall include means to shield personnel from radiation exposure. [10CFR72.126(a)(6)]

3.2.2.12 Emissions

The design of the MRS facility shall provide that emissions of radionuclides to the ambient air do not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem (0.1 mSv). [40CFR61.92]

3.2.2.13 OSTS Radiological Protection

A. The radiological protection features of the OSTS design will be integrated with the radiation protection system of the Purchaser facility, and the OSTS design shall not significantly impact the performance of the Purchaser site with regard to radiation dose limits, radiation exposure control, radiation emission limitations, or other radiation protection measures. [CRD 3.3.1.B]

B. The design of the OSTS shall consider the exposure limits of 10CFR20.1201, 10CFR20.1301, and 10CFR72.104, so as not to compromise the limits of the Purchaser site or ISFSI. If the radiation protection programs and occupational exposure limits of the Purchaser are more stringent than the regulatory limits, these will be considered for design. [10CFR20.1101] [10CFR72.44(d)] [10CFR72.236(e)] [CRD 3.3.1.B]

3.2.3 Interface Requirements

See Section 3.7 for interfaces between segments of the MRS facility and between segments of the OSTS.

3.2.3.1 Interfaces External to the CRWMS

Interfaces to local utilities, law enforcement agencies, fire and emergency response organizations, and others will be developed and requirements shall be included in the MRS Facility Design Requirements Documents (DRDs). The OSTS is operated by the Purchaser. The operation of the OSTS is dependent upon existing equipment at the Purchaser site. This interface is critical to the OSTS design. [Derived by CRD 3.2.3.1]

3.2.3.2 MRS Facility Interfaces with Other CRWMS Elements

The interface requirements between the MRS facility and the other elements of the CRWMS are included in this section.

3.2.3.2.1 MRS Facility-MGDS Interface Requirements

MRS facility and MGDS interface through the combined waste capacity limits in effect when the two facilities are in geographic proximity, through the licensing linkage mandated by law, and during operation when SNF is loaded into the MPC transportation cask systems bound for the MGDS. The administrative interface between the MRS facility and the MGDS, which includes the communication of plans, schedules, and reports, is not addressed in the MRS-SRD.

A. The MRS facility shall not be located in a state which contains any site approved for site characterization for, or for construction of, a HLW repository. [NWPA Sec. 141(g), 10CFR72.96(b)]

B. In the event the MRS facility is located, or planned to be located within 50 miles of the first repository, the combined quantity of waste in both the MRS facility and the first repository shall not exceed 70,000 metric tons of heavy metal until a second repository is in operation. [NWPA Sec. 114(d), 10CFR72.96(c)]

C. The MRS facility shall not be constructed in the State of Nevada. [NWPAA Sec. 145(g), 10CFR72.96(d)]

D. Construction of the MRS facility shall not begin until the NRC has issued a license for the construction of a repository under Section 115(d) of the NWPA. [NWPAA Sec. 148(d)(1), 10CFR72.44(g)(1)]

E. Construction of the MRS facility or acceptance of SNF and loaded MPCs at the MRS facility shall cease during such time as the repository license is revoked by the NRC or construction of the repository ceases. [NWPAA Sec. 148(d)(2), 10CFR72.44(g)(2)]

F. The quantity of SNF to be stored at the MRS facility shall not exceed 10,000 metric tons of heavy metal prior to operation of a repository and shall not exceed 15,000 metric tons of heavy metal at any time. [NWPAA Sec. 148(d)(3)(4)] [10CFR72.44(g)(3)(4)]

G. Prior to delivery of a transportation cask to a carrier for transport, the MRS facility shall ensure that any special instructions needed to safely open it have been sent to or otherwise made available to the MGDS for its use in accordance with 10CFR20.205. [10CFR71.89]

3.2.3.2.2 MRS Facility-Waste Acceptance Interface Requirements

MRS facility and Waste Acceptance interface when SNF and loaded MPCs are unloaded from the transportation cask systems arriving from the Purchasers and its identity is verified, and when unloaded casks are returned to the Purchasers for re-use.

A. The MRS facility shall be capable of receiving and handling standard, failed, and nonstandard SNF described in 10CFR961.11, Appendix E. [10CFR961.11 Article VI.A.1]

B. The MRS facility shall be capable of handling standard SNF, failed SNF, nonstandard SNF, and loaded MPCs using grapples of its own design. [Derived by CRD 3.7.3.1.1]

C. The MRS facility shall have the capability to provide for inspection and verification of the description and characteristics of the SNF or the content of loaded MPCs received. If the SNF or loaded MPC is improperly described, Waste Acceptance will be notified for resolution of the waste description. The capability to verify the description and characteristics of loaded MPCs may not include the need to open the MPC. [10CFR961.11 Art. VI.B.3.(b)]

D. The MRS facility shall have the capability to clean the interiors of unloaded casks to satisfy requirements **<TBD>** and any existing agreements for cleanliness with the waste Purchasers. [Derived by CRD 3.7.3.1.1]

3.2.3.2.3 MRS Facility-Transportation Interface Requirements

MRS facility and Transportation interface when loaded transportation cask subsystems are received at the MRS facility, and when they are dispatched for shipment.

A. The Transportation motive support equipment and the MRS facility shall be equipped with compatible communication equipment allowing truck drivers and rail engineers operating in the immediate vicinity of the MRS facility to provide advanced notice of their arrival. [Derived by CRD 3.7.3.1.1]

B. Access points for vehicles carrying transportation casks shall have an area for detaching and removing the Transportation motive support equipment from the site and attaching an on-site vehicle to the transporter. [Derived by CRD 3.7.3.1.1]

C. Provision shall be made for inspection of loaded transportation cask subsystems upon receipt to ensure that radiation levels external to them, levels of contamination on their surfaces, and their surface temperatures are measured. [CRD 3.2.1.1.F]

D. Queuing space shall be provided for transportation cask subsystems awaiting access to the MRS facility transfer facility and CMF as designated in Table 3-3. [A00000000-01717-2200-00001] **<TBR>**

Table 3-3. MRS Facility Queuing Space for Transportation Cask Subsystems <TBR>

Incoming/Outgoing Transportation Cask Subsystems	Number of Truck Casks	Number of Rail Casks
Incoming Loaded (from Purchaser)	6	15
Outgoing Unloaded (to Purchaser)	6	18
Outgoing Loaded (to MGDS)	N/A	8
Incoming Unloaded (from MGDS)	N/A	18
Maximum simultaneous queuing space	12	33

E. The MRS facility shall provide queuing space sufficient to allow 20 feet separation between loaded transportation casks awaiting access to the cask handling facility. [49CFR177.842(f), 49CFR174.700(d)][CRD 3.2.1.1.F]

F. The MRS facility shall be capable of receiving, handling, and maintaining existing or anticipated to exist transportation cask subsystems as provided by Transportation. The types of transportation cask subsystems presently available or anticipated to be available are shown in Table 3-4. [10CFR961.11 Article IV.B.2][CRD 3.2.1.1.F] **<TBR>**

Transportation will deliver NRC-certified casks to the MRS facility for loading and/or unloading operations.

Table 3-4. Types of Transportation Cask Subsystems <TBR>

Category	NRC Docket No.	Type	Capacity		Loaded Hook Weight (lbs)	Overall Dimensions	
			PWR	BWR[1]		Length (in.)	Diameter (in.)
From-Reactor: Existing Casks							
NLI 1/2	71-9010	LWT	1	2	49,500	195.2	47.125
NAC-LWT	71-9225	LWT	1	2	49,000	214	50
TN-8	71-9015	OWT	3	-	79,400	218	68
TN-9	71-9016	OWT	-	7	79,400	227	68
IF-300[2]	71-9001	Rail	7	17	140,000	210	64
From-Reactor: Innovative Technology Casks							
GA-4	71-9226	LWT	4	-	52,600	187.5	48
GA-9	71-9227	LWT	-	9	52,900	198.0	47.73
Extra Long[2]	<TBD>	<TBD>	<TBD>	<TBD>	<TBD>	<TBD>	<TBD>
Transportable Storage Casks							
<TBD>	<TBD>	Rail	26	52	250,000	202	102
MPCs[3]							
MPC for 75 Ton Cask Subsystem[3]	N/A	N/A	12	24	<TBD>	195	50
75 Ton MPC Cask Subsystem[3]	<TBD>	Rail	12	24	150,000	205	70
MPC for 125 Ton Cask Subsystem[3]	N/A	N/A	21	40	<TBD>	195	60
125 Ton Cask Subsystem[3]	<TBD>	Rail	21	40	250,000	210	90

Note:

[1] Capacity of BWR fuel assembly with channels.

[2] Cask will not be used at the MRS facility, only at the MGDS.

[3] Nominal values, for planning purposes only, based upon the MPC Conceptual Design Report.

G. The MRS facility shall provide facilities to support Transportation emergency operations. For training requirements pertaining to emergency operations, see Section 3.6.2.5.3. [CRD 3.6.2.1.F]

H. The MRS facility shall provide queuing space sufficient to accommodate loaded cask waiting times of 24 hours for casks awaiting access to the protected area. [10CFR73.26(b)(1)]

I. All shipments from the MRS facility to the MGDS shall be made in MPC transportation cask subsystems exclusively by rail in dedicated trains. [DOE/RW-0239][A00000000-01717-6700-00001][CRD 3.2.1.1.I]

J. The MRS facility shall be capable of moving and queuing rail cars and truck trailers of a size and quantity **<TBD>**. [Derived by CRD 3.7.3.1.1]

K. The MRS facility design and operation shall not degrade the life of the loaded MPC and its contents, including shipment to the MGDS. [Derived by CRD 3.2.1.1.H]

The MPC must be designed to be compatible with the service life of the MRS facility.

L. The storage mode shall be designed to handle loaded MPC under the requirements of 10CFR72 for storage at the MRS facility. The storage mode must be compatible with the MPC weight, dimensions, and configuration. [Derived by CRD 3.2.1.1.H] [CRD 3.3.1.B]

The MPC design is responsible for coordinating with the MRS facility design to ensure that the MPC weight, dimensional envelope, and configuration do not exceed MRS facility capabilities to transfer or store the MPC.

M. The SNF or loaded MPC handling and transfer, and storage facilities shall be designed to maintain SNF subcritical. The design must ensure that at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of handling, transfer, and storage facilities must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, transfer and storage conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)][CRD 3.2.2.5]

The MPC design is responsible for maintaining SNF subcritical. The design must demonstrate safety for the handling, transfer and storage conditions and in the nature of the immediate environment under accident conditions.

N. The design of the MRS facility shall ensure that temperatures in the MPC are maintained below the peak SNF cladding temperatures, in storage, that would lead to gross rupture, without active cooling systems. [10CFR72.122(h)(1)] [10CFR72.236(f)][CRD 3.2.1.1.H] **<TBR>**

The MPC design is responsible for ensuring the peak SNF cladding temperature limits are not exceeded, during handling or storage at the MRS facility. **<TBR>**

O. The storage mode and transfer casks shall provide structural integrity for the loaded MPC to withstand loads induced at MRS facility. [Derived by CRD 3.2.1.1.H]

The MPC design is responsible for the structural and confinement integrity of the loaded MPC outside of any overpacks under loads imposed by MRS facility transfer operations and off-normal conditions.

P. The MRS facility shall provide for the protection of workers and the public in the event of accidents involving loss of confinement within the MPC or storage mode. [10CFR72.104(a)][10CFR72.122(h)(5)][CRD 3.2.2.1.E][CRD 3.2.2.5][CRD 3.2.5.1.C]

The MPC design is responsible for the structural integrity of the loaded MPC while loaded in the storage mode under loads imposed by MRS facility handling operations and accident conditions.

Q. The storage mode shall provide access to stored SNF for response to off-normal conditions, that is compatible with the MPC. [10CFR72.122(l)][CRD 3.3.1.B]

The MPC design is responsible for providing access to stored SNF for response to off-normal conditions that is compatible with the storage mode.

R. The MRS facility shall have the capability to load the MPC and load transportation cask subsystems in a configuration that complies with written procedures and in compliance with the transportation cask and storage mode certificates of compliance. [10CFR71.87(f)][10CFR72.122(h)(5)][CRD 3.2.1.1.C]

Transportation will be responsible for providing MPCs and transportation casks compatible with the MRS facility.

S. The MRS facility shall be designed and have procedures such that SNF assemblies will maintain structural integrity and can be unloaded in an intact configuration. [10CFR72.128(a)][CRD 3.2.1.1.J]

The MPC design is responsible for maintaining the structural integrity of the SNF assemblies, while in an MPC, and allowing for unloading of SNF from the MPC in an intact configuration while being stored at the MRS facility.

T. The MRS facility shall be designed to ensure safe storage and handling of SNF in ambient air temperature of -40°C in full shade and still air. [10CFR71.71(c)(2)] [Derived by CRD 3.2.1.1.H]

The MPC design is responsible for maintaining integrity for the minimum temperature limit specified in 10CFR71.71.

U. The loaded storage mode shall be designed to provide redundant sealing of confinement systems. [10CFR72.236(e)][CRD 3.2.1.1.G]

The MPC, as part of the loaded storage mode, will contribute to the redundant sealing of the confinement system.

V. The MRS facility shall have the capability to open, remove SNF, load SNF, and seal the MPC, without damage to the SNF. [10CFR72.122(l)][CRD 3.3.1.B]

The MPC is responsible for providing the capability to be opened, loaded, and unloaded without damaging the SNF.

3.2.3.2.4 MRS Facility Segment Interface Summary

The MRS facility design shall address requirements for the MRS facility segment interfaces with Transportation identified in Table 3.5. Where an interface exists, the block in the table contains an 'X' indicating that there is a functional interface for the MRS facility to address between the segments involving Function 1.2 Transport Waste. An entry of 'NONE' in the table indicates that no interface has been identified between the segments. [DOE Order 4700.1 Ch III B.2.c(2)(c)][CRD 3.2.3.2.B]

Transportation is responsible for ensuring that the Transportation segment interfaces to Function 1.3.1 Store Waste at the MRS are addressed.

Table 3-5. MRS Facility-Transportation Interfaces <TBR>

Transportation→ **SEGMENTS** MRS Facility↓	Transportation Cask Subsystems	Service and Maintenance Support	Field Operations	Planning and Control
Site Development	X	NONE	NONE	X
Utilities	NONE	X	X	X
Security Facilities	X	NONE	NONE	X
Preparation and Transfer	X	NONE	X	NONE
Storage Mode Facility	X	NONE	NONE	NONE
Site Vehicles	X	NONE	NONE	NONE
Support Facilities	NONE	X	X	X
CMF	X	X	X	X

3.2.3.3 OSTS Interfaces with CRWMS Elements

The interface requirements between the OSTS and the other elements of the CRWMS are included in this section.

3.2.3.3.1 OSTS-MGDS Interface Requirements

There are no interfaces currently identified.

3.2.3.3.2 OSTS-Waste Acceptance Interface Requirements

The design of the OSTS shall not conflict with the existing Purchaser license, to include effluent control requirements, and dose limits for normal and off-normal conditions. [10CFR72.212(b)(3)][CRD 3.3.1.B]

Waste Acceptance will be responsible for providing Purchaser design information so that the OSTS does not conflict with existing Purchaser license. Waste Acceptance will operate in parallel with the MPC loading to verify the waste description and verify that the seal feature is in place at the completion of loading.

3.2.3.3.3 OSTS-Transportation Interface Requirements

The OSTS interfaces with Transportation when the loaded MPC is placed into the MPC Transportation Cask, or when SNF is loaded into the SNF Transportation Cask for shipment.

A. The OSTS shall be compatible with the transportation cask subsystems segment. This compatibility will include, but is not limited to, MPC and equipment used for cask closure and decontamination. [DOE Order 4700.1 Ch III.B.2.c(2)(c)][CRD 3.2.1.1.C, CRD 3.2.3.2.B]

   Transportation is responsible for coordinating with the OSTS design to ensure that the cask subsystem, including the MPC, weight, dimensions, and configuration are compatible with the OSTS.

B. The OSTS shall be designed to handle loaded/unloaded MPC under the requirements of 10CFR72 on-site storage and transfer at the Purchaser. [DOE Order 4700.1 Ch III.B.2.c.(2)(c)][CRD 3.2.3.2.B, 3.3.1.B]

   The MPC design is responsible for coordinating with the OSTS design to ensure that the MPC weight, dimensions, and configuration are compatible with the storage mode.

C. The OSTS handling and transfer, and storage systems shall be designed to maintain SNF subcritical. The design must ensure that, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of OSTS handling, transfer, and storage systems must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, transfer and storage conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)][CRD 3.2.2.5]

   The MPC design is responsible for maintaining SNF subcritical. The design must demonstrate safety for the handling, transfer and storage conditions and in the nature of the immediate environment under accident conditions.

D. The design of the OSTS shall ensure that temperatures in the MPC are maintained below the peak SNF cladding temperatures, in storage, that would lead to gross rupture, without active cooling systems. [10CFR72.122(h)(1)][10CFR72.236(f)][CRD 3.2.1.1.H] **<TBR>**

   The MPC design is responsible for ensuring the peak SNF cladding temperature limits are not exceeded, during handling or storage by the OSTS. **<TBR>**

E. The OSTS storage mode and transfer casks shall provide structural integrity for the loaded MPC to withstand loads induced by the OSTS operations. [10CFR72.122(h)(5)][10CFR72.236(b)(c)(g)][CRD 3.2.5.1.C][CRD 3.3.1.B][Derived by CRD 3.2.1.1.H]

The MPC design is responsible for the structural and confinement integrity of the loaded MPC outside of any overpacks under loads imposed by the OSTS transfer operations and off-normal conditions.

F. The OSTS shall provide for the protection of workers and the public in the event of accidents involving loss of confinement within the MPC or storage mode. [10CFR72.104(a)][10CFR72.122(h)(5)][10CFR72.236(l)][CRD 3.2.2.1.E][CRD 3.2.2.5]

The MPC design is responsible for the structural integrity of the loaded MPC while loaded in the storage mode under loads imposed by OSTS handling operations and accident conditions.

G. The OSTS storage mode shall provide access to stored SNF for response to off-normal conditions, that is compatible with the MPC. [10CFR72.122(l)][10CFR72.236(h)] [CRD 3.3.1.B]

The MPC design is responsible for providing access to stored SNF for response to off-normal conditions that is compatible with the storage mode.

H. The OSTS shall have the capability to load the MPC and load transportation cask subsystems in a configuration that complies with written procedures and in compliance with the transportation cask and storage mode certificates of compliance. [10CFR71.87(f)][10CFR72.122(h)(5)][10CFR72.236(m)][CRD 3.2.1.1.C]

Transportation will be responsible for providing MPCs and transportation casks compatible with the MRS facility.

I. The OSTS shall be designed and have procedures such that SNF assemblies will maintain structural integrity and can be unloaded in an intact configuration. [10CFR72.128(a)][CRD 3.2.1.1.J]

The MPC design is responsible for maintaining the structural integrity of the SNF assemblies and providing for unloading of SNF from MPCs in an intact configuration while being stored by the OSTS.

J. The storage mode for the OSTS shall be designed to handle loaded MPCs under the requirements of 10CFR72 for storage. The storage mode must be compatible with the MPC weight, dimensions, and configuration. [10CFR72.236(m)][Derived by CRD 3.2.1.1.H] [CRD 3.3.1.B]

The MPC design is responsible for coordinating with the OSTS design to ensure that the MPC weight, dimensional envelope, and configuration do not exceed OSTS capabilities to transfer or store the MPC.

K. The OSTS design and operation shall not degrade the life of the loaded MPC and its contents, including shipment to the MGDS. [10CFR72.236(m)][Derived by CRD 3.2.1.1.H]

The MPC design is responsible to be compatible with the service life of the OSTS.

L. The OSTS shall be designed to ensure safe storage and handling of SNF in ambient air temperature of -40°C in full shade and still air. [10CFR71.71(c)(2)][Derived by CRD 3.2.1.1.H]

The MPC design is responsible for maintaining integrity for the minimum temperature limit specified in 10CFR71.71.

M. The MPC transfer cask shall be compatible with wet or dry spent fuel loading and unloading. [10CFR72.236(h)][CRD 3.3.1.B]

The MPC will be compatible with wet loading and dry transfer performed with the OSTS.

N. The OSTS shall have the capability to open, remove SNF, load SNF, and seal the MPC, without damage to the SNF. [10CFR72.122(l)][CRD 3.3.1.B]

The MPC is responsible for providing the capability to be opened, loaded, and unloaded without damaging the SNF.

3.2.3.3.4 OSTS-MRS Facility Interface Requirements

There are no interfaces currently identified.

3.2.3.3.5 OSTS Segment Interface Summary

A. The OSTS design shall address requirements for the OSTS segment interfaces with Transportation identified in Table 3.6. Where an interface exists, the block in the table contains an 'X' indicating that there is a functional interface for the OSTS to address between the segments involving Function 1.2 Transport Waste. An entry of 'NONE' in the table indicates that no interface has been identified between the segments. [10CFR72.236(m)][DOE Order 4700.1 Ch III B.2.c(2)(c)][CRD 3.2.3.2.B]

Transportation is responsible for ensuring that the Transportation segment interfaces to Function 1.3.2 Perform Transfer and Storage Operations are addressed.

B. The OSTS design shall address requirements for the OSTS segment interfaces with Waste Acceptance identified in Table 3.7. Where an interface exists, the block in the table contains an 'X' indicating that there is a functional interface for the OSTS to address between the segments involving Function 1.1 Accept Waste. An entry of 'NONE' in the table indicates that no interface has been identified between the segments. [DOE Order 4700.1 Ch III B.2.c(2)(c)][CRD 3.2.3.2.B]

Waste Acceptance is responsible for ensuring that the Waste Acceptance segment interfaces to Function 1.3.2 Perform Transfer and Storage Operations are addressed.

Table 3.6 OSTS-Transportation Interfaces <TBR>

Transportation→ **SEGMENTS** OSTS↓	Transportation Cask Subsystems	Service and Maintenance Support	Field Operations	Planning and Control
On-Site Transfer	X	X	NONE	NONE
On-Site Storage	X	X	NONE	NONE
Bare SNF Transfer	X	X	NONE	NONE

Table 3.7 WA-OSTS Interfaces <TBR>

WA→ **SEGMENTS** OSTS↓	Contract/ Agreement Management	Waste Fund Management	Waste Acceptance Management	Support Segment
On-Site Transfer	X	NONE	X	NONE
On-Site Storage	X	NONE	X	NONE
Bare SNF Transfer	X	NONE	X	NONE

3.2.4 Physical Characteristics and Requirements

Selection of additional standards or guidelines to meet the requirements specified in this section shall be by engineering analysis and documented in accordance with appropriate QA procedures. [Derived by CRD 3.2.4]

3.2.4.1 Protective Coatings and Materials

3.2.4.1.1 Protective Coatings

A. Protective coatings shall be in accordance with DOE Order 6430.1A Section 0950, Acoustical Treatment. [DOE Order 6430.1A Sec. 0900-99.0]

B. For facilities that require coatings to enhance decontamination of surfaces, the coatings shall conform to ASTM D4256 and ASTM D5144-91. [DOE Order 6430.1A Sec. 0900-99.0]

3.2.4.1.2 Waterproofing

A. Concrete waterproofing shall comply with "ACI Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete". [DOE Order 6430.1A Sec. 0710-1.2]

B. Concrete masonry waterproofing shall comply with "NCMA Waterproof Coatings for Concrete Masonry" (NCMA TEK-55) and "NCMA Waterproofing Concrete Masonry Basements and Earth-Sheltered Structures" (NCMA TEK-121). [DOE Order 6430.1A Sec. 0710-1.2]

C. Brick masonry waterproofing shall comply with BIA 7-F, "Dampproofing and Waterproofing Masonry Walls". [DOE Order 6430.1A Sec. 0710-1.2]

D. Waterproofing at or below grade shall be chemically compatible with groundwater and soils. [DOE Order 6430.1A Sec. 0710-1.2]

3.2.4.2 Habitability

3.2.4.2.1 Environmental Controls

Environmental controls shall be capable of maintaining an environment that provides comfortable and appropriate workplace temperature, humidity, personal storage, lavatory, and toilet facilities as required by 29CFR1910.141. NUREG-0700 Section 6.1.5 may be used for guidance. [CRD 3.2.4.2.1]

3.2.4.2.2 Heating, Ventilation, and Air Conditioning

HVAC equipment shall be sized to conform with the guidelines in NUREG-0700 Section 6.1.5. MIL-STD-1472D Section 5.8.1 and the applicable ASHRAE Standard may be used for guidance. [Derived by CRD 3.2.4.2.2]

3.2.4.2.3 Illumination

Lighting in working areas and other enclosures shall conform with the guidelines in NUREG-0700 Section 6.1.5. MIL-STD-1472D Section 5.8.2 and the applicable Recommended Practice of the Illumination Engineering Society may be used for guidance. [Derived by CRD 3.2.4.2.3]

3.2.4.2.4 Acoustical Noise

Work spaces shall be provided an acoustical environment that conforms to the requirements of 29CFR1910.95. MIL-STD-1472D Section 5.8.3 and NUREG-0700 Section 6.1.5 may be used for guidance. [CRD 3.2.4.2.4]

3.2.4.2.5 Vibration

Facilities, buildings, personnel enclosures, and vehicles shall be designed, located, or modified to conform to the requirements for vibration control specified in appropriate standards, such as MIL-STD-1472D Section 5.8.4, and ANSI/ASA 38. [Derived by CRD 3.2.4.2.5]

3.2.4.3 Security

See Section 3.7.1.3.1 for a description of the Security Facilities Segment.

3.2.4.3.1 Controlled Area

The MRS facility and the OSTS shall have a controlled area established where the SNF storage and handling facilities are no closer to the nearest boundary of the controlled area than 100 meters. Controlled area is that area immediately surrounding an MRS facility over which DOE exercises authority, or surrounding OSTS over which the Purchaser exercises authority, and within which MRS facility or OSTS operations are conducted. [10CFR72.106(a)(b)][CRD 3.3.1.B]

3.2.4.3.2 Controlled Area Crossing

If the MRS facility or the OSTS controlled area is traversed by a public highway, railway, or waterway, then appropriate and effective arrangements shall be made to control traffic and protect the health and safety of the public. [10CFR72.106(c)]

3.2.4.3.3 Physical Protection

A. The design of the MRS facility and the OSTS shall provide physical protection against radiological sabotage and theft of SNF. [10CFR73.40(a)] |

B. Physical security systems shall be established and maintained at the MRS facility and the OSTS in accordance with security plans approved by the NRC. [10CFR73.40(a)] |

3.2.4.3.4 Physical Barriers

A. The design of the MRS facility and the OSTS shall locate vital equipment only within a vital area, which, in turn, shall be located within a protected area such that access to vital equipment requires passage through at least two physical barriers. More than one vital area may be within a single protected area. See Section 6.1 for definition of vital area, vital equipment, protected area, and physical barrier. [10CFR73.50(b)(1)] |

B. The design of the MRS facility and the OSTS shall locate material access areas only within protected areas such that access to the material access area requires passage through at least two physical barriers. More than one material access area may be within a single protected area. [10CFR73.50(b)(2)] |

C. The physical barrier at the perimeter of the protected area shall be separated from any other barrier designated as a physical barrier within the protected area, and the intervening space monitored or periodically checked to detect the presence of persons or vehicles so that the facility security organization can respond to suspicious activity or to the breaching of any physical barrier. [10CFR73.50(b)(3)]

D. An isolation zone shall be established around the physical barrier at the perimeter of the protected area and any part of a building used as part of that physical barrier. [10CFR73.50(b)(4)]

E. There shall be monitors in the isolation zone to detect the presence of individuals or vehicles within the zone so as to allow response by armed members of the license security organization to be initiated at the time of penetration of the protected area. [10CFR73.50(b)(4)]

F. Parking facilities, both for employees and visitors, shall be located outside the isolation zone. [10CFR73.50(b)(4)]

3.2.4.3.5 Access Control

A. The design of the MRS facility shall provide control for all points of personnel and vehicle access into a protected area, including shipping or receiving areas, and into each vital area. [10CFR73.50(c)] |

B. Provisions shall be made to allow identification and validation of access authorization for personnel and vehicles at such points. [10CFR73.50(c)]

C. At the point of personnel and vehicle access into a protected area, the MRS facility shall be designed to provide for a search of individuals and hand-carried packages for devices such as firearms, explosives, and incendiary devices, or other items which could be used for radiological sabotage. The search shall be conducted either by a physical search or by the use of equipment capable of detecting such devices. [10CFR73.50(c)(1)]

D. The MRS facility shall be designed to provide for identification, authorization checks, and for a random search of all packages being delivered into the protected area. [10CFR73.50(c)(2)]

E. A picture badge identification system shall be used for all individuals who are authorized access to protected areas without escort. Access to vital areas and material access areas must be limited to individuals who are authorized access to vital equipment or special nuclear material and who require such access to perform their duties. Authorization for such individuals must be provided by the issuance of specially coded numbered badges indicating vital areas and material access areas to which access is authorized. [10CFR73.50(c)(3)(4)]

F. Unoccupied vital areas and material access areas shall be protected by an active intrusion alarm system. [10CFR73.50(c)(4)]

G. Individuals not employed at the MRS facility must be escorted by a watchman, or other individual designated by site personnel, while in a protected area and must be badged to indicate that an escort is required. In addition, the MRS facility must require that each individual not employed at the MRS facility register his or her name, date, time, purpose of visit, employment affiliation, citizenship, name and badge number of the escort, and name of the individual to be visited. The MRS facility shall retain the register of information for three years after the last entry is made in the register. Except for a driver of a delivery or service vehicle, an individual not employed at the MRS facility who requires frequent and extended access to a protected area or a vital area need not be escorted if the individual is provided with a picture badge, which the individual must receive upon entrance into the protected area and return each time he or she leaves the protected area, that indicates nonemployee - no escort required; areas to which access is authorized; and the period for which access has been authorized. [10CFR73.50(c)(5)]

H. No vehicles used primarily for the conveyance of individuals shall be permitted within a protected area except under emergency conditions. [CRD 3.2.4.3.1.B]

I. The MRS facility shall have procedures to control keys, locks, combinations, and related equipment to minimize the possibility of compromise. The design must allow prompt changing of keys, locks, combinations, and related equipment whenever there is evidence that they have been compromised. Upon termination of employment of any employee, keys, locks, combinations, and related equipment to which that employee had access must be changed. [10CFR73.50(c)(7)]

J. The design of the OSTS shall address the security requirements of 10CFR73.50 and will not degrade the access controls on the site as provided by the Purchaser. [10CFR73.50(c)][10CFR72.210(b)(4)][CRD 3.2.4.3.1.B]

3.2.4.3.6 Vehicle Inspection

All entrances to controlled and protected areas of the MRS facility shall have procedures for and be designed to allow inspections and searches of all vehicles to provide reasonable assurance that explosives, weapons, or other prohibited articles are not introduced without authorization. [DOE Order 6430.1A Sec.1300-10.2.4]

3.2.4.3.7 Detection Aids

A. All alarms required shall annunciate in a continuously manned central alarm station located within the protected area and in at least one other continuously manned station, not necessarily within the protected area, such that a single act cannot remove the capability of calling for assistance or otherwise responding to an alarm. All alarms must be self-checking and tamper indicating. The annunciation of an alarm at the on-site central alarm station must indicate the type of alarm (e.g., intrusion, fire, emergency exit, etc.) and location. [10CFR73.50(d)(1)]

B. All intrusion alarms, emergency exit alarms, alarm systems, and line supervisory systems shall at minimum meet the performance and reliability levels indicated by "GSA Interim Federal Specification W-A-450/1-17 (GSA-FSS)". [10CFR73.50(d)(1)]

C. All emergency exits in each protected area and each vital area shall be alarmed. [10CFR73.50(d)(2)]

3.2.4.3.8 Communications

A. Each security station shall have the capability of continuous communication with a continuously manned central alarm station within the protected area. The central alarm station must also be capable of continuous communication with all guards on duty at the MRS facility and the OSTS. That central alarm station must be capable of calling for assistance from other guards and watchmen and from local law enforcement authorities. [10CFR73.50(e)(1)]

B. The central alarm station shall have conventional telephone service for communication with the local law enforcement authorities. [10CFR73.50(e)(2)]

C. Two-way radio voice communication shall be established between local law enforcement authorities and the continuously manned central alarm station. [10CFR73.50(e)(3)]

D. All communications equipment, including off-site equipment, shall remain operable from independent power sources in the event of loss of primary power. [10CFR73.50(e)(4)]

3.2.4.3.9 Security of Stored Material

The MRS facility and the OSTS shall secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas. [10CFR20.1801]

3.2.4.3.10 Control of Material Not in Storage

The MRS facility and the OSTS shall provide for the capability to control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage. [10CFR20.1802]

3.2.4.3.11 High Radiation Area Access Control

A. The MRS facility shall ensure that each entrance or access point to a high radiation area has one or more of the following features:

1. A control device which, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep-dose equivalent of 0.1 rem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

2. A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry.

3. Entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

4. Continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

5. An alternative method for controlling access to high radiation areas, approved in advance by the NRC.

[10CFR20.1601(a)(b)(c)]

B. The access controls above shall not prevent individuals from leaving a high radiation area. [10CFR20.1601(d)]

C. Control at the MRS facility shall not be required for each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the regulations of the Department of Transportation provided that the packages do not remain in the area longer than 3 days and the dose rate at 1 meter from the external surface of any package does not exceed 0.01 rem (0.1 mSv) per hour. [10CFR20.1601(e)]

3.2.4.3.12 Very High Radiation Area Access Control

In addition to the requirements in Section 3.2.4.3.11 (10CFR20.1601), the MRS facility shall institute additional measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in 1 hour at 1 meter from a radiation source or any surface through which the radiation penetrates. [10CFR20.1602]

3.2.4.3.13 Security Equipment

The MRS facility and the OSTS design shall have a means to accommodate testing and maintenance of intrusion alarms, emergency alarms, communications equipment, physical barriers, and other security related devices or equipment utilized as follows:

A. All alarms, communications equipment, physical barriers, and other security related devices or equipment shall be maintained in operable and effective condition. [10CFR73.50(f)(1)]

B. Each intrusion alarm shall be functionally tested for operability and required performance at the beginning and end of each interval during which it is used for security, but not less frequently than once every seven days. [10CFR73.50(f)(2)]

C. Communications equipment shall be tested for operability and performance not less frequently than once at the beginning of each security personnel work shift. [10CFR73.50(f)(3)]

3.2.4.3.14 OSTS Security

The design of the OSTS shall not degrade the security, control, or physical protection of the Purchaser site. For Purchasers utilizing the OSTS, the security of their site remains the responsibility of the Purchaser. [10CFR73.40(a)][10CFR73.55(a)][CRD 3.2.4.3.1.B][CRD 3.3.1.B]

3.2.4.4 Health Protection

3.2.4.4.1 Workplace Safety

The MRS facility and the OSTS shall be designed to be free from recognized hazards that are likely to cause death or serious physical harm to the employees, and shall comply with occupational safety and health standards promulgated under 29USC651 et.seq. [29USC651 et seq., Sec. 654(a)(b)]

3.2.4.4.2 Federal Employee Occupational Medical Program

The MRS facility shall be capable of providing health services under the direction of a licensed physician and nursing services by licensed professional nurses, including appropriate occupational health evaluations; appropriate vaccines, medications or treatments; appropriate health education and counseling; initial examination and appropriate treatment of any employee with an occupationally related injury or illness, with conveyance of the employee to a local hospital; appropriate on-the-job and interim care prior to referral of the employee to his or her physician; and training in the basic elements of first aid and cardiopulmonary resuscitation. The MRS facility may elect to contract for medical services. [DOE Order 3790.1A, p. VIII-3(5)]

3.2.4.4.3 Respiratory Protection

A. **Equipment Certification.** The MRS facility shall be capable of providing respiratory protection equipment that is tested and certified or had certification extended by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) or equivalent. [10CFR20.1703(a)(1)(2)]

B. **Respiratory Protection Program.** The MRS facility shall be capable of providing air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures; surveys and bioassays, as appropriate, to evaluate actual intakes; testing of respirators for operability immediately prior to each use; and training of personnel. [10CFR20.1703(a)(3)]

C. **Respirator Use.** The MRS facility shall be capable of providing equipment within limitations for type and mode of use and provide proper visual, communication, and other special capabilities (such as adequate skin protection) when needed. [10CFR20.1703(a)(6)]

3.2.4.4.4 Emergency Respiratory Protection

The MRS facility shall be capable of providing as emergency devices only respiratory protection equipment that has been specifically certified or had certification extended for emergency use by NIOSH/MSHA. [10CFR20.1703(c)]

3.2.4.4.5 Work Environment Sampling

The MRS facility shall sample work environments where there is reason to suspect that work processes are creating health hazards. [DOE Order 3790.1A, p. I-2,(3)(a)(5)]

3.2.4.5 Radioactive Materials Monitoring

3.2.4.5.1 Radiological Alarm Systems

A. Radiological alarm systems shall be provided in accessible work areas as appropriate to warn operating personnel of radiation and airborne radioactive material concentrations above a given setpoint and of concentrations of radioactive material in effluent above control limits. [10CFR72.126(b)]

B. Radiation alarm systems shall be designed with provisions for calibration and testing their operability. [10CFR72.126(b)]

C. Setpoints shall be established to ensure that exposures are kept below the allowable limits. [CRD 3.2.2.2.E]

3.2.4.5.2 Effluent and Direct Radiation Monitoring

Areas containing radioactive materials shall be provided with systems for measuring the direct radiation levels in and around these areas. [10CFR72.126(c)(2)]

3.2.4.5.3 Effluent Control

Systems designed to monitor the release of radioactive materials shall have means to calibration and testing their operability. [10CFR72.126(d)]

3.2.4.5.4 Instrument and Equipment Calibration

The MRS facility and the OSTS shall develop appropriate plans and procedures to ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically for the radiation measured. [10CFR20.1501(b)]

3.2.4.5.5 Airborne Radioactive Material Control

A. The design of the MRS facility and the OSTS shall use, to the extent practicable, process or other engineering controls (e.g., containment or ventilation) to control the concentrations of radioactive material in air. [10CFR20.1701]

B. When it is not practical to apply process or other engineering controls to control the concentrations of radioactive material in the air to values below those that define an airborne radioactivity area, the design of the MRS facility and the OSTS shall, consistent with maintaining the total effective dose equivalent ALARA, have the capability to increase monitoring and limit intakes by: control of access, limitation of exposure times, use of respiratory protection equipment, or other controls. [10CFR20.1702]

3.2.4.5.6 Surveillance

The MRS facility and the OSTS shall have means to accommodate surveillance requirements which include:

A. Inspection and monitoring of loaded MPC in storage (see Section 3.7.1.5.2)

B. Inspection, test and calibration activities to ensure that the necessary integrity of required systems and components is maintained

C. Confirmation that operation of the MRS facility and the OSTS is within the required functional and operating limits

D. Confirmation that the limiting conditions required for safe storage are met.

[10CFR72.44(c)(3)]

3.2.4.6 Shielding and Protective Clothing

3.2.4.6.1 Shielding Design

A. **Normally Occupied Areas.** The shielding design basis shall limit the maximum exposure to an individual worker to one-fifth of the annual occupational external exposure limits. Within this design basis, personnel exposures must be maintained ALARA. Specifically, the shielding must be designed with the objective of limiting the total EDE (Effective Dose Equivalent) to less than one rem per year to workers, based on their predicted exposure time in the normally occupied area. The EDE is the sum of all contributing external penetrating radiation (gamma and neutron). In addition, appropriate shielding must be installed, if necessary, to minimize nonpenetrating external radiation exposures to the skin and lens of the eye of the worker. In most cases, the confinement barrier or process equipment provides this shielding. [DOE Order 6430.1A Sec. 1300-6.2]

B. **Intermittently Occupied Areas.** Shielding and other radiation protection measures shall be provided for areas requiring intermittent access, such as for preventive maintenance, component changes, adjustment of systems and equipment, and so forth, so that the projected dose rates based on occupancy, time, and frequency of exposure do not exceed one rem per year. [DOE Order 6430.1A Sec. 1300-6.2]

C. **Concrete.** Concrete radiation shielding design shall comply with ANS 6.4 and ACI 349 and shall consider the material specifications of ANS 6.4.2 where it provides a critical confinement or structural function. For other shields, ACI 318 is appropriate and provides adequate strength for design earthquake (DE) loads. [DOE Order 6430.1A Sec. 1300-6.2]

D. **Penetrations.** Straight line penetration of shield walls shall be avoided to prevent radiation streaming. [DOE Order 6430.1A Sec. 1300-6.2]

3.2.4.6.2 Remote Shielded Operation

Remote shielded operation (i.e., with remote handling equipment such as remote manipulators) shall be considered where it is anticipated that exposures to hands and forearms would otherwise approach the dose guidance in Section 3.2.2 or where contaminated puncture wounds could occur. [DOE Order 6430.1A, Sec. 1300-6.3]

3.2.4.6.3 Change Rooms

A. Men's and women's change rooms shall be provided for changing into and from protective clothing. These areas must be adjacent to shower facilities. [DOE Order 6430.1A Sec.1300-6.8]

B. Change rooms shall be designed to ensure that clean clothing (e.g., personal clothing) and protective clothing are segregated and that storage of contaminated protective clothing will control contamination so that it does not spread beyond the storage container. [DOE Order 6430.1A Sec.1300-6.8]

C. The change room exhaust air shall be HEPA-filtered if dispersible radionuclides are handled in the process area it serves. [DOE Order 6430.1A Sec.1300-6.8]

3.2.4.6.4 Protective Equipment

Protective equipment such as helmets, face shields, safety shoes, and respiratory protectors shall be selected in accordance with the requirements of 29CFR1910 Subpart I and 29CFR1926 Subpart E for construction applications. NUREG-0700 Section 6.1.4, and DOE Order 6430.1A Section 1300-12.4.5 may be used for guidance. Storage areas for protective equipment must be established in accordance with 29CFR1910.132. [CRD 3.3.6.4.A][CRD 3.3.6.4.C]

3.2.4.7 Design Basis Events

3.2.4.7.1 Aircraft

Unless a safety analysis can demonstrate that the risk from an aircraft crashing into the facility is acceptable (less than an annual probability of occurrence of $1x10^{-5}$), potential aircraft crashes shall be considered among the spectrum of man-made missiles that confinement structures must be designed to withstand or against which they must be protected. [DOE Order 6430.1A Sec.0111-99.0]

3.2.4.7.2 External Blasts and Missiles

The potential effects of a major explosion at a nearby facility or transportation route shall be considered among the spectrum of external blast effects and missiles that confinement structures must be designed to withstand or against which they must be protected. [DOE Order 6430.1A Sec. 0111-99.0]

3.2.4.7.3 Internal Blasts and Missiles

The probable consequence of design basis accidents (DBAs) involving internally generated missiles or blast effects shall be considered. Such DBAs typically involve failure of high-speed rotating machinery, cranes, experimental facilities, high-energy fluid system components, or explosives. Structures required to function following such accidents must be designed to withstand these DBAs. [DOE Order 6430.1A Sec. 0111-99.0.7]

3.2.4.7.4 Man-Induced Events

The MRS facility and the OSTS shall be designed to accommodate the effects of all identified past and present man-induced facilities, activities, and events that might endanger its ability to safely handle and store SNF or loaded MPCs. Information obtained pertaining to occurrence and severity of these events should be evaluated for reliability, accuracy, and completeness, and evaluation of these events should be based on the current state of knowledge about them. [10CFR72.94(a)(b)(c)]

3.2.5 System Quality Factors

3.2.5.1 Reliability

The MRS facility and OSTS reliability requirements are driven by the necessity to provide a fault tolerant system that allows for the handling and storage of SNF in a safe manner. Nothing in this section shall be construed to indicate that NRC mandated redundancy of systems may be neglected. [Derived by CRD 3.2.5.1.A]

3.2.5.1.1 Reliability Program Requirements

All design organizations shall establish and execute a reliability, availability, and maintainability (RAM) program to support Integrated Logistics Support and the general engineering program for the CRWMS. Reliability must be addressed as an element of design reviews. [Derived by CRD 3.2.5.1.B]

3.2.5.1.2 Reliability of Equipment

A failure modes and effect analysis must be performed for all major equipment whose failure can result in personnel injury or illness. Based on this analysis, designs shall be developed to ensure reliability which minimizes safety hazards to the extent possible. Under such design conditions, failures must not result in personnel injury or illness. If designs cannot be developed to these requirements, then the reliability of systems will be shown by analysis to be such as to minimize the probability of injury or illness to personnel. In demonstrating system reliability, MIL-STD-882B may be considered in the design where applicable. (These requirements differ from "items important to safety," which has a very specific meaning for NRC requirement compliance. Furthermore, these requirements do not supplant radiological standards contained in NRC or EPA requirements; e.g., the radiological standards of 10CFR20.) [Derived by CRD 3.2.5.1.D]

3.2.5.1.3 SSC Reliability

Structures, systems, or components (SSCs) important to safety shall be designed and located such that their safety functions are continuously performed under credible fire and explosion exposure conditions. [10CFR72.122(c)]

3.2.5.1.4 Utility Service Reliability

Each utility service shall be designed to meet emergency conditions. The design of utility services and distribution systems that are important to safety must include redundant systems to the extent necessary, as determined by MRS Design, to maintain the ability to perform safety functions assuming a single failure. [10CFR72.122(k)(1)]

3.2.5.1.5 Emergency Power Reliability

Provisions shall be made so that, in the event of a loss of the primary electric power source or circuit, reliable and timely emergency power will be provided to instruments, utility service systems, the central security alarm station, and operating systems, in amounts sufficient to allow safe storage conditions to be maintained and to permit continued functioning of all systems essential to safe storage and handling of SNF or loaded MPCs. [10CFR72.122(k)(3)]

3.2.5.1.6 Mission Reliability

A. All equipment shall be shown by analysis to have adequate reliability to enable the MRS facility to meet the throughput requirements identified in Table 3-2 and its mission. [Derived by CRD 3.2.5.1.E]

B. All equipment shall be shown by analysis to have adequate reliability to enable the OSTS to support Purchaser loading and shipping and its mission. [Derived by CRD 3.2.5.1.E]

3.2.5.2 Maintainability and Inspectability

3.2.5.2.1 Testing and Maintenance

Systems and components important to safety shall be designed to permit inspection, maintenance, and testing. [10CFR72.122(f)]

3.2.5.2.2 Physical Clearance

A. **Corridors.** The size and arrangement of interior corridors shall accommodate the movement of equipment including initial equipment installation, facility operations, and possible future removal or replacement of equipment. [DOE Order 6430.1A, Sec. 0110-99.0.4]

B. **Maintenance Accessibility.** Facility design shall provide access for routine maintenance, repair, or replacement of equipment subject to failure. Accessibility shall include proper lighting and utility hookups and acceptable levels of radiological exposure. [DOE Order 6430.1A Sec. 1300-3.5]

3.2.5.2.3 Mean Time to Repair

For all equipment installed which is necessary to meet the availability requirements of Section 3.2.5.3, the mean time to repair (MTTR) shall be identified. For items to be repaired in place, sufficient parts must be maintained in inventory and qualified repair personnel available to ensure the MTTR can be achieved. [CRD 3.2.5.2.D]

3.2.5.2.4 Replacement Equipment

A. For equipment which must be removed to be repaired, replacement equipment shall be provided as necessary to support the MTTR. Such equipment must be accessible and transportable. [CRD 3.2.5.2.D]

B. Where the equipment weights exceed the limits for human portability, a lifting device shall be provided having capability to remove and install the equipment. [CRD 3.2.5.2.D]

C. Removability shall be addressed for all equipment. This includes identification of how the equipment will be removed including lifting, transport, and possible disassembly. [CRD 3.2.5.2.D]

3.2.5.2.5 Fault Isolation

When fault isolation is important in addressing MTTRs, fault detection shall be built into the system in terms of electronic detection, measurement points, etc., to the extent practicable. [CRD 3.2.5.2.D]

3.2.5.2.6 Maintenance in Radioactive Environments

Equipment which normally operates in a radioactive environment shall be designed to be moved to a non-radioactive environment for maintenance and repair, whenever possible. When it is not possible, the design shall allow for installation of temporary shielding, permit minimizing radiation exposure times, and provide sufficient space for ease of operation. [10CFR72.126(a)(5)]

3.2.5.2.7 Important to Safety Equipment

Equipment which may fail during an operation which is important to safety shall be designed to permit recovery of the operation without compromising the health and safety of the public or the employees. [CRD 3.2.5.2.D]

3.2.5.2.8 Mean Downtime

Facilities, subsystems, and equipment of the MRS shall be designed with mean downtimes that are consistent with the availability requirements specified in Section 3.2.5.3 of this document. The mean downtimes include mean time to repair, disruptive preventive maintenance time, logistics delay time, administrative delay time, and safety delay time. [CRD 3.2.5.2.D]

3.2.5.2.9 Design for Maintainability

A. Structures, systems, and components shall be designed and constructed so that facilities are easily and economically maintained. Maintainability considerations include:

1. Incorporation into the facility of easily maintained features and durable materials

2. Ease of replacement of installed equipment (i.e., without structure modification)

3. Accessibility of installed equipment and building systems for performance of maintenance

4. Life cycle costs in selection of features, systems, and finishes

5. Provisions of maintenance instructions and as-built drawings, especially the location of underground and otherwise concealed utility lines, process chemical and coolant piping.

[DOE Order 4700.1, p. V-17, q]

B. Engineered hardware shall be designed to meet the maintainability requirements as specified in UCRL 15673, Section 1. Should hardware require movement by personnel in order to provide accessibility for maintenance, requirements for portability (Section 3.2.9 of this document) shall be included in the design. [Derived by CRD 3.2.5.2.B]

C. Facility support equipment shall conform to requirements for maintainability specified in UCRL 15673, Section 2. [CRD 3.2.5.2.D]

D. The design of equipment and facilities shall conform to maintainability requirements specified in UCRL 15673, Section 3. [CRD 3.2.5.2.D]

3.2.5.3 Availability

3.2.5.3.1 Availability Parameters

Availability is defined as the degree, percent, or probability that structures, systems, and components will be ready for operation when required at a random point in time. Availability is expressed as total scheduled operation time minus mean downtime divided by total scheduled operation time. (See Section 3.2.5.2.8) [Derived by CRD 3.2.5.3.A, 3.2.5.3.B]

3.2.5.3.1.1 MRS Facility Parameters

As a minimum, the MRS facility shall be capable of performing the following functions, at a rate consistent and compatible with MRS receipt, handling, storage, and shipment rates stated in Section 3.2.1, considering the following target availabilities:

A. Receive transportation cask subsystems at any point in time with an availability of 0.98. **<TBR>**

B. Prepare transportation cask subsystems for transfer cell operations at a specified rate with an availability of 0.98. **<TBR>**

C. Transfer SNF or loaded MPCs from the transportation cask subsystems to the storage mode at a specified rate with an availability of 0.98. **<TBR>**

D. Emplace storage mode in the designated area with an availability of 0.98. **<TBR>**

E. Prepare transportation cask systems for reuse with an availability of 0.97. **<TBR>**

F. Ship loaded MPCs from storage to the MGDS as required with an availability demonstrated to support the through-put requirements as shown in Table 3-2.

[Derived by CRD 3.2.5.3.A, 3.2.5.3.B]

3.2.5.3.1.2 OSTS Parameters

As a minimum, the OSTS shall be capable of performing the following functions, at a rate consistent and compatible with the OSTS handling and shipment rates stated in Section 3.2.1, considering the following target availabilities:

A. Receive MPCs and transportation cask subsystems, in accordance with schedules, with an availability of **<TBD>**.

B. Prepare transportation cask subsystems for fuel loading operations at a specified rate with an availability of **<TBD>**.

C. Transfer loaded MPCs and SNF from the MPC transfer cask and SNF transfer device to the transportation cask subsystems at a specified rate with an availability of **<TBD>**.

D. Ship loaded MPCs to the MRS or MGDS as required with an availability demonstrated to support the through-put requirements as shown in Section 3.2.1 **<TBR>**.

[Derived by CRD 3.2.5.3.A, 3.2.5.3.B]

Note: The OSTS will be operated by the Purchaser. The Purchaser may have additional requirements on availability and reliability. The design should be designed to perform to the requirements, however actual operating conditions are to be determined by the Purchaser.

3.2.5.3.2 Standby Equipment

All equipment utilized in standby state shall be operated periodically, in accordance with a documented schedule, to ensure its operability. [Derived by CRD 3.2.5.3.A]

3.2.5.4 Service Life

A. The MRS facility shall be designed for a minimum service life of 40 years. [10CFR72.42(a)]

B. The OSTS shall be capable of retrieving MPCs from storage and preparing them for transport for up to 100 years of storage. [10CFR72.42(a)][10CFR51.23(a)][CRD 3.2.5.4]

3.2.5.5 Overall Utilization

Overall utilization is the product of scheduled utilization (the ratio of scheduled operating hours per year to total hours per year), availability, and worker productivity (the average fraction of a work period that workers perform required work, non-productive time excluded).

A. Overall utilization of the MRS facility shall be **<TBD>**. [Derived by CRD 3.2.5.5.B]

B. Overall utilization of the OSTS shall be **<TBD>**. This requirement may be impacted by Purchaser requirements. [Derived by CRD 3.2.5.5.B]

3.2.6 Environmental Requirements

3.2.6.1 Natural Environment

3.2.6.1.1 Natural Phenomena

A. SSCs important to safety shall be designed to withstand the effects of natural phenomena, such as earthquakes, tornados, lightning, hurricanes, floods, tsunami, and seiches, without impairing their capability to perform safety functions. The design bases for these structures, systems, and components must reflect appropriate consideration of the most severe of the natural phenomena reported for the site and surrounding area, with appropriate margins to take into account the limitations of the data and the period of time in which the data have accumulated. They must also incorporate appropriate combinations of the effects of normal and accident conditions and the effects of natural phenomena. [10CFR72.122(b)]

B. The MRS facility and the OSTS shall be designed to prevent an SSC not important to safety from failing and resulting in an adverse interaction with an SSC important to safety. [10CFR72.122(b)]

C. The design of the MRS facility and the OSTS shall make provisions to include monitoring of the intensity of natural phenomena so that comparisons with the design bases of SSCs important to safety may be performed. [10CFR72.122(b)(3)]

3.2.6.1.2 Earthquake

A. East of the Rocky Mountain Front (east of approximately 104° west longitude), except in areas of known seismic activity including but not limited to the regions around New Madrid, MO, Charleston, SC, and Attica, NY, the design earthquake (DE) for SSCs important to safety shall be determined by one of the following methods:

1. A standardized DE described by an appropriate response spectrum anchored at 0.25 g may be used.

2. A site-specific DE may be determined by using the criteria and level of investigations required by Appendix A of 10CFR100, where the DE must be equivalent to the safe shutdown earthquake (SSE) for a nuclear power plant, and must have a value for the horizontal ground motion of no less than 0.10 g with the appropriate response spectrum.

[10CFR72.102(a)(f)]

B. West of the Rocky Mountain Front (west of approximately 104° west longitude), and in other areas of known potential seismic activity, the impact of seismicity on SSCs important to safety shall be evaluated by the techniques of Appendix A of 10CFR100, where the DE must be equivalent to the safe shutdown earthquake (SSE) for a nuclear power plant, and must have a value for the horizontal ground motion of no less than 0.10 g with the appropriate response spectrum. [10CFR72.102(b)(f)]

C. Earthquake load design for buildings and other structures not important to safety shall be determined in accordance with the procedures contained in the UBC and UCRL 15910. [DOE Order 6430.1A, Sec. 0111-2.7.1]

D. Seismological siting criteria shall include:

1. East of the Rocky Mountain Front (east of approximately 104° west longitude), except in areas of known seismic activity including but not limited to the regions around New Madrid, MO, Charleston, SC, and Attica, NY, sites will be acceptable if the results from on-site foundation and geological investigation, literature review, and regional geological reconnaissance show no unstable geological characteristics, soil stability problems, or potential for vibratory ground motion at the site in excess of an appropriate response spectrum anchored at 0.2 g. [10CFR72.102(a)(1)]

2. West of the Rocky Mountain Front (west of approximately 104° west longitude), and in other areas of known potential seismic activity, sites that lie within the range of strong near-field ground motion from historical earthquakes on large capable faults should be avoided. [10CFR72.102(b)]

3. Sites other than bedrock sites must be evaluated for their liquefaction potential or other soil instability due to vibratory ground motion. [10CFR72.102(c)]

4. Site-specific investigations and laboratory analyses must show that soil conditions are adequate for the proposed foundation loading. [10CFR72.102(d)]

5. Sites which require a minimum of engineered provisions to correct site deficiencies are preferred. [10CFR72.102(e)]

6. Sites with unstable geologic characteristics should be avoided. [10CFR72.102(e)]

3.2.6.1.3 Tornado and Extreme Wind

A. For SSCs important to safety, the design basis tornado or extreme wind characteristics shall be defined in accordance with NRC Regulatory Guide 1.76. [CRD 3.2.6.1.A]

B. The effects of potential tornado-generated missiles on SSCs important to safety shall be considered in accordance with:

1. NRC NUREG-0800 "Standard Review Plan", Section 3.5.1.4

2. The guidelines of UCRL 53526. Additional missiles may be identified from review of on-site sources and possible missiles that could be borne to the site by tornado. Both small high-velocity missiles and massive low-velocity missiles must be considered separately in terms of penetration, perforation, or crushing effects. The horizontal and vertical velocities of the missiles must be combined in the design. [CRD 3.2.6.1.A]

C. Loads resulting from the design basis tornado shall be assumed capable of occurring at any time. However, for design purposes, design basis tornado loads need not be assumed to occur simultaneously with other severe site-related events such as earthquake, fire, or flood, except where the simultaneous occurrence is related (e.g., fire from lightning or other wind-related causes). [DOE Order 6430.1A Sec 0111-99.0.2]

D. Structures not important to safety need not be designed for tornado loading. Wind load design for buildings and other structures shall be determined in accordance with procedures in ANSI/ASCE 7-88, with the basic wind speed coming from UCRL 15910. [DOE Order 6430.1A Sec. 0111-2.4.2]

3.2.6.1.4 Floods

The design loads from flooding shall comply with UCRL 15910. In calculating design loads from flooding, a conservative approach must be taken to ensure that the loads used in the design are greater than the maximum historic levels recorded for the site and no less than the probable maximum flood (PMFL). [DOE Order 6430.1A Sec. 0111-99.0.3]

3.2.6.1.5 Earth and Groundwater

A. Every foundation wall or other wall serving as a retaining structure shall be designed to resist, in addition to the vertical loads acting on it, the incident lateral earth pressures and surcharges, plus hydrostatic pressures corresponding to the maximum probable groundwater level. [DOE Order 6430.1A Sec. 0111-2.8.2]

B. Retaining walls shall be designed for earth pressures and potential groundwater levels producing the highest stresses and overturning moments. When a water-pressure-relief system is incorporated into the design, only earth pressures need be considered. In cohesive soils, the long-term consolidation effects on the stability of the walls must be considered. Lateral earth pressures must be determined in accordance with accepted structural and geotechnical engineering practice. [DOE Order 6430.1A Sec. 0111-2.8.2]

3.2.6.1.6 Thermal Analysis

The design of structures shall include the effects of stresses and movements resulting from variations in temperature. The rise and fall in the temperature must be determined for the localities in which the structures are to be built. Structures must be designed for movements resulting from the maximum seasonal temperature change. The design must provide for the lags between air temperatures and the interior temperatures of massive concrete members or structures. In cable-supported structures, changes in cable sag and tension must be considered. [DOE Order 6430.1A Sec. 0111-2.8.4]

3.2.6.1.7 Rain and Snow Loads

Live loads on roofs shall be as stipulated in ANSI/ASCE 7-88 which include the minimum roof live loads or the snow loads and snow drifts or possible rain loads stipulated therein, whichever produces the more severe effect. [DOE Order 6430.1A Sec. 0111-2.3.2]

3.2.6.1.8 Flood Protection

If, after compliance with the requirements of Executive Order 11988, new construction of structures or facilities are to be located in a floodplain, then:

A. Accepted floodproofing and other flood protection measures shall be applied by the MRS facility and the OSTS design to new construction or rehabilitation. [Exec. Order 11988 Sec. 2(b)]

B. To achieve flood protection, the MRS facility and the OSTS design shall, wherever practical, elevate structures above the base flood level rather than filling in land. [Exec. Order 11988 Sec. 2(b)]

3.2.6.2 Induced Environment

3.2.6.2.1 Fire and Explosion Protection

A. Structures, systems, and components important to safety shall be designed and located so that safety functions continue to be performed under credible fire and explosion exposure conditions. [10CFR72.122(c)]

B. Noncombustible and heat-resistant materials shall be used wherever practical throughout the MRS facility and the OSTS, particularly in locations vital to the control of radioactive materials and to the maintenance of safety control functions. [10CFR72.122(c)]

C. Explosion and fire detection, alarm, and suppression systems shall be designed and provided with sufficient capacity and capability to minimize adverse effects of fires and explosions on structures, systems, and components important to safety. [10CFR72.122(c)]

D. The design of the MRS facility and the OSTS shall include provisions to protect against adverse effects that might result from either the operation or failure of the fire suppression system. [10CFR72.122(c)]

3.2.6.2.2 Fire Resistance

A. Development of the design basis fire shall include consideration of conditions that may exist during normal operations and special situations (e.g., during periods of decontamination, renovation, modification, repair, and maintenance). [DOE Order 6430.1A Sec. 0110-99.0.6]

B. The structural shell surrounding the critical areas and their supporting members shall remain standing and continue to act as a confinement structure during design basis fire under conditions of failure of any fire suppression system not designed as a safety class item. Fire resistance of this shell must be attained by an integral part of the structure (concrete slabs, walls, beams, and columns) and not by a composite assembly (membrane fireproofing). Penetrations in this shell must incorporate, as a minimum, protection against design basis fire exposures. [DOE Order 6430.1A Sec. 0110-99.0.6]

C. In no event shall the fire resistance rating of the structural shell described above be less than two hours under conditions of failure of any fire suppression system not designed as a safety class item. [DOE Order 6430.1A Sec. 0110-99.0.6]

3.2.6.2.3 Vibration

Equipment supports shall be designed to avoid resonance resulting from the harmony between the natural frequency of the structure and the operating frequency of reciprocating or rotating equipment supported on the structure. The operating frequency of supported equipment must be determined from manufacturers data prior to completion of structural design. Resonance must be prevented by designing equipment isolation supports to reduce the dynamic transmission of the applied load to as low a level as can be economically achieved in the design. [DOE Order 6430.1A Sec. 0111-2.8.1]

3.2.6.2.4 Creep and Shrinkage

Concrete and masonry structures shall be investigated for stresses and deformations induced by creep and shrinkage. For concrete and masonry structures, the minimum linear coefficient of shrinkage must be assumed to be 0.0002 inch/inch, unless a detailed analysis is undertaken. The theoretical shrinkage displacement must be computed as the product of the linear coefficient and the length of the member. [DOE Order 6430.1A Sec. 0111-2.8.5]

3.2.6.2.5 Internal Effects

Structures, systems, and components important to safety shall be designed to accommodate the effects of site characteristics and environmental conditions associated with normal operation, maintenance, testing, and postulated accidents at the MRS facility and the OSTS. [10CFR72.122(b)(1)]

3.2.7 Transportability/Modularity

A. The design of the MRS facility and the OSTS shall consider the use of modular construction techniques. [Derived by CRD 3.2.7]

B. The design of the OSTS shall consider the transportability of the transfer cask and, possibly, the storage mode [Derived by CRD 3.2.7]

3.2.8 Flexibility, Expansion, and Integration

3.2.8.1 Additional Handling Facilities

A. The design of the MRS facility shall not preclude the later addition of facilities related to handling of SNF and loaded MPCs, including sorting, safety packaging and preparing spent fuel for permanent disposal, subject to the host's agreement. [DOE/RW-0316P] **<TBR>**

B. The OSTS design shall not preclude the addition of facilities at the Purchaser site for the opening of MPCs, transfer of SNF, and sealing of MPCs. [Derived by CRD 3.2.8]

3.2.8.2 Additional Facilities

The design of the MRS facility shall not preclude the collocation of other facilities at the site, such as a system operations center or scientific research and technical facilities. [DOE/RW-0316P]

3.2.8.3 Storage Capacity

A. The design of the MRS facility shall not preclude the possible storage of spent fuel in excess of the 15,000 MTU limit stated in 10CFR72.44(g). [Derived by CRD 3.2.8] **<TBR>**

B. The storage capacity associated with the OSTS is a matter for the Purchaser to determine and will vary from site to site as licensed by the NRC. [Derived by CRD 3.2.8]

3.2.8.4 OSTS Operating Flexibility

The OSTS design shall not preclude the use of various SNF storage modes or the variation in MPC, MPC transfer cask, SNF transfer device, or transportation cask subsystem design. [Derived by CRD 3.2.8]

3.2.9 Portability and Load Carrying

Equipment and components that must be moved over short distances for maintenance or other purposes shall:

A. Not exceed 35 pounds in weight, if to be moved by one person

B. Have suitable handgrips or lifting aids

C. Have mechanical lifting and handling devices provided, if heavier than 70 pounds or impractical for 2-man carry.

[Derived by CRD 3.2.9]

3.3 DESIGN AND CONSTRUCTION

3.3.1 General Design Criteria

3.3.1.1 Design Criteria

A. NRC design criteria, as specified in 10CFR72 and other regulations issued by the NRC, shall apply to the design and construction of all structures, systems, and components important to safety and those providing safeguards and security. [CRD 3.3.1.B]

B. Except for design criteria identified by A. above, design and construction of all CRWMS facilities and equipment shall be accomplished using the criteria specified in the appropriate section of DOE Order 6430.1A. The following components are addressed in DOE Order 6430.1A:

1. General Requirements
2. Site and Civil Engineering
3. Concrete
4. Masonry
5. Metals
6. Woods and Plastics

7. Thermal and Moisture Protection
8. Doors and Windows
9. Finishes
10. Specialties
11. Equipment
12. Furnishings
13. Special Facilities
14. Conveying Systems
15. Mechanical
16. Electrical

[CRD 3.3.1.A] |

C. State, county, municipal, and other local regulations, building and zoning codes, and ordinances shall be reviewed and incorporated, as necessary, in the CRWMS designs whenever those practices are not in conflict with the requirements of DOE Order 6430.1A. [DOE Order 6430.1A, Sec. 0101-1]

D. Should conflicts exist between DOE Order 6430.1A and state, county, municipal, or local codes or regulations, a deviation shall be requested in accordance with Section 0101-2, Criteria Deviations, of DOE Order 6430.1A. All deviations from DOE Order 6430.1A to meet current engineering practices must be documented. [CRD 3.3.1.A] |

3.3.1.2 Design Objectives

A. The MRS facility and the OSTS shall have design objectives which include: |

1. Achieving minimum construction costs consistent with programmatic, environmental, security, and safety requirements

2. Achieving technical adequacy

3. Achieving optimum economy in operation and maintenance

4. Assuring that appropriate consideration is given to the expected period of use; quality construction practices; energy conservation, decontamination, decommissioning, and quality assurance requirements; and the appearance of completed facilities.

[DOE Order 4700.1, p. V-33, part C, Sec. 2(a)]

B. The MRS facility and the OSTS shall be designed to be operated with reasonable assurance that the health and safety of the public are not endangered. [10CFR72.40(a)(13)(i)] |

3.3.1.3 Quality Standards

Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance to safety of the function to be performed. [10CFR72.122(a)]

3.3.1.4 Sharing of Structures, Systems, and Components

Structures, systems, and components important to safety shall not be shared between an MRS and other facilities unless it is shown that such sharing does not impair the capability of either facility to perform its safety functions, including the ability to return to a safe condition in the event of an accident. [10CFR72.122(d)]

3.3.1.5 Proven Technology

For all applications important to safety, the MRS facility and the OSTS shall, to the extent practicable, utilize systems, structures, and components which have proven functional adequacy and reliability for the purpose as demonstrated by reference to related applications or widely accepted engineering principles, and if the MRS facility and the OSTS do not, then identification and resolution of all related safety questions must be addressed prior to operation. [10CFR72.24(i)]

3.3.2 Electromagnetic Radiation

3.3.2.1 Electromagnetic Shielding

Shielding shall be provided to protect magnetic recording equipment, magnetic tapes, and disk packs where electromagnetic fields of 10 microvolts per meter or 50 oersteds or greater can be expected. [DOE Order 6430.1A Sec. 0110-99.8.4]

3.3.2.2 Line Location

Line location shall be established in accordance with clearance requirements stated in ANSI C2. [DOE Order 6430.1A Sec. 1630-2.2.1]

3.3.2.3 Power Poles

Joint use of poles for power and communications distribution shall maintain safety standards and shall limit electrical interference to communications services. [DOE Order 6430.1A Sec. 1630-2.2.2]

3.3.2.4 Lighting Fixtures

Lighting fixtures shall not create electrical or electromagnetic interference detrimental to proper operation of telecommunication, alarm, and ADP (automated data processing) equipment. [DOE Order 6430.1A Sec. 1655-99.8]

3.3.2.5 Communication Circuits

Critical communications circuits shall be protected or shielded from electromagnetic interference from sources within facilities and from external sources to the extent specified by the manufacturers of the equipment used in the system. [CRD 3.3.2.A]

3.3.3 Nameplates and Markings

A. Equipment and any parts of that equipment to be used by personnel shall be identified with appropriate labels. Equipment and equipment parts include, but are not limited to, system and subsystem component groupings, individual components, control positions or modes, display markings, instructions, procedure manuals, storage spaces, access panels, and tools. [DOE Order 6430.1A Sec. 1300-12.4.11]

B. The label shall indicate clearly and concisely the function and purpose of the item being labeled. Unnecessary information (e.g., information used only for manufacturing purposes) must not be included. Hierarchial labeling also must be used to facilitate component location on control panels. [DOE Order 6430.1A Sec. 1300-12.4.11]

C. The label information shall be easy to understand. Words, symbols, and other markings in a label or instruction must be unambiguous and accurate. The terminology used must have commonly accepted meaning for all users. [DOE Order 6430.1A Sec. 1300-12.4.11]

D. Label design shall be consistent with use of abbreviations and acronyms minimized. Various equipment labels placed on the same or similar pieces of equipment and serving similar functions must use the same material, color, font type, relative location to component, general format, and other configuration features to promote simplicity and avoid clutter. The terminology used for equipment, procedures, and training materials must be the same for each case. [DOE Order 6430.1A Sec. 1300-12.4.11]

E. Permanent labels shall be attached to the specific component or equipment in such a manner that environmental conditions or usage by personnel will not remove or destroy the label. [DOE Order 6430.1A Sec. 1300-12.4.11]

3.3.4 Workmanship

3.3.4.1 Special Processes

Special processes, including welding, heat treating, and nondestructive testing, shall be controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements. [10CFR72.158]

3.3.4.2 Criteria

The workmanship criteria shall reflect the currently applicable codes, standards, regulations, architectural, engineering principles and practices specified in DOE Order 6430.1A (General Design Criteria) - 0109 Reference Standards and Guides, including but not limited to:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANS	American Nuclear Society
ANSI	American National Standards Institute
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
ASTM	American Society for Testing and Materials
IEEE	Institute of Electrical and Electronics Engineers
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAPHCC	National Association of Plumbing-Heating-Cooling Contractors
NCMA	National Concrete Masonry Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

[DOE Order 6430.1A Sec. 0109]

3.3.5 Interchangeability

To the extent practical, components such as motors, pumps, fans, video monitors, cranes, hoists, etc. used for similar functions shall be of identical manufacture and model, in order to promote the interchangeability of components. [Derived by CRD 3.3.5]

3.3.6 Safety

The order of precedence for satisfying safety requirements and resolving identified hazards shall be as follows:

A. From the beginning, design to eliminate hazards. If an identified hazard cannot be eliminated, reduce the risk to an acceptable level through design selection.

B. If identified hazards cannot be eliminated or their associated risk adequately reduced through design selection, that risk must be reduced through the use of protective safety design features or devices.

C. When neither design nor safety devices can effectively eliminate identified hazards or adequately reduce associated risk, devices must be used to detect the condition and to produce an adequate warning signal to alert personnel of the hazard. Warning signals and their application must be designed to minimize the probability of incorrect personnel reaction to the signal and must be standardized within like types of systems.

D. Only where it is impractical to eliminate hazards through design selection or adequately reduce the associated risk with safety and warning devices, procedures and training must be used. Procedures may include the use of personal protective equipment.

[Derived by CRD 3.3.6.2]

3.3.6.1 Safety Labels and Placards

Safety labels, signs, and placards shall be designed and displayed as required in 29CFR1910 Subpart J and in 29CFR1926 Subpart G for construction applications. MIL-STD-1472D Section 5.13.2 may be used for guidance. [CRD 3.3.6.6.A]

3.3.6.2 Pipe, Hose, and Tube Line Identification

Pipe, hose, and tube-line identification for liquids, gas, and steam shall be clearly and unambiguously labeled or coded as to contents, pressure, heat, cold, direction of flow, or other specific hazard information. [Derived by CRD 3.3.6.6.B]

3.3.6.3 Workplace Hazards

Alerting devices, emergency doors and exits, and equipment provided for use in the environment around workspaces shall be designed in accordance with the requirements of 29CFR1910 Subparts E and L and in 29CFR1926 Subpart F for construction applications. MIL-STD-1472D Section 5.13.4 may be used for guidance. [CRD 3.3.6.6.C]

3.3.6.4 Emergency Lighting

A. The emergency lighting system shall be designed to automatically actuate in accordance with NUREG-0700 Section 6.1.5.4.a. Emergency lighting must be powered by batteries that are continuously charged by facility electrical power. [Derived by CRD 3.3.6.7.B]

B. Failure of the normal lighting systems shall not inhibit or degrade the operation of emergency lighting in accordance with NUREG-0700 Section 6.1.5.4.b. [Derived by CRD 3.3.6.7.A]

C. Lighting levels shall comply with the guidelines in NUREG-0700 Section 6.1.5.4.c. [CRD 3.3.6.7.C]

3.3.6.5 Equipment Related Hazards

Interlocks, alarms, access, hazard access, and edge rounding shall be provided and designed in accordance with the applicable requirements of 29CFR1910 Subpart N for material handling equipment, Subpart O for machinery, Subpart P for tools, and 29CFR1926 Subparts H, I, and O for construction applications. MIL-STD-1472D Section 5.13.5 may be used for guidance. [Derived by CRD 3.3.6.8.A]

3.3.6.6 Work Platforms

Scaffolds, ladders, work platforms, stands, and bridges shall be provided with safety devices in accordance with the requirements of 29CFR1910 Subparts D and F, and 29CFR1926 Subparts L and M for construction applications. MIL-STD-1472D Section 5.13.6 may be used for guidance. [CRD 3.3.6.9]

3.3.6.7 Electrical, Mechanical, Fluid, and Toxic Hazards

A. Protection against electrical hazards shall conform to the requirements in 29CFR1910 Subpart S and in 29CFR1926 Subpart K for construction applications. The National Electrical Code (ANSI/NFPA 70), the National Electrical Safety Code (ANSI Standard C2), and MIL-STD-1472D Section 5.13.7.1 may be used for guidance. [CRD 3.3.6.10.A, 3.3.6.10.D]

B. Protection against mechanical and machinery hazards shall conform to the requirements in 20CFR1910 Subpart O and in 29CFR1926 Subpart O for construction applications. MIL-STD-1472D Section 5.13.7.2 may be used for guidance. [CRD 3.3.6.3.G, 3.3.6.8.C]

C. Protection against fluid and toxic material hazards shall conform to the requirements in 29CFR1910 Subpart H. MIL-STD-1472D Sections 5.13.7.3 and 5.13.7.4 may be used for guidance. [CRD 3.3.6.3.G]

D. Where the possibility exists for the eyes or body of any person to be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the immediate work area for emergency use. [29CFR1910.151(c)]

E. Tag-out and lock-out features shall be provided as required by 29CFR1910.147 for machines and equipment, in order to protect service and maintenance personnel. [CRD 3.3.6.8.B]

3.3.6.8 Posting Requirement

A. **Posting of Radiation Areas.** The MRS facility and the OSTS shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA." [10CFR20.1902(a)] |

B. **Posting of High Radiation Areas.** The MRS facility and the OSTS shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA." [10CFR20.1902(b)] |

C. **Posting of Very High Radiation Areas.** The MRS facility and the OSTS shall post each very high radiation area with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA." [10CFR20.1902(c)] |

D. **Posting of Airborne Radioactivity Areas.** The MRS facility and the OSTS shall post each airborne radioactivity area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA." [10CFR20.1902(d)] |

E. **Posting of Areas or Rooms in Which Licensed Material is Used or Stored.** The MRS facility and the OSTS shall post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in Appendix C to 10CFR20.1001-10CFR20.2401 with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)." [10CFR20.1902(e)] | |

3.3.6.9 Exceptions to Posting Requirements

The MRS facility and the OSTS shall not be required to post caution signs in areas or rooms containing radioactive materials for periods of less than 8 hours, if the materials are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to radiation or radioactive materials in excess of the limits established in 10CFR20, and the area or room is subject to MRS facility and the OSTS control. [10CFR20.1903(a)] | |

3.3.6.10 Labeling Containers

A. The MRS facility and the OSTS shall ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL." [10CFR20.1904(a)] |

B. The MRS facility and the OSTS shall ensure that the label also provides sufficient information (such as the radionuclide(s) present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, kinds of materials, and mass enrichment) to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures. [10CFR20.1904(a)]

C. The MRS facility and the OSTS shall, prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials. [10CFR20.1904(b)]

3.3.6.11 General Safety Requirements

A. Facilities and equipment shall be free from recognized hazards that are causing or likely to cause death or serious physical harm to employees. [29USC651 et. seq., 654 (a)(b)]

B. Facilities and equipment shall comply with occupational safety and health standards promulgated under 29USC651 et. seq. [29USC651 et. seq., 654 (a)(b)]

C. Each employee of the CRWMS shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to 29USC651 et. seq. which are applicable to his own actions and conduct. [29USC651 et. seq., 654 (a)(b)]

3.3.6.12 Ventilation

Ventilation and exhaust ductwork meeting the requirements of 29CFR1910.94 shall be provided as applicable in areas where hazardous atmospheres are generated by construction, testing or maintenance activities. [CRD 3.3.6.3.E]

Ventilation, confinement, and containment of airborne radioactive materials are provided for in Sections 3.7.1.4.2.8, 3.7.1.5.2.3, and 3.7.1.8.2.13.

3.3.6.13 Welding

Welding equipment and areas where welding will be performed shall meet the requirements specified in 29CFR1910 Subpart Q. [CRD 3.3.6.8.E]

3.3.7 Human Factors Engineering

3.3.7.1 Workstations and Control Rooms

Control rooms include rooms, areas, and personnel enclosures for personnel who operate equipment or monitor the operations of equipment or facilities. Workstations contain workspace and associated equipment for performing those functions. Design and layout of control rooms and workstations shall be performed in accordance with the requirements and guidelines identified in NUREG-0700 Section 6.1. [Derived by CRD 3.3.7.1]

3.3.7.2 Voice Communications Equipment

Requirements for human factors engineering and man machine interfaces with voice communications equipment impact design and selection of telephones, intercoms, radios, and other voice communication equipment. Design and selection of voice communications equipment shall consider the human factors engineering requirements and guidelines identified in NUREG-0700 Section 6.2.1 and in appropriate standards, such as MIL-STD-1472D Section 5.3.10 for operating controls for voice communications equipment. [Derived by CRD 3.3.7.2]

3.3.7.3 Alarms and Warning Systems

Auditory and visual alarm systems alert personnel to out of tolerance conditions that, if overlooked, may lead to personnel injury, equipment damage, or loss of system capability. Alarms and warning systems shall be designed or procured to meet the requirements and guidelines identified in NUREG-0700 Section 6.3 for alarms and operator response systems, and in Section 6.2.2 for audio displays and alerts. [Derived by CRD 3.3.7.3]

3.3.7.4 Controls

Controls include operator activated switches, valves, and similar mechanisms or devices used to regulate or guide operations of a machine, apparatus, or system. Human factors engineering design of controls shall follow the requirements and guidelines identified in NUREG-0700 Section 6.4. [Derived by CRD 3.3.7.4]

3.3.7.5 Visual Displays

Visual displays include meters, colored lights, graphic devices, and numerical readouts. Design or acquisition of visual displays shall consider the requirements and guidelines identified in NUREG-0700 Section 6.5. [Derived by CRD 3.3.7.5]

3.3.7.6 Control Panel Layout

The consideration of human engineering aspects of control contributes to operator proficiency, lessens operator fatigue, decreases training requirements, and contributes to safety. Design and layout of control panels shall conform to the requirements and guidelines identified in NUREG-0700 Section 6.8 for control groupings, layout arrangement, and location aids. [Derived by CRD 3.3.7.6]

3.3.7.7 Control Panel Integration

Design and integration of controls with associated displays shall incorporate the requirements and guidelines provided in NUREG-0700 Section 6.9 for single and multiple controls with single and multiple displays, control and display groups, and dynamic controls and display relationships. [Derived by CRD 3.3.7.7]

3.3.7.8 Labels, Markings, and Signs

Labeling and marking equipment and providing signs and location aids shall consider the requirements and guidelines provided in NUREG-0700 Section 6.6 for general labeling principles. [Derived by CRD 3.3.7.8]

3.3.7.9 Visual Display Terminal (VDT) Workstation

Human factors engineering of computer terminals, visual displays, and VDT workstations contributes to operator proficiency and lessens operator fatigue. Design, selection, and integration of VDT workstations shall incorporate the guidelines and requirements specified in appropriate standards, such as ANSI/HFS Std. No. 100-1988 for VDT workstation environment. [Derived by CRD 3.3.7.9]

3.3.7.10 Anthropometry

Sizing and layout dimensions for equipment and facilities, and the selection of personnel equipment and clothing to provide compatibility with using personnel shall consider the anthropometric guidelines and requirements identified in appropriate standards, such as MIL-STD-1472D Section 5.6.3 for clearance dimensions, limiting dimensions, adjustable dimensions, and clothing and person equipment, and DOD-HDBK-743A for special populations. [Derived by CRD 3.3.7.10]

3.3.7.11 Remote Handling and Operation

The design, selection, and integration of equipment, controls, and indicators for remotely operated systems shall comply with the guidelines and requirements identified in appropriate standards, such as MIL-STD-1472D Section 5.10. [Derived by CRD 3.3.7.11]

3.3.7.12 Vehicles and Material Handling

The human factors engineering, design, selection, and acquisition of operational vehicles, transportational vehicles, and material handling equipment shall consider requirements for human interface as specified in appropriate standards, such as MIL-STD-1472D Section 5.12 for seating, controls, operating instruments, visibility, heating and ventilation, trailers and vans, cranes, materials handling equipment, construction equipment, and automotive systems, and Section 5.14.1 for head-up displays, if used. [Derived by CRD 3.3.7.12]

3.3.7.13 Accessibility and Useability by the Physically Handicapped

The design, selection, and construction of facilities shall consider accessibility and useability of facilities and equipment by physically handicapped personnel, both visitors and employees. As a minimum, the guidance and requirements specified in DOE Order 6430.1A Section 1300-13 shall be considered for all facility and equipment designs. [Derived by CRD 3.3.7.13]

3.3.7.14 User-Computer Software Interface

Design of computer software and firmware that provides an interface between users and computers shall comply with the guidelines and requirements identified in appropriate standards, such as MTR 10090 for data entry and user inputs, data display, sequence control, user guidance and prompts, data transmission, and data protection. [Derived by CRD 3.3.7.14]

3.3.8 Methods and Control

3.3.8.1 Material Management

3.3.8.1.1 Identification and Control

A system (preferably automated) shall be developed and implemented to provide identification and control of materials, parts, and components, including the use of heat numbers, part numbers, serial numbers, or other means, either on the item or on records traceable to the item as required, throughout fabrication, installation, and use of the item. The identification and control must be designed to prevent the use of incorrect or defective materials, parts, and components. The material management system must enable location and removal of such items. [10CFR72.156]

3.3.8.1.2 Nonconforming Items

Materials, parts, or components that do not conform to requirements shall not be used or installed. This shall include procedures for identification, documentation, segregation, disposition, and notification to affected organizations. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures. [10CFR72.170]

3.3.8.2 Inventory Control

3.3.8.2.1 Inventory

A. The MRS facility shall conduct an inventory of all spent fuel in storage at intervals not to exceed 12 months unless otherwise directed by the NRC. [10CFR72.72(b)]

B. Direct inventory of the contents of the sealed storage mode and sealed MPCs shall not be required provided verification of integrity of the seal is assured. [Derived]

C. The MRS facility shall establish, maintain, and follow written material control and accounting procedures that enable the facility to account for material in storage. [10CFR72.72(c)]

D. The MRS facility shall retain copies of current inventory records and current material control and accounting procedures until the NRC terminates the license. [10CFR72.72(c)]

3.3.8.2.2 Accounting and Control Systems

Inventory accounting and control systems shall comply with the requirements of 10CFR75, in compliance with the US/IAEA agreement. [10CFR75.1]

3.3.8.3 Radioactive Material Handling

Refer to Sections 3.7.1.4, 3.7.1.5, 3.7.1.8, 3.7.2.1, 3.7.2.2, and 3.7.2.3 for specific requirements on handling radioactive materials.

3.3.9 Government Furnished Property

A. The site to accommodate the MRS facility will be provided by the government. [Derived by CRD 3.3.9]

B. Procedures to maintain, operate, and dispose of Government furnished property shall be specified in the MRS facility DRD as appropriate. [Derived by CRD 3.3.9.B]

3.3.10 Computer Resources

Computer resources shall be addressed in the MRS facility DRD, and must consider intercompatibility of computer resources (hardware and software). [Derived by CRD 3.3.10.A, 3.3.10.B]

3.3.11 Environmental Protection

For environmental protection requirements which pertain to utility services at the MRS facility, see Section 3.7.1.2.2.

3.3.11.1 Air Pollution Control

A. The MRS facility shall adhere to the requirements of the Clean Air Act for stationary sources of air emissions as presented in its implementing regulations which include 40CFR60 and 40CFR61. [40CFR60.1, 40CFR61.01][CRD 3.3.11.B]

B. The OSTS design shall not conflict with the license and procedures or standards set by the Purchaser to comply with the requirements of the Clean Air Act for stationary sources of air emissions as presented in its implementing regulations which include 40CFR60 and 40CFR61. [40CFR60.1, 40CFR61.01][1][CRD 3.3.1.B][CRD 3.3.11.B]

3.3.11.2 Drinking Water Protection

The MRS shall not conduct any underground injection or well construction activity except as authorized by permit or rule. [40CFR144.11]

3.3.11.3 Discharge of Dredged or Fill Material

Except as provided in 33CFR323.4, the MRS facility shall not discharge any dredged or fill material into the waters of the United States without permission. [33CFR323.3]

3.3.11.4 Toxic Substances Control

The handling, use, and disposal of any toxic substances shall comply with the requirements of the Toxic Substances Control Act, as amended. [15USC2601 et seq.]

3.3.11.5 Pesticide Control

The use and disposal of pesticides shall comply with the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act as presented in its implementing regulations which include 40CFR165. [40CFR165.2]

3.3.11.6 State and Local Laws

Any State and local requirements which are found to be more restrictive than Federal law shall be adhered to in addition to the Federal statute. [40CFR50.2(d), 40CFR60.10, 40CFR142.4]

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[1] A pending decision may exempt NRC-licensed nuclear power plants from 40CFR61, Subpart H.

3.4 DOCUMENTATION

3.4.1 Specifications

3.4.1.1 Presentation of Design Basis

The MRS facility and the OSTS shall ensure that applicable requirements and the design basis for structures, systems, and components important to safety are correctly translated into specifications, including ensuring that appropriate quality standards are included in design documents. [10CFR72.146(a)]

3.4.1.2 Interface Control

The MRS facility and the OSTS shall ensure that design interfaces are identified, controlled, and coordinated among participating organizations, including writing procedures for the review, approval, release, distribution, and revision of documents involving design interfaces. [10CFR72.146(b)]

3.4.1.3 Quality Affecting Specification

The MRS facility and the OSTS shall prescribe activities affecting quality by documented specifications of a type appropriate to the circumstances and shall require that these be followed. The specifications must include appropriate acceptance criteria for determining that important activities have been satisfactorily accomplished. [10CFR72.150]

3.4.2 Drawings

3.4.2.1 Presentation of Design Basis

The MRS facility and the OSTS shall ensure that applicable requirements and the design basis for structures, systems, and components important to safety are correctly translated into drawings, including ensuring that appropriate quality standards are included in design documents. [10CFR72.146(a)]

3.4.2.2 Quality Affecting Drawings

The MRS facility and the OSTS shall prescribe activities affecting quality by documented drawings of a type appropriate to the circumstances and shall require that these be followed. The drawings must include appropriate acceptance criteria for determining that important activities have been satisfactorily accomplished. [10CFR72.150]

3.4.3 Maintenance, Operators, and Technical Manuals

3.4.3.1 Operational Radiation Restrictions

The MRS facility shall have in place operational restrictions established to meet ALARA objectives and operational limits set in accordance with Section 3.2.2.2 for radioactive material in effluent and for direct radiation. [10CFR72.104(b)(c)]

3.4.3.2 Procedures for Opening Packages

The MRS facility shall establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received and ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened. [10CFR20.1906(e)(1)(2)]

3.4.3.3 NRC Notification

MRS facility personnel shall notify the NRC Operations Center within one hour of discovery of accidental criticality or any loss of special nuclear material. This notification must be made using the Emergency Notification System or, if not available, using a commercial telephone service to (301)951-0550. [10CFR72.74(a)(b)]

3.4.3.4 Radioactive Effluent Procedures

Technical specifications shall be maintained that, in addition to stating the limits on the release of radioactive materials for compliance with limits of 10CFR20 and ALARA objectives for effluent, require that operating procedures for control of effluent be established and followed, and equipment in the radioactive waste treatment systems be maintained and used, to meet the requirements of Sections 3.2.2.2 and 3.4.3.1. [10CFR72.44(d)(1)]

3.4.3.5 Requirements for Creation of Maintenance, Operators, and Technical Manuals

Measures and procedures shall be established to ensure that applicable regulatory requirements, design basis requirements, and other requirements as specified herein are correctly translated into specifications, drawings, procedures, and instructions, including training, operator's, maintenance, and other technical manuals. These measures and procedures must ensure that appropriate quality standards are specified and included in design documents and that deviations from these standards are properly controlled. [10CFR72.146(a)]

3.4.4 Test Plans and Procedures

3.4.4.1 Test Program

A. A test program shall be established to ensure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures that incorporate the requirements of this document, 10CFR72, and the requirements and acceptance limits contained in the MRS facility and the OSTS licenses. [10CFR72.162]

B. The test procedures shall include provisions for assuring that all prerequisites for the given test are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. [10CFR72.162]

C. Test results shall be documented and evaluated to ensure that test requirements have been satisfied. [10CFR72.162]

3.4.4.2 Inspection and Test Status

A. Markings such as stamps, tags, labels, routing cards, or other suitable means shall be used to indicate the status of inspections and tests performed upon individual items. These measures must provide for the identification of items which have satisfactorily passed required inspections and tests where necessary to preclude inadvertent bypassing of the inspections and tests. [10CFR72.168(a)]

B. SSC shall be designed to provided identification of the operating status by methods such as tagging valves and switches, to prevent inadvertent operation. [10CFR72.168(b)] [CRD 3.3.1.B]

3.4.4.3 Environmental Monitoring

Technical specifications shall be written which ensure that an environmental monitoring program is established to ensure compliance with the technical specifications for effluent. [10CFR72.44(d)(2)]

3.4.5 Quality Assurance Documentation

3.4.5.1 Material and Equipment Conformance

A. Documentary evidence shall be available that demonstrates material and equipment conform to the procurement specifications prior to their installation or use and shall ensure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment. [10CFR72.154(b)]

B. The MRS facility and the OSTS shall retain or have available this documentary evidence for the life of the facility. [10CFR72.154(b)]

3.4.5.2 Records Maintenance

A. The MRS facility shall maintain sufficient records to furnish evidence of activities affecting quality. The records must include: design records, records of use and the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. The records must include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records must, at a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any noted deficiencies. [10CFR72.174]

B. Records shall be identifiable and retrievable. [10CFR72.174]

C. Records pertaining to the design, fabrication, erection, testing, maintenance, and use of structures, systems, and components important to safety shall be maintained by or under the control of the MRS facility until the NRC terminates the license. [10CFR72.174]

D. Facilities and equipment shall be provided to collect, store, and maintain QA records in accordance with the requirements of the QARD. [CRD 3.5.3.A]

3.4.6 Construction Records

Construction and fabrication records requirements shall be as specified in the MRS facility and the OSTS DRDs. [Derived by CRD 3.4.6.A]

3.4.7 Computer Documentation Standard Usage and Practices

Analytical and computational models, and software user documentation developed for the MRS facility and the OSTS shall be prepared in accordance with the QARD. [CRD 3.4.7]

3.4.8 Records Management

For records management requirements for the MRS facility, see Section 3.7.1.7.2.

3.5 LOGISTICS

3.5.1 Maintenance

3.5.1.1 Standardization and Calibration

A. The design of the MRS facility and the OSTS shall allow maintenance to be performed, to the extent practical, using standard tools, lubricants, cleaners, test equipment, etc. [Derived]

B. Test equipment requiring calibration shall be calibrated periodically, in accordance with the manufacturers specifications and industry standards. [CRD 3.5.1.2]

C. The use of special tools and the number of standard tools required shall be minimized by selection of common fasteners, clamps, adapters, connectors, etc. [CRD 3.5.1.2]

3.5.1.2 On-Line Maintenance

The performance of on-line maintenance shall be limited to those actions necessary for safety, to prevent system degradation, and to restore security monitoring. It shall consist of remove and replace actions, minor servicing, minor repairs, or repair to items which cannot easily be removed from service for maintenance. [Derived]

3.5.1.3 Intermediate Maintenance

A. Intermediate maintenance shall provide failure detection, isolation, and replacement of units which are shop repairable or vendor repairable. Intermediate maintenance is complex or difficult enough to require physical removal from its operating location, yet not complex or difficult enough for off-site or vendor repair. [Derived]

B. Facilities, tools, and parts for shop repairable items shall be provided. [Derived]

3.5.1.4 Salvaging, Off-site Repair, and Vendor Repair

Items which cannot be repaired at the MRS facility shall be evaluated for salvage or off-site repair. Because of the long life of the MRS facility, vendor supportability shall be addressed in procurement and maintenance agreements. [Derived]

3.5.1.5 Equipment Maintenance

A. Built-in test equipment (BITE) and automatic test equipment (ATE) shall be used where they are already incorporated into the design of a system or equipment, but existing equipment should not be redesigned to accommodate BITE or ATE. Newly designed equipment or systems should incorporate BITE and/or ATE only where it can be demonstrated to significantly reduce the on-site maintenance workload. [Derived by CRD 3.5.1.1.B]

B. Maintenance facilities, equipment, and tools shall be provided based on the criteria specified by DOE Order 4330.4A, I, 3.5. [CRD 3.5.1.1.C]

C. The maintenance system shall be equipment intensive, rather than personnel intensive, and rely on technology to reduce maintenance requirements. [Derived by CRD 3.5.1.1.A]

3.5.2 Supply

3.5.2.1 Logistics Support Analysis

As the maintenance concept influences the design, it also affects the type and quantity of supply support required to support the MRS facility and the OSTS. Based on projected logistics support requirements for design considerations, an analysis shall be conducted to assess the capability of support available to the MRS facility and the OSTS. This analysis, Logistic Support Analysis (LSA), should be conducted on an iterative basis through all phases of the system or equipment life cycle to satisfy supportability objectives. The level of detail of the analyses and the timing of the task performance should be tailored to each system/equipment and be responsive to program schedules and milestones. An LSA Program, in accordance with MIL-STD-1388 series, or the equivalent, must be established for the MRS facility. For the OSTS, an LSA will be conducted to identify design considerations. That LSA will be made available to the Purchaser, who may elect to continue with an LSA program at their discretion. [Derived by CRD 3.5.2, 3.5.4]

3.5.2.2 Standardization

A. Standardized parts, fittings, hardware, and modules shall be specified for the MRS facility to simplify stocking and ensure reliability and supportability. As a minimum, spare parts for on-line and intermediate shop repairs shall be maintained at the MRS facility. [CRD 3.3.8.1.D]

B. Standardized parts, fittings, hardware, and modules shall be specified for the OSTS to simplify stocking and ensure reliability and supportability. As a minimum, spare parts for on-line and intermediate shop repairs shall be maintained at the OSTS. [CRD 3.3.8.1.D]

3.5.3 Facilities and Facility Equipment

3.5.3.1 Warehouses

A. Warehouse space shall be provided for storage of all spare parts, replacement equipment, and consumable materials. These items must be maintained in an environment conducive to their protection. [CRD 3.5.3.C]

B. Items subject to deterioration shall be subject to a test and maintenance program. [Derived]

C. All spare parts and replacement equipment shall be maintained in an inventory system, readily identifiable and accessible. [Derived]

D. Handling equipment shall be available for accessing and moving items. [Derived]

E. Aisles and doors shall support item portability and transportability. [Derived]

For inventory control of materials, equipment, and parts see Section 3.3.8.1.

3.5.3.2 Repair Shops

A. Adequate repair facilities and equipment shall be provided for intermediate maintenance and repairs. [Derived]

B. Repair facilities shall be designed with door openings, halls, and aisles adequate for movement of items to be repaired into and out of the facility. [Derived]

C. Records shall be maintained of all repairs performed, in accordance with the requirements of Section 3.4.5. [CRD 3.5.3.A]

3.5.3.3 Shipping Facility

A. A facility shall be provided for receipt of maintenance and repair materials and tools, and shipment and return receipt of items shipped off-site for repair. [Derived]

B. The facility shall be designed with door openings, halls, and aisles adequate for movement of items to be shipped into and out of the facility. [Derived]

C. Records shall be maintained of all equipment shipped off-site, in accordance with the requirements of Section 3.4.5. [CRD 3.5.3.A]

3.6 PERSONNEL AND TRAINING

3.6.1 Personnel

3.6.1.1 Physical Health

A. The physical condition and general health of personnel certified for the operation of equipment and controls important to safety shall not be such as might cause operational errors that could endanger other in-plant personnel or the public health and safety. [10CFR72.194]

B. Any condition that might cause impaired judgment or motor coordination shall be considered in the selection of personnel for activities that are important to safety. These conditions need not categorically disqualify a person, if appropriate provisions are made to accommodate such defect. [10CFR72.194]

3.6.1.2 Employee Population

The MRS facility employee population shall be determined during MRS facility design. [Derived]

3.6.2 MRS Facility Training

3.6.2.1 Identification of Training Requirements

A. The contractor and government responsibility for training shall be defined. This will include the concept of how training will be accomplished (e.g., school, contractor training). [Derived by CRD 3.6.2.1.D]

B. Equipment required for training purposes shall be identified. [Derived by CRD 3.6.2.1.D]

C. Training devices to be developed, characteristics of the training devices, and training and skills to be developed through the use of training devices shall be identified. [Derived by CRD 3.6.2.1.D]

D. Training time and locations available for training shall be identified. [Derived by CRD 3.6.2.1.D]

E. Source material and training aids to support specified training shall be identified. [Derived by CRD 3.6.2.1.D]

3.6.2.2 Quality Assurance Training

3.6.2.2.1 Quality Assurance Training Program

The design of the MRS facility shall provide facilities, equipment, manuals, and training aids for indoctrination and training of personnel performing activities affecting quality as necessary to ensure that suitable proficiency is achieved and maintained. Management of other organizations participating in the quality assurance program must regularly review the status and adequacy of that part of the quality assurance program which they are executing. [10CFR72.144(d)]

3.6.2.2.2 Equipment Maintenance Training

MRS facility equipment maintenance training shall be provided based on the criteria specified by DOE Order 4330.4A. [CRD 3.6.2.1.C]

3.6.2.3 Health Physics Training

A. The design of the MRS facility shall provide capability for processing and evaluating all personnel dosimeters that require processing to determine the radiation dose and that are used by the MRS facility to comply with 10CFR20.1201 or with conditions specified in the MRS facility license. This capability does not apply to direct and indirect reading pocket ionization chambers and those dosimeters used to measure the dose to the extremities. [10CFR20.1501(c)]

B. A training program shall be provided, if necessary, to ensure that all dosimetry processors can be accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology and approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored. [10CFR20.1501(c)(1)(2)]

C. A health physics training program shall be implemented to ensure that occupational radiation exposures are ALARA. Guidance on the content of these programs may be obtained from NRC Regulatory Guides 8.8 and 8.10. [Derived]

3.6.2.4 Operator Training

3.6.2.4.1 Operating Personnel

Operation of equipment and controls that have been identified as important to safety in the Safety Analysis Report and in the license shall be limited to trained and certified personnel or be under the direct visual supervision of an individual with training and certification in the operation. [10CFR72.190]

3.6.2.4.2 Supervisory Personnel

Supervisory personnel who personally direct the operation of equipment and controls important to safety shall also be certified in such operations. [10CFR72.190]

3.6.2.4.3 Operator Training and Certification

A training and certification program for operators shall be developed and submitted to the NRC with the license application. [10CFR72.192]

3.6.2.5 Other Training

3.6.2.5.1 Not Important to Safety Equipment Training

Personnel operating or maintaining equipment other than important to safety equipment shall be trained to ensure their safety and the necessary reliability of the system they support. This includes personnel who maintain records for the MRS facility. [Derived]

3.6.2.5.2 Job-related Safety and Health Training

The MRS facility shall maintain training facilities to provide appropriate job-related safety and health training, including training as required under Section 19 of the Occupational Safety and Health Act (OSHA) of 1970 (29USC651 et seq.), Executive Order 12196, 29CFR1960, and the DOE's Federal Employee Occupational Safety and Health Program (DOE Order 3790.1A). [DOE Order 3790.1A, p. V-1, (2)(b)]

3.6.2.5.3 Hazardous Material Training

The MRS facility shall provide appropriate training for workers who may be involved in hazardous material emergency response and hazardous material transportation safety. [29CFR1910(q)(6)][49CFR172.702(b)]

3.6.2.5.4 Fire Brigade Training

The MRS facility shall provide training and education for all fire brigade members commensurate with those duties and functions that they are expected to perform. If feasible, such training may be allocated to off-site training locations. [29CFR1910.156(c)(1)]

3.7 SEGMENT REQUIREMENTS

3.7.1 MRS Facility Segment Requirements

3.7.1.1 Site Development (CI)[1] Segment

3.7.1.1.1 Site Development Segment Description

This segment provides the general site improvements for the controlled area of the MRS facility, and is defined as those facilities and subsystems necessary for the general civil improvements to the site.

This segment includes the following:

A. **Site Layout.** The MRS facility is divided into major areas of operation; e.g., support and industrial services, SNF handling including receiving and packaging, and interim storage.

B. **Earthwork, Drainage, and Landscape.** The operations area of the site is graded to provide a relatively constant elevation. Drainage is provided by a network of catch basins, culverts, ditches, berms, and swales. Landscaping of areas visible to the public is aesthetically pleasing and consistent with the surrounding environment.

C. **Roads, Walks, and Parking.** Roads, walks, and parking areas are provided for personnel access to the site, receipt and handling of materials and supplies, as well as transportation casks, and, if required, public easement across the site. Provisions are made for handicapped access to the MRS facility site and its various facilities, as appropriate.

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[1] (CI) Indicates that this item is one of the Configuration Items identified in the MRS-Conceptual Design Report.

D. **Railways.** Railways are provided for receipt and handling of transportation SNF casks.

E. **Fencing.** Fencing is provided to control access to the MRS facility.

F. **Yard Illumination.** Lighting is provided along walkways, roads, and in parking areas to provide for personnel safety and security.

G. **Area for Expansion.** The design and layout of the MRS facility includes provisions for future expansion to accommodate additional storage of SNF or the addition of facilities (e.g., for preparation of SNF for disposal at the MGDS).

H. **Receiving, Queuing, and Holding Areas.** Areas are provided for parking of transportation casks and their associated vehicles on the MRS facility site.

3.7.1.1.1.1 Site Development Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at the MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Receive Loaded/Unloaded Transportation Cask Subsystem (1.3.1.1.1)
E. Accept Transportation Cask/Transporter (1.3.1.1.1.1)
F. Move Transportation Cask/Transporter to Parking Area (1.3.1.1.1.4)
G. Move Cask/Transporter inside Controlled Area (1.3.1.1.1.5)
H. Move Off-Normal Transportation Cask/Transporter to Holding (1.3.1.1.1.6)
I. Move Suspect Transportation Cask/Transporter to Holding (1.3.1.1.1.7)
J. Process Off-Normal Transportation Cask/Transporter (1.3.1.1.1.8)
K. Process Suspect Transportation Cask/Transporter (1.3.1.1.1.9)
L. Park Transportation Cask/Transporter (1.3.1.1.2)
M. Prepare SNF or Loaded MPC for Storage (1.3.1.1.3)
N. Move TSC to Storage Area (1.3.1.1.3.6)
O. Return Transporter to Debarkation (1.3.1.1.3.8)
P. Transfer SNF or Loaded MPC into Storage (1.3.1.1.4)
Q. Move Loaded Storage Mode to Storage Location (1.3.1.1.4.4)
R. Retrieve MPC from Storage (1.3.1.1.5)
S. Retrieve Loaded Storage Mode from Storage (1.3.1.1.5.1)
T. Prepare MPC for Transport (1.3.1.1.6)
U. Retrieve Unloaded MPC Transportation Cask (1.3.1.1.6.1)
V. Prepare Loaded MPC Transportation Cask Subsystem for Transport (1.3.1.1.6.4)
W. Prepare Cask/Transporter for Release from Site (1.3.1.1.6.5)
X. Store SNF (1.3.1.2)
Y. Support Storage Operations (1.3.1.4)
Z. Provide Protective Services (1.3.1.4.4)

AA. Safeguard SNF (1.3.1.4.4.1)
AB. Maintain Physical Security (1.3.1.4.4.2)
AC. Provide Radiological Protection (1.3.1.4.4.6)
AD. Provide Environmental Monitoring (1.3.1.4.4.7)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.1.1.2 Site Development Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.1.2 Site Development Segment Requirements

3.7.1.1.2.1 Illumination

Isolation zones and clear areas between barriers shall be provided with illumination sufficient for the monitoring required by paragraphs (b) (3) and (4) of 10CFR73.50, but not less than 0.2 foot candles. [10CFR73.50(b)(5)]

3.7.1.1.2.2 Environmental Contamination

The MRS facility shall be designed, constructed, and operated to preclude the transport of radioactive materials to the environment by way of an aquifer. [10CFR72.122(b)(4)]

3.7.1.1.2.3 Adverse Impacts on Wetlands and Flood Plains

A. The design of the MRS facility shall avoid, to the extent possible, the long-term and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of flood plains and wetlands, and shall avoid direct and indirect support of flood plain and wetlands development wherever there is a practical alternative. [10CFR1022.3(a)]

B. The design of the MRS facility shall incorporate flood plain management goals and wetlands protection considerations into its planning, regulatory, and decision making process and shall to the extent practicable consider:

   1. Reducing the hazard and risk of flood loss.

   2. Minimizing the impact of floods on human safety, health, and welfare.

   3. Restoring and preserving natural and beneficial values served by flood plains.

4. Requiring the construction of structures and facilities to be, at a minimum, in accordance with the standards and criteria set forth in, and consistent with, the intent of the regulations promulgated by the Federal Insurance Administration pursuant to the National Flood Insurance Act of 1968, as amended, 42USC4001 et seq.

5. Minimizing the destruction, loss, or degradation of wetlands.

6. Preserving and enhancing the natural and beneficial values of wetlands.

7. Promoting public awareness of flood hazards by providing conspicuous delineations of past and probable heights on property that has suffered flood damage or is in an identified flood hazard area and that is used by the general public.

[10CFR1022.3(b)]

C. The design of the MRS shall identify, evaluate, and as appropriate, implement alternative actions which may avoid or mitigate adverse flood plain or wetlands impacts. [10CFR1022.3(d)]

3.7.1.1.2.4 Flood Plain Action Policy

If project or program implementation has progressed to the point where review of alternatives is no longer practicable, or if DOE determines after a review of alternatives to take action in a flood plain, the MRS shall design or modify the selected alternative in order to minimize potential harm to or within the flood plain and to restore and preserve flood plain values. [10CFR1022.5(b)]

3.7.1.1.2.5 Minimization of Flood Plain Impact

If no practicable alternative to location in the flood plain or wetlands is available, consistent with the policy set forth in Executive Order 11988, the design of the MRS facility shall, prior to taking action, design or modify its action in order to minimize potential harm to or within the flood plain or wetlands. [10CFR1022.15(a)]

3.7.1.1.2.6 Railway Design

Railways shall be designed per the AREA Manual for Railway Engineering. [DOE Order 6430.1A, Sec. 0245]

3.7.1.1.2.7 Paving and Surfacing

A. Paving and surfacing of walks and parking areas shall comply with Uniform Federal Accessibility Standard (Fed-Std-795). [DOE Order 6430.1A, Sec. 0250]

B. Paving of roads designed shall comply with AASHTO GDHS-84, Road Design. [DOE Order 6430.1A, Sec. 0250]

3.7.1.2 Utilities Segment

3.7.1.2.1 Utilities Segment Description

This segment provides utility services to all areas of the MRS facility. This includes only the collection, distribution and treatment or packaging systems. The piping and wiring internal to the building being served is not included in this segment. This segment includes the following:

A. **Conventional Waste Treatment Facility (CI).** The primary function of the conventional waste treatment facility is to treat wastewater that may contain contaminants such as nutrients, suspended sediments, dissolved sediments, bacteria, oxygen demanding matter, chemicals, oil, and grease. This facility provides for the handling and packaging of non-radioactive hazardous wastes for off-site disposal.

B. **Sanitary Waste Treatment Facility (CI).** The primary function of the sanitary waste treatment facility is to provide for the treatment of domestic and biodegradable wastewater.

C. **Water Utilities Facility (CI).** This facility contains the equipment necessary for treatment, distribution, and delivery of general service water, including component cooling and cooling tower make-up, domestic and drinking water, and demineralized water. This facility provides all utility water except for the fire protection system.

D. **Fossil Fuel Distribution Facility (CI).** This facility provides fuel to the MRS facility for such items as hot water boilers, steam boilers, heating, emergency power, and other related functions. Fuel oil or natural gas may be used for these functions depending on availability at the final MRS facility site.

E. **Electrical Power Delivery (CI).** The electrical power delivery covers the MRS facility electrical power system from the point of connection to the local utility transmission lines to the termination of the power cable at the switchgear in the MRS facility.

F. **Fire Protection, Service, and Distribution Facility (CI).** This facility contains the equipment necessary to supply all fire protection services, including water supply, for the MRS facility.

G. **Compressed Air Services Facility (CI).** This facility provides equipment necessary to supply all of the compressed air services for the MRS facility except bottled breathing air used in respirators.

H. **Communications (CI).** Communications includes the equipment necessary to tie the MRS facility to the public telephone system as well as any equipment for added communications to off-site facilities, such as, microwave communications, two way radio, or satellite linkages.

I. **Instrumentation and Controls (CI).** The Instrumentation and Controls consists of a distributed control system which performs or coordinates the many physical control and monitoring activities, including the SNF assembly handling operations and the support systems operations. All these operations are performed from a control station local to the affected equipment, a central control station, or an auxiliary shutdown station.

3.7.1.2.1.1 Utilities Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at the MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Prepare SNF or Loaded MPC for Storage (1.3.1.1.3)
E. Remove Loaded Transportation Cask from Transporter (1.3.1.1.3.1)
F. Prepare Loaded Transportation Cask for Transfer (1.3.1.1.3.2)
G. Remove SNF or Loaded MPC from Loaded Transportation Cask (1.3.1.1.3.3)
H. Verify SNF and Loaded MPC and Condition (1.3.1.1.3.4)
I. Prepare Unloaded Transportation Cask for Return to Service (1.3.1.1.3.5)
J. Transfer SNF or Loaded MPC into Storage (1.3.1.1.4)
K. Configure Storage Mode (1.3.1.1.4.1)
L. Place SNF into Storage Mode (1.3.1.1.4.2)
M. Close MPC and/or Storage Mode (1.3.1.1.4.3)
N. Move Loaded Storage Mode to Storage Location (1.3.1.1.4.4)
O. Emplace Loaded Storage Mode into Storage (1.3.1.1.4.5)
P. Retrieve MPC from Storage (1.3.1.1.5)
Q. Retrieve Loaded Storage Mode from Storage (1.3.1.1.5.1)
R. Move Loaded Storage Mode into SNF Transfer Area (1.3.1.1.5.2)
S. Open Storage Mode (1.3.1.1.5.3)
T. Remove MPC from Storage Mode (1.3.1.1.5.4)
U. Verify MPC Identity and Condition (1.3.1.1.5.5)
V. Recover SNF from Off-Normal MPC (1.3.1.1.5.7)
W. Prepare MPC for Transport (1.3.1.1.6)
X. Prepare Unloaded MPC Transportation Cask for Loading (1.3.1.1.6.2)
Y. Place SNF or Loaded MPC into Transportation Cask (1.3.1.1.6.3)
Z. Prepare Loaded MPC Transportation Cask Subsystem for Transport (1.3.1.1.6.4)
AA. Store SNF (1.3.1.2)
AB. Monitor SNF Storage System (1.3.1.2.3)
AC. Monitor Radiological/Thermal Condition (1.3.1.2.3.1)
AD. Account for SNF (1.3.1.2.3.2)
AE. Support Storage Operations (1.3.1.4)
AF. Provide Operations Support (1.3.1.4.2)
AG. Provide Utilities (1.3.1.4.2.1)
AH. Provide HVAC (1.3.1.4.2.2)

AI. Provide Protective Services (1.3.1.4.4)
AJ. Safeguard SNF (1.3.1.4.4.1)
AK. Provide Fire Protection (1.3.1.4.4.5)
AL. Provide Radiological Protection (1.3.1.4.4.6)
AM. Provide Environmental Monitoring (1.3.1.4.4.7)
AN. Provide Administrative Support (1.3.1.4.6)
AO. Provide Human Resources (1.3.1.4.6.2)
AP. Maintain Records (1.3.1.4.6.2)
AQ. Maintain Institutional and External Relations (1.3.1.4.6.3)
AR. Maintain Financial Accounting (1.3.1.4.6.4)
AS. Process Site-Generated Radwaste (1.3.1.4.7)
AT. Collect Liquid Radwaste (1.3.1.4.7.1)
AU. Collect Solid Radwaste (1.3.1.4.7.2)
AV. Treat/Package/Monitor/Ship Radwaste for Off-site Disposal (1.3.1.4.7.3)
AW. Control Site-Generated Wastes Other than Radwaste (1.3.1.4.8)
AX. Monitor All Off-Site Releases (1.3.1.4.8.1)
AY. Segregate Hazardous Waste Streams (1.3.1.4.8.3)
AZ. Maintain and Repair Transportation Cask Subsystems (1.3.1.4.9)
BA. Maintain and Repair Transportation Casks (1.3.1.4.9.1)
BB. Maintain and Repair Ancillary Equipment and Special Tools and Fixtures (1.3.1.4.9.2)
BC. Perform Cask Reconfigurations (1.3.1.4.9.3)
BD. Manage Transportation Cask Subsystem Inventory (1.3.1.4.9.4)
BE. Manage Unloaded Cask Inventory (1.3.1.4.9.5)
BF. Manage Transporter Inventory (1.3.1.4.9.6)
BG. Manage Ancillary Equipment and Special Tools and Fixtures Inventory (1.3.1.4.9.7)
BH. Manage Spare Parts and Consumables Inventory (1.3.1.4.9.8)
BI. Create and Maintain Records (1.3.1.4.9.9)
BJ. Manage Transporter Repair and Maintenance (1.3.1.4.9.10)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.2.1.2 Utilities Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.2.2 Utilities Segment Requirements

3.7.1.2.2.1 Utilities Services

A. **Emergency Capability.** Each utility service system shall be designed to meet emergency conditions. The design of utility services and distribution systems important to safety includes redundant systems to the extent necessary to maintain, with adequate capacity, the ability to perform safety functions assuming a single failure. [10CFR72.122(k)(1)]

B. **Testing and Operation.** Emergency utility services shall be designed to permit testing of the functional operability and capacity, including the full operational sequence, of each system for transfer between normal and emergency supply sources, and to permit the operation of associated safety systems. [10CFR72.122(k)(2)]

C. **Emergency Power.** Provisions shall be made so, in the event of a loss of the primary electric power source or circuit, reliable and timely emergency power will be provided to instruments, utility service systems, the central security alarm station, and operating systems, in amounts sufficient to allow safe storage conditions to be maintained and to permit continued functioning of all systems essential to safe storage and handling of SNF. The design of the MRS must analyze power requirements to determine if an uninterruptible power source, an emergency generator, or both are required. [10CFR72.122(k)(3)]

D. **Shared Utilities.** An MRS facility located on the site of another facility may share common utilities and services with such a facility and be physically connected with the other facility. However, the sharing of utilities and services or the physical connection shall not significantly:

1. Increase the probability or consequences of an accident or malfunction of components, structures, or systems important to safety

2. Reduce the margin of safety as defined in the basis for any technical specifications of either facility.

[10CFR72.122(k)(4)]

3.7.1.2.2.2 Effluent Systems

Effluent systems shall be provided for the handling and storage systems, as appropriate, which include means for measuring the amounts of radionuclides in effluent during normal operations and under accident conditions. A means of measuring the flow of the diluting medium, either air or water, must also be provided. [10CFR72.126(c)(1)]

3.7.1.2.2.3 Lead Free Water System

A. Any pipe, solder, or flux, used in the installation or repair of any public water system, or any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system, shall be lead free. The term "lead free" refers to solders and flux containing not more 0.2% lead and refers to pipes and pipe fittings containing not more than 8.0% lead. [42USC300f et seq., Sec. 300g-6(a)(d)]

B. The above limitation shall not apply to leaded joints necessary for the repair of cast iron pipes. [42USC300f et seq., Sec. 300g-6(a)]

3.7.1.2.2.4 Effluent Limitations

Except as in compliance with Sections 1311, 1312, 1316, 1317, 1328, 1342, and 1344 of 33USC1251 et seq., the MRS facility shall ensure that no discharge of any pollutant by any person will occur. [33USC1251 et seq., Sec. 1311(a)]

3.7.1.2.2.5 Compliance With Effluent Standards

The design of the MRS facility shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act (CWA) (33USC1251 et seq.) for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal. [40CFR122.41(a)(1)]

3.7.1.2.2.6 Underground Storage Tank (UST) System

The requirements of 40CFR280 apply to all owners and operators of an UST system as defined in 40CFR280.12 except as otherwise provided in paragraphs (b), (c), and (d) of 40CFR280.10. Any UST system listed in paragraph (c) of 40CFR280.10 shall meet the requirements of 40CFR280.11. [40CFR280.10(a)]

3.7.1.2.2.7 Hazardous Waste Determination

If the MRS facility generates a solid waste, as defined in 40CFR261.2, then the MRS facility shall determine if that waste is a hazardous waste using the following method:

A. Determine if the waste is excluded from regulation under 40CFR261.4.

B. Determine if the waste is listed as a hazardous waste in Subpart D of 40CFR261.

C. For purposes of compliance with 40CFR268, or if the waste is not listed in Subpart D of 40CFR261, the generator shall then determine whether the waste is identified in subpart C of 40CFR261 by either:

   1. Testing the waste according to the methods set forth in Subpart C of 40CFR261, or according to an equivalent method approved by the EPA under 40CFR260.21

   2. Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.

D. If the waste is determined to be hazardous, refer to Parts 264, 265, 268 of 40CFR for possible exclusions or restrictions pertaining to management of this specific waste.

[40CFR262.11]

3.7.1.2.2.8 Monitoring and Records

A. The MRS facility shall ensure that samples and measurements taken for the purpose of monitoring are representative of the monitored activity. [40CFR122.41(j)(1)]

B. The MRS shall conduct monitoring results according to test procedures approved under 40CFR136 or, in the case of sludge use or disposal, approved under 40CFR136 unless otherwise specified in 40CFR503, unless other test procedures have been specified in the permit. [40CFR122.41(j)(4)]

3.7.1.2.2.9 Drinking Water Standards

The MRS facility drinking water system shall meet the National Primary Drinking Water Standards, unless the water system meets all of the following conditions:

A. Consists only of distribution and storage facilities (and does not have any collection and treatment facilities)

B. Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply

C. Does not sell water to any person

D. Is not a carrier which conveys passengers in interstate commerce.

[40CFR141.3]

3.7.1.2.2.10 Instrumentation and Control

A. Instrumentation and control systems shall be provided to monitor systems that are important to safety over anticipated ranges for normal and off-normal operation. Those instruments and control systems that must remain operational under accident conditions must be identified in the Safety Analysis Report. [10CFR72.122(i)]

B. A control room or control area, if appropriate for the design of the MRS facility, shall be designed to permit occupancy and actions to be taken to safely monitor the MRS facility under normal conditions, and to provide safe control of the MRS facility under off-normal or accident conditions. [10CFR72.122(j)]

3.7.1.2.2.11 Fire Protection System

Fire protection systems shall be designed in accordance with DOE Order 6430.1A, Sections 0110-6, 1052, 1161-3, 1670-2, and 1671-2. [DOE Order 6430.1A]

3.7.1.3 Security Facilities (CI) Segment

3.7.1.3.1 Security Facilities Segment Description

This segment includes the physical protection measures necessary to provide protection and access controls to deter unauthorized access to, or removal of, items of security interest from the MRS facility. This segment provides access control points as well as surveillance and intrusion detection devices. This segment includes the following:

A. **Main Gatehouse.** The Main Gatehouse is in, and provides the access point to, the controlled area of the MRS facility for all employees and all industrial truck traffic. All vehicles, except for those transporting bulk materials by rail or SNF transportation casks, entering and leaving the MRS facility pass through this gate.

B. **Receiving Gatehouse.** The Receiving Gatehouse provides the access point to the controlled area of the MRS facility, where SNF transportation cask shipments and bulk material shipments enter the site.

C. **Inspection Gatehouse.** The Inspection Gatehouse provides the access point to the protected area for vehicular traffic.

D. **Security Building.** The Security Building houses the offices for the central security force. Communications are provided with all on-site security stations such as the Gatehouses and the Protected Area Badge House as well as with the local off-site police force. This building contains the equipment necessary to monitor the site security system including visual monitors, intrusion alarms, and motion detectors. This building also houses the electronic access control system.

E. **Protected Area Badge House.** All personnel obtain their protected area access badge here prior to entry into the protected area.

F. **Security Training.** A physical training area is provided for the security force. This training area includes a firing range for weapons training. This facility may be allocated off-site if suitable facilities are available.

3.7.1.3.1.1 Security Facilities Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Receive Loaded/Unloaded Transportation Cask Subsystem (1.3.1.1.1)
E. Accept Transportation Cask/Transporter (1.3.1.1.1.1)
F. Detach Prime Mover (1.3.1.1.1.2)

G. Inspect Transportation Cask/Transporter (1.3.1.1.1.3)
H. Move Cask/Transporter inside Controlled Area (1.3.1.1.1.5)
I. Move Suspect Transportation Cask/Transporter to Holding (1.3.1.1.1.7)
J. Process Suspect Transportation Cask/Transporter (1.3.1.1.1.9)
K. Prepare MPC for Transport (1.3.1.1.6)
L. Prepare Cask/Transporter for Release from Site (1.3.1.1.6.5)
M. Store SNF (1.3.1.2)
N. Monitor SNF Storage System (1.3.1.2.3)
O. Account for SNF (1.3.1.2.3.2)
P. Support SNF Storage Operations (1.3.1.4)
Q. Provide Operations Support (1.3.1.4.2)
R. Provide HVAC (1.3.1.4.2.2)
S. Provide Protective Services (1.3.1.4.4)
T. Safeguard SNF (1.3.1.4.4.1)
U. Maintain Physical Security (1.3.1.4.4.2)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.3.1.2 Security Facilities Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.3.2 Security Facilities Segment Requirements

3.7.1.3.2.1 Transaction Reporting

A Nuclear Material Transaction Report (DOE/NRC Form-741) shall be completed and distributed whenever spent fuel is transferred or received. Refer to Section 3.7.1.7.2 for records storage requirements. [10CFR72.78]

3.7.1.3.2.2 Radioactive Material Packaging

Provisions shall be made to ensure that the MRS facility has the capability to determine that, for all radioactive material packages to be shipped from the MRS facility, the radiation levels in normally occupied positions of the transport vehicle are less than two mrem/hour. [10CFR71.47(d)]

3.7.1.3.2.3 Search

A. At the point of personnel and vehicle access into a protected area, the MRS facility shall be designed to provide capabilities to allow for a search of individuals and hand-carried packages for devices such as firearms, explosives, and incendiary devices, or other items which could be used for radiological sabotage. The search may be conducted either by a physical search or by the use of equipment capable of detecting such devices. [10CFR73.50(c)(1)]

B. Subsequent to search, drivers of delivery and service vehicles shall be escorted at all times while within the protected area. [10CFR73.50(c)(1)]

3.7.1.3.2.4 Procedures for Receiving Packages

A. The MRS facility shall be capable of receiving a package when the carrier offers it for delivery. [10CFR20.1906(a)]

B. The MRS facility shall provide capability to monitor the external surfaces of a package known to contain radioactive material for radioactive contamination and radiation levels if the package is labeled as containing radioactive material; or has evidence of potential contamination, such as packages that are crushed, wet, or damaged. [10CFR20.1906(b)]

C. The MRS facility shall provide the capability to perform monitoring required as soon as practicable after receipt of the package. [10CFR20.1906(c)]

D. Transferring of special form sources in MRS facility-owned or MRS facility-operated vehicles to and from a work site shall be exempt from the contamination monitoring requirements of paragraph B except for the survey requirement in paragraph B for measuring radiation levels that is required to ensure that the source is still properly lodged in its shield. [10CFR20.1906(f)]

3.7.1.4 Preparation and Transfer Segment

3.7.1.4.1 Preparation and Transfer Segment Description

This segment provides for the handling and transfer of SNF and loaded MPCs between transportation casks and the storage mode. It also provides the internal communications and instrumentation and controls necessary for the safe storage of SNF at the MRS facility. This segment consists of the following:

A. **Transfer Facility (CI).** The Transfer Facility is capable of receiving transportation casks from Transportation, removing SNF from the transportation cask and placing in into an MPC in either storage mode for storage or a rail cask for transportation to the MGDS. The Transfer Facility is also capable of receiving transportation casks from the Transportation element, removing the loaded MPC from the transportation cask, and placing it into the storage mode for interim storage. The transfer facility is also capable of retrieving a loaded storage mode, removing the loaded MPC from it, and placing it into rail casks for shipment to the MGDS. The equipment necessary to remove the transportation cask from its associated vehicle, open it, and extract the SNF assemblies or the loaded MPC from the cask is included as a part of this facility. The facility also includes the equipment necessary to open and close the storage mode. It may also be required to handle TSCs. Routine maintenance such as replacing seals and gaskets is performed on the transportation casks in this facility. This also includes the emergency (or

standby) generator, or other source of emergency power for systems which are important to safety or whose temporary shutdown might endanger site personnel.

B. **Washdown.** This provides a washdown area to clean the casks.

C. **Radwaste Facility (CI).** Provisions are made to provide for storage and handling of contaminated tools and equipment. This facility provides collection, monitoring, treatment, storage, and packaging for radioactive waste that results from handling and storing SNF. Radwaste which cannot be released directly to the environment is packaged and shipped off-site for disposal.

3.7.1.4.1.1 Preparation and Transfer Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Receive Loaded/Unloaded Transportation Cask Subsystem (1.3.1.1.1)
E. Process Off-Normal Transportation Cask/Transporter (1.3.1.1.1.8)
F. Prepare SNF or Loaded MPC for Storage (1.3.1.1.3)
G. Remove Loaded Transportation Cask from Transporter (1.3.1.1.3.1)
H. Prepare Loaded Transportation Cask for Transfer (1.3.1.1.3.2)
I. Remove SNF or Loaded MPC from Loaded Transportation Cask (1.3.1.1.3.3)
J. Verify SNF and Loaded MPC Identity and Condition (1.3.1.1.3.4)
K. Prepare Unloaded Transportation Cask for Return to Service (1.3.1.1.3.5)
L. Transfer SNF or Loaded MPC into Storage (1.3.1.1.4)
M. Configure Storage Mode (1.3.1.1.4.1)
N. Place SNF or Loaded MPC into Storage Mode (1.3.1.1.4.2)
O. Close MPC and/or Storage Mode (1.3.1.1.4.3)
P. Retrieve MPC from Storage (1.3.1.1.5)
Q. Move Loaded Storage Mode into SNF Transfer Area (1.3.1.1.5.2)
R. Open Storage Mode (1.3.1.1.5.3)
S. Remove MPC from Storage Mode (1.3.1.1.5.4)
T. Verify MPC Identity and Condition (1.3.1.1.5.5)
U. Handle Unloaded Storage Mode (1.3.1.1.5.6)
V. Recover SNF from Off-Normal MPC (1.3.1.1.5.7)
W. Prepare MPC for Transport (1.3.1.1.6)
X. Retrieve Unloaded MPC Transportation Cask (1.3.1.1.6.1)
Y. Prepare Unloaded MPC Transportation Cask for Loading (1.3.1.1.6.2)
Z. Place SNF or Loaded MPC into Transportation Cask (1.3.1.1.6.3)
AA. Prepare Loaded MPC Transportation Cask Subsystem for Transport (1.3.1.1.6.4)
AB. Prepare Cask/Transporter for Release from Site (1.3.1.1.6.5)
AC. Store SNF (1.3.1.2)
AD. Maintain SNF Integrity (1.3.1.2.1)

AE. Monitor SNF Storage System (1.3.1.2.3)
AF. Support SNF Storage Operations (1.3.1.4)
AG. Provide Operations Support (1.3.1.4.2)
AH. Provide HVAC (1.3.1.4.2.2)
AI. Provide Protective Services (1.3.1.4.4)
AJ. Safeguard SNF (1.3.1.4.4.1)
AK. Provide Radiological Protection (1.3.1.4.4.6)
AL. Process Site-Generated Radwaste (1.3.1.4.7)
AM. Collect Liquid Radwaste (1.3.1.4.7.1)
AN. Collect Solid Radwaste (1.3.1.4.7.2)
AO. Treat/Package/Monitor/Ship Radwaste for Off-Site Disposal (1.3.1.4.7.3)
AP. Store Packaged Radwaste for Off-Site Disposal (1.3.1.4.7.4)
AQ. Control Site-Generated Wastes Other than Radwaste (1.3.1.4.8)
AR. Avoid Use of RCRA Listed Materials (1.3.1.4.8.2)
AS. Segregate Hazardous Waste Streams (1.3.1.4.8.3)
AT. Maintain and Repair Transportation Cask Subsystems (1.3.1.4.9)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.4.1.2 Preparation and Transfer Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.4.2 Preparation and Transfer Segment Requirements

3.7.1.4.2.1 Criticality Monitoring

A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled beneath water shielding. [10CFR72.124(c)]

3.7.1.4.2.2 SNF and Loaded MPC Handling

The SNF and loaded MPCs shall be prepared in a manner that allows handling and retrievability without the release of radioactive materials to the environment or radiation exposures in excess of 10CFR20 limits. The storage mode must be designed to confine the waste for the duration of the license. [10CFR72.122(h)(5)]

3.7.1.4.2.3 Transportation Cask Suitability

The design of the MRS facility shall provide the capability to ensure that, prior to each shipment of packaged licensed material:

A. The transportation cask is proper for the contents to be shipped. [10CFR71.87(a)]

B. Each closure device of the transportation cask, including any required gasket, is properly installed, secured, and free of defects. [10CFR71.87(c)]

C. Any pressure relief device is operable and set in accordance with written procedures. [10CFR71.87(e)]

D. In case of loaded transportation casks transported as exclusive use shipments by rail or highway only, the non-fixed radioactive contamination measured on any single wiping material at any time does not exceed ten times the levels prescribed in Table V of 10CFR71. [10CFR71.87(i)(2)]

3.7.1.4.2.4 Transportation Cask Loading

The design of the MRS facility shall provide a capability to ensure that, prior to each shipment of licensed material loaded at the MRS facility, the transportation cask has been loaded and closed in accordance with written procedures, and for fissile material, any moderator or neutron absorber, if required, is present and in proper condition. [10CFR71.87(f)(g)]

3.7.1.4.2.5 Transportation Cask Closure

The design of the MRS facility shall provide a capability to ensure that each package for radioactive material loaded at the MRS facility is in accordance with the requirements of 10CFR71.43 and the cask Certificate of Compliance, in particular, the design of the MRS facility must provide a means for verifying that:

A. Each loaded transportation cask is sealed in such a manner as to provide evidence that the cask has not been opened by unauthorized persons.

B. The containment system for each loaded transportation cask is securely closed by a positive fastening device which cannot be opened unintentionally.

C. The valves on the loaded transportation cask are properly installed and functional.

D. The loaded transportation cask is properly prepared for shipment.

E. The loaded transportation cask is properly prepared for transport so that in still air at 38°C (100°F) and in the shade, no accessible surface of a loaded transportation cask would have a temperature exceeding 82°C (180°F) in an exclusive use shipment.

[10CFR71.43(b)(c)(e)(f)(g)]

3.7.1.4.2.6 Transportation Cask Shipment

Transportation casks shall be prepared for shipment such that radiation levels external to the package comply with the following:

A. 200 mrem/hour on the accessible external surface of the transportation cask unless the following conditions are met, in which case the limit is 1000 millirem per hour:

1. The shipment is made in a closed transport vehicle

2. Provisions are made to secure the transportation cask so that its position within the vehicle remains fixed during transportation

3. There are no loading or unloading operations between the beginning and end of the transportation.

B. 200 mrem/hour at any point on the outer surface of the vehicle, including the upper and lower surfaces, or in the case of an open vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle

C. 10 mrem/hour at any point 2 meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of an open vehicle, at any point two meters from the vertical planes projected from the outer edges of the conveyance

D. Two mrem/hour in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when persons occupying these positions are provided with special health supervision, personnel radiation exposure monitoring devices, and training in accordance with 10CFR19.12.

[10CFR71.47]

3.7.1.4.2.7 Transportation Casks

The design of the MRS facility shall provide the capability to verify that transportation casks are prepared for transport in accordance with the certificates of compliance. [10CFR71.51]

3.7.1.4.2.8 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)]

3.7.1.4.2.9 SNF Criticality

A. The SNF and the loaded MPCs handling, packaging, transfer, and storage systems shall be designed to maintain a nuclear subcriticality. The design must ensure that at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of handling, packaging, transfer, and storage systems must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, packaging, transfer and storage conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)]

B. When practical, the design of the MRS facility shall be based on favorable geometry or permanently fixed neutron absorbing materials (poisons), or both. Where solid neutron absorbing materials are used, the design of the MRS facility must provide for positive means to verify their continued efficacy. [10CFR72.124(b)]

3.7.1.4.2.10 Cask Cleaning

The MRS facility shall have the capability, following the unloading of the transportation cask, to assure that cask internals and components, and the cask interior can be maintained at or below the level of internal contamination required by the interface requirements in Section 3.2.3.2. [Derived]

3.7.1.4.2.11 Criteria for SNF and Radioactive Waste Handling

A. The SNF and the loaded MPCs handling systems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal and accident conditions. These systems must be designed with:

1. Capability to test and monitor components important to safety

2. Suitable shielding for radioactive protection under normal and accident conditions

3. Confinement structures and systems

4. Heat-removal capability having testability and reliability consistent with its importance to safety

5. Means to minimize the quantity of radioactive wastes generated.

[10CFR72.128(a)]

B. Radioactive waste treatment facilities shall be provided. Provisions must be made for packaging site-generated low-level wastes in a form suitable for storage on-site awaiting transfer to disposal sites. [10CFR72.128(b)]

C. The SNF, the loaded MPC, and the transportation cask handling systems shall be designed to provide the capability to minimize the generation of mixed wastes. [Derived by CRD 3.2.2.8]

3.7.1.4.2.12 Effluent Control

A. The MRS facility shall be designed to provide means to limit to levels ALARA the release of radioactive materials in effluent during normal operations, and control the release of radioactive materials under accident conditions. [10CFR72.126(d)]

B. Analyses shall be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limits given in Section 3.2.2.2. [10CFR72.126(d)]

C. Analyses of design basis accidents shall be made to show that releases to the general environment will be within the exposure limits given in Section 3.2.1.5.2. [10CFR72.126(d)]

D. Systems designed to monitor the release of radioactive materials shall have means for calibration and testing their operability. [10CFR72.126(d)]

3.7.1.4.2.13 Instrumentation and Control

A. Instrumentation and control systems shall be provided to monitor systems that are important to safety over anticipated ranges for normal and off-normal operation. Those instruments and control systems that must remain operational under accident conditions must be identified in the Safety Analysis Report. [10CFR72.122(i)]

B. A control room or control area, if appropriate for the design of the MRS facility, shall be designed to permit occupancy and actions to be taken to safely monitor the MRS facility under normal conditions, and to provide safe control of the MRS facility under off-normal or accident conditions. [10CFR72.122(j)]

3.7.1.4.2.14 Emergency Capabilities

Each utility service system shall be designed to meet emergency conditions. The design of utility services and distribution systems important to safety includes redundant systems to the extent necessary to maintain, with adequate capacity, the ability to perform safety functions assuming a single failure. [10CFR72.122(k)(1)][CRD 3.3.1.B]

3.7.1.5 Storage Mode Facility (CI) Segment

3.7.1.5.1 Storage Mode Facility Segment Description

This segment provides for the safe interim storage of loaded MPCs at the MRS facility. The storage mode is designed to protect the integrity of the loaded MPCs and the environment, remove heat from the loaded MPCs, and provide radiological shielding. As described in Section 1, the reference conceptual design for this segment utilizes dry storage with thick-walled vertical reinforced concrete storage casks. In addition, TSCs may be stored here after receiving and processing. This segment includes the following:

A. **Storage Area.** The Storage Area is a separate, isolated area inside the protected area where the loaded storage casks reside. Level concrete pads are provided to support the storage casks with access roads between the pads to allow passage of the storage mode transporter.

B. **Storage Mode Monitoring.** This consists of environmental, radiation, and thermal monitoring equipment as required by the Storage Mode license.

C. **Storage Mode Transporter.** This is a specialized vehicle designed to move the storage casks between the Transfer Facility and the Storage Area. This vehicle may be included as part of the storage mode and provided by the storage mode vendor as part of a package.

D. **Storage Mode Radwaste Collection.** Depending on storage technology, a storage mode radioactive waste collection system is provided as required.

3.7.1.5.1.1 Storage Mode Facility Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Prepare SNF or Loaded MPC for Storage (1.3.1.1.3)
E. Move TSC to Storage Fixture (1.3.1.1.3.7)
F. Transfer SNF or Loaded MPC into Storage (1.3.1.1.4)
G. Move Loaded Storage Mode to Storage Location (1.3.1.1.4.4)
H. Emplace Loaded Storage Mode into Storage (1.3.1.1.4.5)
I. Retrieve MPC from Storage (1.3.1.1.5)
J. Retrieve Loaded Storage Mode from Storage (1.3.1.1.5.1)
K. Move Loaded Storage Mode into SNF Transfer Area (1.3.1.1.5.2)
L. Handle Unloaded Storage Mode (1.3.1.1.5.6)
M. Store SNF (1.3.1.2)
N. Maintain SNF Integrity (1.3.1.2.1)

O. Maintain Storage System Containment (1.3.1.2.2)
P. Monitor SNF Storage System (1.3.1.2.3)
Q. Monitor Radiological/Thermal Condition (1.3.1.2.3.1)
R. Account for SNF (1.3.1.2.3.2)
S. Support Storage Operations (1.3.1.4)
T. Provide Operations Support (1.3.1.4.2)
U. Provide HVAC (1.3.1.4.2.2)
V. Provide On-Site Transportation (1.3.1.4.2.4)
W. Provide Protective Services (1.3.1.4.4)
X. Safeguard SNF (1.3.1.4.4.1)
Y. Provide Radiological Protection (1.3.1.4.4.6)
Z. Process Site-Generated Radwaste (1.3.1.4.7)
AA. Collect Liquid Radwaste (1.3.1.4.7.1)
AB. Collect Solid Radwaste (1.3.1.4.7.2)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.5.1.2 Storage Mode Facility Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.5.2 Storage Mode Facility Segment Requirements

3.7.1.5.2.1 Storage Capacity

A. The MRS facility shall not store in excess of 10,000 tons of heavy metal prior to receipt of SNF/HLW at a licensed repository. [10CFR72.44(g)(3), NWPA Sec. 148(d)(3)]

B. The MRS facility shall not store, at any one time, a quantity of SNF in excess of 15,000 metric tons of heavy metal. [10CFR72.44(g)(4), NWPA Sec. 148(d)(4)]

3.7.1.5.2.2 Loaded MPC Storage Criticality

A. The loaded MPC handling, packaging, transfer, and storage systems shall be designed to be maintained subcritical. The design must ensure that, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of handling, packaging, transfer, and storage systems must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, packaging, transfer and storage conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)]

B. The design of the MRS facility shall be based on favorable geometry or permanently fixed neutron absorbing materials (poisons), or both. Where solid neutron absorbing materials are used, the design of the MRS facility must provide for positive means to verify their continued efficacy. [10CFR72.124(b)]

3.7.1.5.2.3 Storage Characteristics

Loaded MPC storage and other subsystems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal and accident conditions. These systems must be designed with:

A. Capability to test and monitor components important to safety

B. Suitable shielding for radioactive protection under normal and accident conditions

C. Confinement structures and systems

D. Heat-removal capability having testability and reliability consistent with its importance to safety

E. Means to minimize the quantity of radioactive wastes generated.

[10CFR72.128(a)]

3.7.1.5.2.4 Retrievability

Storage systems shall be designed to allow ready retrieval of loaded MPCs for disposal. [10CFR72.122(l)]

3.7.1.5.2.5 Waste Form

A. The MRS facility shall be designed to store loaded MPCs. [10CFR72.120(b)]

B. Liquid or solidified HLW shall not be received or stored at the MRS facility. [DOE/RW-0239]

3.7.1.5.2.6 SNF Integrity

The storage mode facilities at the MRS facility shall be designed to protect the spent fuel cladding inside an MPC during storage against degradation that leads to gross ruptures or otherwise shall confine the spent fuel such that the degradation of the fuel during storage will not pose operational safety problems with respect to its removal from storage. [10CFR72.122(h)(1)]

3.7.1.5.2.7 Pool Storage

A. For underwater storage of spent fuel in which the pool water serves as a shield and a confinement medium for radioactive materials, systems for maintaining water purity and the pool water level shall be designed so that any abnormal operations or failure in those systems from any cause will not cause the water level to fall below safe limits. [10CFR72.122(h)(2)]

B. The design shall preclude installations of drains, permanently connected systems, and other features that could, by abnormal operations or failure, cause a significant loss of water. [10CFR72.122(h)(2)]

C. Pool water level equipment shall be provided to alarm in a continuously manned location if the water level in the storage pools falls below a predetermined level. [10CFR72.122(h)(2)]

D. Underwater monitoring shall not be required when special nuclear material is stored beneath water shielding. [10CFR72.124(c)]

3.7.1.5.2.8 Storage Monitoring

A. Storage confinement systems shall have the capability for continuous monitoring in a manner such that the MRS facility operation will be able to determine when corrective action needs to be taken to maintain safe storage conditions. [10CFR72.122(h)(4)]

B. Criticality monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under 10CFR72 shall not be required. [10CFR72.124(c)]

3.7.1.5.2.9 Facility Access for Inspection

The MRS facility shall afford to the IAEA and NRC representatives at all reasonable times opportunity to inspect MPCs and the premises and facilities wherein SNF and MPCs are handled or stored. [10CFR75.42(a)] [10CFR72.82(c)(3)]

3.7.1.5.2.10 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)]

3.7.1.6 Site Vehicles (CI) Segment

3.7.1.6.1 Site Vehicles Segment Description

This segment provides the on-site transportation services to support all plant-related functions including the receipt, handling of SNF and loaded MPCs, and storage of loaded MPCs, on-site personnel transport, security services, health services, and plant maintenance. Storage mode transporters are excluded from site vehicles if those are specifically furnished by the vendor supplying the storage mode. If storage mode transporters are furnished by the storage mode vendor, they must be included in the storage mode requirements. This segment includes the following vehicle capabilities:

A. Maintenance vehicles
B. Mobile Cranes (as required)
C. Health Services vehicles
D. Tractors
E. Rail engine(s)
F. Security vehicles
G. Personnel transporters
H. TSC Transporter (as required).

3.7.1.6.1.1 Site Vehicles Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Handle SNF or Loaded MPC (1.3.1.1)
D. Receive Loaded/Unloaded Transportation Cask Subsystem (1.3.1.1.1)
E. Detach Prime Mover (1.3.1.1.1.2)
F. Move Transportation Cask/Transporter to Parking Area (1.3.1.1.1.4)
G. Move Cask/Transporter inside Controlled Area (1.3.1.1.1.5)
H. Move Off-Normal Transportation Cask/Transporter to Holding (1.3.1.1.1.6)
I. Move Suspect Transportation Cask/Transporter to Holding (1.3.1.1.1.7)
J. Park Transportation Cask/Transporter (1.3.1.1.2)
K. Prepare SNF or Loaded MPC for Storage (1.3.1.1.3)
L. Move TSC to Storage Area (1.3.1.1.3.6)
M. Place TSC into Storage Fixture (1.3.1.1.3.7)
N. Return Transporter to Debarkation (1.3.1.1.3.8)
O. Prepare MPC for Transport (1.3.1.1.6)
P. Retrieve Unloaded MPC Transportation Cask (1.3.1.1.6.1)
Q. Prepare Cask/Transporter for Release from Site (1.3.1.1.6.5)
R. Support SNF Storage Operations (1.3.1.4)
S. Provide Operations Support (1.3.1.4.2)
T. Provide On-Site Transportation (1.3.1.4.2.4)

U. Maintain Operating Facilities (1.3.1.4.3)
V. Maintain Equipment (1.3.1.4.3.1)
W. Maintain Buildings (1.3.1.4.3.2)
X. Provide Protective Services (1.3.1.4.4)
Y. Maintain Physical Security (1.3.1.4.4.2)
Z. Provide Emergency Medical Treatment (1.3.1.4.4.4)
AA. Process Site-Generated Radwaste (1.3.1.4.7)
AB. Treat/Package/Monitor/Ship Radwaste for Off-Site Disposal (1.3.1.4.7.3)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.6.1.2 Site Vehicles Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.6.2 Site Vehicles Segment Requirements

3.7.1.6.2.1 Switch Engine

Switch engines shall be available which are capable of moving and queuing railcars of a weight and quantity specified in Section 3.2.3.2.3. [Derived]

3.7.1.6.2.2 Site Tractors

Tractors shall be available which are capable of moving and queuing trailers of weight and quantity specified in Section 3.2.3.2.3. [Derived]

3.7.1.6.2.3 Site Cranes

Design of cranes shall be in conformance with the requirements of CMAA-70. [DOE Order 6430.1A, Sec. 1460]

3.7.1.7 Support Facilities Segment

3.7.1.7.1 Support Facilities Segment Description

The Support Facilities segment provides administrative and support capabilities for the MRS facility. This segment is not involved in the direct handling of radioactive materials. This segment provides the following:

A. **Vehicle Maintenance Facility (CI).** This facility provides the equipment necessary to perform required maintenance for the MRS facility vehicles. Fuel for vehicles are also stored and distributed from this facility.

B. **Administration and Site Services Facility (CI).** This complex provides for all of the administrative and personnel services necessary for operation of the MRS facility. This includes personnel records, payroll services, training, health care, and all records and maintenance. Administrative offices as well as the office space required for the NRC and the DOE are in this complex.

C. **Site Services Warehouse (CI).** This warehouse provides storage for materials, supplies, and equipment necessary to support maintenance and repair of site facilities. Material passing through this warehouse is, as required, inspected to provide security and repackaged to minimize potentially contaminated waste.

D. **Utility Warehouse (CI).** This warehouse provides storage for materials, supplies, and equipment necessary to support facilities such as the vehicle maintenance building, general grounds, and, if required, storage cask manufacturing building.

E. **Protected Area Warehouse (CI).** This warehouse provides storage for materials, supplies, and equipment necessary to support routine maintenance and operations inside the protected area.

F. **Visitors and Media Center (CI).** This facility is located outside of the controlled area. It provides space and equipment necessary for support of a public information center for the CRWMS and MRS facility. An auditorium is provided as well as a display area, media facilities, and a snack area.

3.7.1.7.1.1 Support Facilities Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Store SNF (1.3.1.2)
D. Monitor SNF Storage System (1.3.1.2.3)
E. Account for SNF (1.3.1.2.3.2)
F. Support SNF Storage Operations (1.3.1.4)
G. Provide Operations Support (1.3.1.4.2)
H. Provide HVAC (1.3.1.4.2.2)
I. Provide Central Stores (1.3.1.4.2.3)
J. Provide Technical Services (1.3.1.4.2.5)
K. Acquire Off-Site Services (1.3.1.4.2.6)
L. Maintain Operating Facilities (1.3.1.4.3)
M. Maintain Equipment (1.3.1.4.3.1)
N. Maintain Buildings (1.3.1.4.3.2)
O. Provide Protective Services (1.3.1.4.4)
P. Safeguard SNF (1.3.1.4.4.1)
Q. Maintain Emergency Plan (1.3.1.4.4.3)

R. Provide Emergency Medical Treatment (1.3.1.4.4.4)
S. Provide Radiological Protection (1.3.1.4.4.6)
T. Provide Environmental Monitoring (1.3.1.4.4.7)
U. Provide QA/QC Services (1.3.1.4.5)
V. Provide Administrative Support (1.3.1.4.6)
W. Provide for Human Resources (1.3.1.4.6.1)
X. Maintain Records (1.3.1.4.6.2)
Y. Maintain Institutional and External Relations (1.3.1.4.6.3)
Z. Maintain Financial Accounting (1.3.1.4.6.4)
AA. Provide Office Space for Regulatory Inspectors (1.3.1.4.6.5)
AB. Control Site-Generated Wastes Other than Radwaste (1.3.1.4.8)
AC. Monitor All Off-Site Releases (1.3.1.4.8.1)
AD. Avoid Use of RCRA Listed Materials (1.3.1.4.8.2)
AE. Segregate Hazardous Waste Streams (1.3.1.4.8.3)
AF. Maintain and Repair Transportation Cask Subsystems (1.3.1.4.9)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.7.1.2 Support Facilities Segment Interfaces

The lower level DRDs identify, describe, and specify requirements for interfaces between segments.

3.7.1.7.2 Support Facilities Segment Requirements

3.7.1.7.2.1 SNF Process Records

A. The design of the MRS facility shall provide a storage area to keep records showing receipt, inventory (including location), disposal, acquisition, and transfer of all SNF in storage. The records shall include, as a minimum, the name of the shipper of the material to the MRS facility, the estimated quantity of radioactive material per item (including special nuclear material in spent fuel), item identification and seal number, storage location, on-site movements of each fuel assembly or MPC, and ultimate disposal. [10CFR72.72(a)]

B. These records for SNF shall be retained for as long as the material is stored and for a period of five years after the material is transferred out of the MRS facility. [10CFR72.72(a)]

3.7.1.7.2.2 Material Control

The design of the MRS facility shall provide means to control, in accordance with work and inspection instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided. [10CFR72.166]

3.7.1.7.2.3 Administrative Controls

The design of the MRS facility shall provide administration facilities for administrative controls which include the organization and management procedures, record keeping, review and audit, and reporting necessary to assure that the operations involved in the storage of SNF in loaded MPCs in the MRS facility are performed in a safe manner. [10CFR72.44(c)(5)]

3.7.1.7.2.4 Duplicate Records Storage

A. The design of the MRS facility shall provide storage facilities to keep duplicate records of spent fuel. The duplicate set of records must be kept at a separate location sufficiently remote from the original records that a single event would not destroy both sets of records. [10CFR72.72(d)]

B. Records of spent fuel transferred out of the MRS facility shall be preserved for a period of five years after the date of transfer. [10CFR72.72(d)]

3.7.1.7.2.5 Records Retention

The MRS facility shall provide storage facilities such that records required by the regulations in this document, 10CFR72, or by the license conditions, are maintained for the period specified by the appropriate regulation or license condition. If a retention period is not otherwise specified, the above records must be maintained until the NRC terminates the license. [10CFR72.80(c)]

3.7.1.7.2.6 Shipment Records

A. The design of the MRS facility shall provide storage facilities to maintain records of each shipment of licensed material not exempt under 10CFR71.10, for a period of three years. [10CFR71.91(a)]

B. The design of the MRS facility shall provide reasonable retrievability from storage of records required by 10CFR71 for inspection. [10CFR71.91(b)]

C. The design of the MRS facility shall provide storage facilities to maintain sufficient written records to furnish evidence of the quality of packaging. The records to be maintained include results of the determinations required by 10CFR71.85; design, fabrication, and assembly records; results of reviews, inspections, tests, and audits; results monitoring work performance and materials analyses; and results of maintenance, modification, and repair activities. Inspection, test, and audit records must identify the inspector or data recorder, the type of observation, the results, the acceptability and the action taken in connection with any deficiencies noted. The records must be retained for three years after the life of the packaging to which they apply. [10CFR71.91(c)]

3.7.1.7.2.7 NRC Office Space

A. The design of the MRS facility shall include office space for the exclusive use of the NRC inspection personnel. [10CFR72.82(c)(1)]

B. Heat, air conditioning, light, electrical outlets and janitorial services shall be furnished by the MRS facility. [10CFR72.82(c)(1)]

C. The office shall be convenient to and have full access to the installation and shall provide the inspector both visual and acoustic privacy. [10CFR72.82(c)(1)]

D. The space provided shall be adequate to accommodate a full-time inspector, a part-time secretary, and transient NRC personnel and will be generally commensurate with other office facilities at the site. A space of 250 square feet, either within the site office complex or in an office trailer, or other on-site space, is suggested as a guide. For sites containing multiple facilities, additional space may be requested to accommodate additional full-time inspectors. [10CFR72.82(c)(2)]

E. The office space that is provided shall be subject to the approval of the Director, Office of Nuclear Material Safety and Safeguards or the appropriate NRC Regional Administrator. [10CFR72.82(c)(2)]

F. All furniture, supplies and NRC equipment will be furnished by the NRC. [10CFR72.82(c)(2)]

3.7.1.7.2.8 Underground Storage Tank (UST) System

The requirements of 40CFR280 apply to all owners and operators of an UST system as defined in 40CFR280.12 except as otherwise provided in paragraphs (b), (c), and (d) of 40CFR280.10. Any UST system listed in paragraph (c) of 40CFR280.10 shall meet the requirements of 40CFR280.11. [40CFR280.10(a)]

3.7.1.7.2.9 Occupational Safety and Health Records

A. The MRS facility shall make, keep and preserve, and make available to the Secretary of Labor or the Secretary of Health and Human Services, such records regarding activities related to Occupational Safety and Health as the Secretary of Labor, in cooperation with the Secretary of Health and Human Services, may prescribe by regulation as necessary or appropriate for the enforcement or for developing information regarding the causes and prevention of occupational accidents and illnesses. [29USC651 et seq., Sec. 657 (c)(1)]

B. The MRS facility shall conduct periodic inspections in order to carry out any provisions of the above paragraph. [29USC651 et seq., Sec. 657 (c)(1)]

C. The MRS facility, through posting of notices or other appropriate means, shall keep their employees informed of their protection and obligations under 29USC651, including the provisions of applicable standards. [29USC651 et seq., Sec. 657 (c)(1)]

3.7.1.7.2.10 Record Maintenance

A. For any record that must be maintained, the MRS facility shall maintain either the original or a copy reproduced by any state of the art method provided that any copy is duly authenticated by authorized personnel and is capable of producing a clear and legible copy after storage for the period specified by NRC regulations. [10CFR72.80(d)]

B. The MRS facility shall maintain records in accordance with DOE 1324.2. [DOE Order 3790.1A (5)(b)(2)(g)(3)]

3.7.1.7.2.11 MRS Facility Records Inspection

The MRS facility shall make available to the IAEA for examination, records kept by the MRS facility pertaining to special nuclear material accounting and control. [10CFR75.42(d)(1)]

3.7.1.7.2.12 Monitoring and Records

A. The MRS facility shall retain records of monitoring information required by the EPA related to the MRS facility sewage sludge use and disposal activities, for a period of at least five years (or longer as required by 40CFR503). [40CFR122.41(j)(2)]

B. The MRS facility shall retain records, other than the ones in paragraph A, of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the EPA, and records of all data used to complete the application to the EPA, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the EPA at any time. [40CFR122.41(j)(2)]

C. The MRS facility shall ensure records of monitoring information include: the date, exact place, and time of sampling or measurements; the individual(s) who performed the sampling or measurements; the date(s) analyses were performed; the individual(s) who performed the analyses; the analytical techniques or methods used; and the results of such analyses. [40CFR122.41(j)(3)]

3.7.1.7.2.13 Records of Radiation Protection Programs

A. The MRS facility shall maintain records of the radiation protection program, including the provisions of the program and audits and other reviews of program content and implementation. [10CFR20.2102(a)]

B. The MRS facility shall retain records of the provisions of the radiation protection program until the NRC terminates each pertinent license requiring the record. [10CFR20.2102(b)]

C. The MRS facility shall retain records of audits and reviews of the program content and implementation for three years after the record is made. [10CFR20.2102(b)]

3.7.1.7.2.14 Records of Surveys

A. The MRS facility shall maintain and retain records showing the results of surveys and calibrations required by Sections 3.2.2.9, 3.2.4.5.4, 3.6.2.3, and 3.7.1.3.2.4.B (10CFR20.1501 and 10CFR20.1906(b)) for three years after the record is made. [10CFR20.2103(a)]

B. The MRS facility shall retain each of the following records until the NRC terminates each pertinent license requiring the record:

1. Records of the results of surveys to determine the dose from external sources and used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents.

2. Records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose.

3. Records showing the results of air sampling, surveys, and bioassays required pursuant to Section 3.2.4.4.3.B and 10CFR20.1703(a)(3)(i) and (ii).

4. Records of the results of measurements and calculations used to evaluate the release of radioactive effluent to the environment.

[10CFR20.2103(b)]

3.7.1.7.2.15 Records of Prior Occupational Dose

A. The MRS facility shall retain the records on NRC Form 4 or equivalent until the NRC terminates each pertinent license requiring this record. [10CFR20.2104(f)]

B. The MRS facility shall retain records used in preparing NRC Form 4 for three years after the record is made. [10CFR20.2104(f)]

3.7.1.7.2.16 Records of Planned Special Exposures

A. For each use of the provisions of 10CFR20.1206 for planned special exposures, the MRS facility shall maintain records that describe the exceptional circumstances requiring the use of a planned special exposure, the name of the management official who authorized the planned special exposure and a copy of the signed authorization, what actions were necessary, why the actions were necessary, how doses were maintained ALARA, what individual and collective doses were expected to result, and the doses actually received in the planned special exposure. [10CFR20.2105(a)]

B. The MRS facility shall retain these records until the NRC terminates each pertinent license requiring these records. [10CFR20.2105(b)]

3.7.1.7.2.17 Records of Individual Monitoring Results

A. The MRS facility shall maintain records of doses received by all individuals for whom monitoring was required pursuant to Section 3.2.2.10 (10CFR20.1502), and records of doses received during planned special exposures, accidents, and emergency conditions. [10CFR20.2106(a)]

B. The MRS facility shall make entries of the records specified below at least annually. These records must include, when applicable:

1. The deep-dose equivalent to the whole body, eye dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities

2. The estimated intake or body burden of radionuclides

3. The committed effective dose equivalent assigned to the intake or body burden of radionuclides

4. The specific information used to calculate the committed effective dose equivalent pursuant to 10CFR20.1204(c)

5. The total effective dose equivalent when required by 10CFR20.1202

6. The total of the deep-dose equivalent and the committed dose to the organ receiving the highest total dose.

[10CFR20.2106(a)(b)]

C. The MRS facility shall maintain the records specified above on NRC Form 5, in accordance with the instructions for NRC Form 5, or in clear and legible records containing all the information required by NRC Form 5. [10CFR20.2106(c)]

D. The MRS facility shall protect records required under A, B, and C from public disclosure because of their personal privacy nature. These records are protected by most State privacy laws and, when transferred to the NRC, are protected by the Privacy Act of 1974, 5USC552a, and the NRC regulations in 10CFR9. [10CFR20.2106(d)]

E. The MRS facility shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. [10CFR20.2106(e)]

F. The MRS facility shall also keep the declaration of pregnancy on file, but may maintain it separately from the dose records. [10CFR20.2106(e)]

G. The MRS facility shall retain each required form or record until the NRC terminates each pertinent license requiring the record. [10CFR20.2106(f)]

3.7.1.7.2.18 Records of Public Dose

The MRS facility shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public until the NRC terminates each pertinent license requiring the record. [10CFR20.2107]

3.7.1.7.2.19 Records of Waste Disposal

A. The MRS facility shall maintain records of the disposal of licensed materials made under 10CFR20 Sections 2002, 2003, 2004, and 2005; and disposal by burial in soil. [10CFR20.2108(a)]

B. The MRS facility shall retain those records until the NRC terminates each pertinent license requiring the record. [10CFR20.2108(b)]

3.7.1.7.2.20 Records of Testing Entry Control Devices

A. The MRS facility shall maintain records of tests made under 10CFR20.1603(a)(9) on entry control devices for very high radiation areas. [10CFR20.2109(a)]

B. The MRS facility shall include in these records the date, time, and results of each such test of function. [10CFR20.2109(b)]

C. The MRS facility shall retain these records for three years after the record is made. [10CFR20.2109(b)]

3.7.1.7.2.21 Form of Records

A. The MRS facility shall ensure that each record required by 10CFR20 is legible throughout the specified retention period. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, must include all pertinent information, such as stamps, initials, and signatures. [10CFR20.2110]

B. The MRS facility shall maintain adequate safeguards against tampering with and loss of records. [10CFR20.2110]

3.7.1.7.2.22 Cask Documentation

For each transportation cask used at the MRS facility, the MRS facility shall maintain copies of the specific license, certificate of compliance, or other approval of the package, and have the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment; and shall comply with the terms and conditions of the license, certificate, or other approval, as applicable, and the applicable requirements of Subparts A, G, and H of 10CFR71. [10CFR71.12(c)(1)(2)]

3.7.1.8 Cask Maintenance Facility (CMF) (CI) Segment

3.7.1.8.1 Cask Maintenance Facility Segment Description

The Cask Maintenance Facility (CMF) is provided to support maintenance of the transportation cask subsystems. The CMF provides the appropriate space, material handling capability, low-level radwaste handling capability (for waste resulting from CMF activities), shielding, appropriate HVAC, and radioactive material confinement capability to maintain and service the transportation cask subsystems and supporting equipment.

Adequate on-site facilities and capabilities must be provided for testing, inspection, and maintenance to ensure that the transportation cask subsystems, specified in Section 3.2.3.2.3, will perform satisfactorily in service and that certificate of compliance requirements can be satisfied.

The CMF includes the following subsystems:

A. Cask Staging
B. Cask Test and Repair
C. Cask Reconfiguration
D. Cask and Transporter Support
E. Radwaste

F. Radiological Protection
G. Campaign Support.

3.7.1.8.1.1 Cask Maintenance Facility Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Store Waste at MRS (1.3.1)
C. Support SNF Storage Operations (1.3.1.4)
D. Process Site-Generated Radwaste (1.3.1.4.7)
E. Collect Liquid Radwaste (1.3.1.4.7.1)
F. Collect Solid Radwaste (1.3.1.4.7.2)
G. Control Site-Generated Wastes Other than Radwaste (1.3.1.4.8)
H. Monitor All Off-Site Releases (1.3.1.4.8.1)
I. Avoid Use of RCRA Listed Materials (1.3.1.4.8.2)
J. Segregate Hazardous Waste Streams (1.3.1.4.8.3)
K. Maintain and Repair Transportation Cask Subsystems (1.3.1.4.9)
L. Maintain and Repair Transportation Casks (1.3.1.4.9.1)
M. Maintain and Repair Ancillary Equipment and Special Tools and Fixtures (1.3.1.4.9.2)
N. Perform Cask Reconfigurations (1.3.1.4.9.3)
O. Manage Transportation Cask Subsystem Inventory (1.3.1.4.9.4)
P. Manage Unloaded Cask Inventory (1.3.1.4.9.5)
Q. Manage Transporter Inventory (1.3.1.4.9.6)
R. Manage Ancillary Equipment and Special Tools and Fixture Inventory (1.3.1.4.9.7)
S. Manage Spare Parts and Consumable Inventory (1.3.1.4.9.8)
T. Create and Maintain Records (1.3.1.4.9.9)
U. Manage Transporter Repair and Maintenance (1.3.1.4.9.10)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.1.8.1.2 Cask Maintenance Facility Segment Interfaces

The lower level MRS facility DRD identifies, describe, and specify requirements for interfaces between segments.

3.7.1.8.2 Cask Maintenance Facility Segment Requirements

3.7.1.8.2.1 General Capability Requirements

Adequate on-site facilities and capabilities shall be provided to ensure that transportation cask subsystems are maintained to meet operational needs and certificate of compliance requirements. [Derived]

3.7.1.8.2.2 Packaging Materials

The CMF shall be capable of controlling the handling, storage, shipping, cleaning, and preservation of materials and equipment to be used in packaging to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels shall be specified and provided. [10CFR71.127]

3.7.1.8.2.3 Cask Subsystems Documentation, Test, and Maintenance Records

A. The CMF shall have access to the record system containing all cask subsystem documentation including shop fabrication and as-built drawings, certificates of compliance, SARs, and fabrication QA records. [Derived]

B. The CMF shall comply with the terms and conditions of the certificates of compliance and the applicable requirements of 10CFR71, Subparts A, G, and H. [10CFR71.12(c)(2)]

C. The CMF shall have the capability to create and update records of all tests and inspections for each cask subsystem (in accordance with 10CFR71, Subpart G and H) including special tools and fixtures, and ancillary equipment; all maintenance performed, including components replacement; all decontamination performed; all cask subsystem usage; and all cask reconfigurations. [Derived]

3.7.1.8.2.4 Decontamination and Cleaning

A. The CMF shall have the capability to assure that the cask internals and components and the cask interiors can be maintained at the level of internal contamination required in Section 3.2.3.2.2. [Derived]

B. The CMF shall have the capability to decontaminate cask subsystem components and cask external surfaces to levels required by regulations and ALARA requirements. [Derived]

3.7.1.8.2.5 Cask Handling Capabilities

The CMF handling and lifting equipment shall be capable of moving and lifting the cask subsystem or components to the appropriate position in the CMF and onto transporters or other transfer equipment. Shielding of high radiation levels and confinement of loose or removable radioactive contaminants may be necessary for some inspections and tests. [Derived]

3.7.1.8.2.6 Performance of Tests and Inspections

The CMF shall have the capability to perform all tests and inspections required by regulation (10CFR71.93(b)) or Transportation system requirements for transportation cask subsystems. The tests or inspections may be performed on new or contaminated casks, components of casks, special tools and fixtures, ancillary equipment, and vehicles prior to release for shipping campaigns. The tests and inspections include:

A. Radiological inspection for fixed and removable contamination on external and internal surfaces of casks and on cask subsystem components.

B. Visual inspection or other appropriate NDE for evidence of wear, corrosion, physical damage, or component failure of the:

1. Cask body, interior and exterior and all components including seals
2. Fuel assembly basket and all related fixtures and fittings
3. Impact limiters including bolts, keys, and all fittings
4. Closure stud tensioner system including fittings
5. Transporter including skid, tie-down system, personnel barrier, deck, placard holders
6. Threads of bolts and tapped holes
7. Ancillary equipment
8. Special tools and fixtures.

C. Compliance tests and inspections pursuant to the requirements of the certificate of compliance, SAR, and the Transportation system requirements, including but not limited to:

1. Closure head seals
   a. Helium leak test (rates to 10^{-7} cc/sec at standard temperature and pressure)
   b. Hydrostatic tests (5 to 500 psig)
2. Valves and valve caps/covers
   a. Hydrostatic tests (5 to 500 psig)
   b. Test of valve cracking and reseating pressures
3. Thermal test of casks for heat dissipation capability
4. Neutron absorber presence by radiation measurement of loaded casks
5. Trunnions
   a. Load test
   b. Liquid penetration, ultrasonic, and radiographic tests (all welds)
6. Lifting lugs
   a. Load test
   b. Liquid penetration, ultrasonic, and radiographic tests (all welds)
7. Mechanical fit and clearance of all components
8. Moisture content of wood-filled impact limiters
9. Fusible plug seal integrity. [Derived]

3.7.1.8.2.7 Replacement of Components

As a result of the inspections and tests identified in 3.7.1.8.2.6, routine replacement of certain cask components is required. The CMF shall be capable of performing the following component replacements:

A. Elastomeric or metal closure seal and retainer clip replacement

B. Threaded fasteners such as closure bolts or studs

C. Drain and fill and relief or vent valves and fittings

D. Valve box or cover plate O-rings

E. Liquid neutron shield

F. Fusible plugs

G. Threaded inserts

H. Trunnion and trunnion bolt replacement.

[Derived]

3.7.1.8.2.8 Site-Generated Radioactive Waste Handling

A. The CMF shall be capable to prepare for disposal all contaminated and non-contaminated components and facility tools and equipment and to collect and process or package for disposal all MRS facility radioactive or hazardous byproducts of the facility's activities. This requires interfacing with the MRS facility radwaste facility. [Derived]

B. The CMF shall have means to minimize the quantity of radioactive wastes generated. [10CFR72.128(a)(5)]

C. The CMF design shall provide the capability to minimize the generation of mixed wastes. [Derived]

3.7.1.8.2.9 Cask Reconfigurations

A. The CMF shall have the capability to remove and install fuel assembly baskets in casks that have removable baskets. [Derived]

B. the CMF shall have the capability to store 8 **<TBR>** highly contaminated **<TBR>** fuel baskets. [Derived]

C. The CMF shall have the capability to remove and install fuel spacers in casks. [Derived]

D. The CMF shall have the capability to store 340 **<TBR>** highly contaminated fuel spacers. [Derived]

E. The CMF shall have the capability to store **<TBD>** empty MPCs. [Derived by CRD 3.7.3.2.N]

3.7.1.8.2.10 Tool and Spare Parts Storage

A. The CMF shall have the capability to store special tools and fixtures and ancillary equipment for transportation casks and MPCs that have moderate amounts of removable contamination. [Derived]

B. The CMF shall have the capability to store spare parts and non-contaminated special tools and fixtures and ancillary equipment for transportation casks and MPCs. [Derived]

C. The CMF shall have the capability for QA-approved storage for safety-related spare parts for transportation casks and MPCs. [Derived]

3.7.1.8.2.11 Cask Visits

A. **During Initial Operation.** The CMF shall have the capability to handle a maximum of 90 **<TBR>** visits per year for truck casks and 24 **<TBR>** visits per year for rail casks. These visits include one visit per cask per year for annual certification and major maintenance. [Derived]

B. **After Initial Operation.** The CMF shall have the capability to handle a maximum of 140 **<TBR>** visits per year for truck casks and 72 **<TBR>** visits per year for rail casks. These visits include one visit per cask per year for annual certification and major maintenance. Should the system studies result in a CMF also being collocated with the MGDS, the cask maintenance operations during this time period will be divided with that facility. [Derived]

3.7.1.8.2.12 Cask Decommissioning

The CMF shall have the capability of evaluating damaged or degraded casks for continued operability, and shall have the capability to prepare the cask for decommissioning and disposal. [Derived]

3.7.1.8.2.13 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)]

3.7.2 OSTS Subelement Requirements

The OSTS subelement is composed of three segments: the On-Site Transfer Segment, the On-Site Storage Segment, and the Bare SNF Transfer Segment. The design of the three segments of the OSTS is provided by OCRWM to the Purchasers. The OSTS subelement is presumed to be operated by the Purchaser.

3.7.2.1 On-Site Transfer Segment

3.7.2.1.1 On-Site Transfer Segment Description

This segment is the equipment necessary for loading an MPC and transferring it into an MPC transportation cask, outside of the fuel pool and for transferring a loaded MPC to, and possibly from, the storage mode. This segment will be used by those Purchasers using MPCs that are incapable of loading an MPC in an MPC transportation cask in the fuel pool, and by those Purchasers utilizing MPCs for on-site storage.

For the transfer of SNF from the fuel pool, the MPC will be in an MPC transfer cask and loaded in the fuel pool. The MPC would be closed while in the MPC transfer cask. The MPC would be transferred to an MPC transportation cask outside the fuel pool in a dry transfer area adjacent to the fuel pool, or transferred to the storage mode.

Requirements for the development of the transportation cask subsystems to include the MPC Transportation Cask, the MPC, and ancillary equipment are addressed in the Transportation System Requirements Document.

Requirements for the development of this segment are addressed in Section 3.7.2.1.2.

3.7.2.1.1.1 On-Site Transfer Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Perform Transfer and Storage Operations (1.3.2)
C. Transfer SNF into an MPC in Fuel Pool (1.3.2.1)
D. Transfer SNF into an MPC in Transfer Cask in Fuel Pool (1.3.2.1.1)
E. Transfer Loaded MPC from MPC Transfer Cask into MPC Transportation Cask Outside of Fuel Pool (1.3.2.1.2)

F. Transfer SNF into an MPC Outside of Fuel Pool (1.3.2.2)
G. Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool (1.3.2.2.3)
H. Store MPC On-Site (1.3.2.3)
I. Transfer MPC from MPC Transfer Cask to Storage Mode for On-Site Storage (1.3.2.3.1)
J. Transfer MPC from Storage to MPC Transportation Cask (1.3.2.3.3)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.2.1.1.2 On-Site Transfer Segment Interfaces

The On-Site Transfer Segment will interface with the following segments within the OSTS subelement:

A. the On-Site Storage Segment
B. the Bare SNF Transfer Segment

Interfaces to other system elements are in Section 3.2.3.3.

The lower level DRDs identify and specify design requirements for interfaces between segments of the OSTS. As discussed in Section 3.2.3.1, the On-Site Transfer Segment has significant interfaces with existing Purchaser equipment.

3.7.2.1.2 On-Site Transfer Segment Requirements

3.7.2.1.2.1 Handling

Handling and retrieving shall be performed in a manner without the release of radioactive materials to the environment or radiation exposures in excess of 10CFR20 limits. The storage mode must be designed to confine the waste for the duration of the license. [10CFR72.122(h)(5)] [CRD 3.2.5.1.C]

3.7.2.1.2.2 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)][CRD 3.3.1.B]

3.7.2.1.2.3 SNF Criticality

A. The SNF and the loaded MPCs handling, packaging, and transfer systems shall be designed to maintain nuclear subcriticality. The design must ensure that, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of handling, packaging, and transfer systems must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, packaging, and transfer conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)][CRD 3.2.2.5]

B. When practical, the on-site transfer segment shall be designed to maintain the SNF within the MPC in a favorable geometry or permanently fixed neutron absorbing materials (poisons), or both. Where solid neutron absorbing materials are used, the design of the OSTS must provide for positive means to verify their continued efficacy. [10CFR72.124(b)][CRD 3.2.2.5][CRD 3.7.3.2.L]

3.7.2.1.2.4 Criteria for SNF and Radioactive Waste Handling

A. The SNF and the loaded MPCs handling systems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal and accident conditions. The on-site transfer segment must be designed to interface with the Purchaser facilities where it is to be used. These systems must be designed with:

1. Capability to test and monitor components important to safety

2. Suitable shielding for radioactive protection under normal and accident conditions

3. Confinement structures and systems

4. Heat-removal capability having testability and reliability consistent with its importance to safety

5. Means to minimize the quantity of radioactive wastes generated.

[10CFR72.128(a)][CRD 3.3.1.B]

B. Provisions shall be made for packaging site-generated low-level wastes in a form suitable for storage on-site awaiting transfer to disposal sites. [10CFR72.128(b)]

C. The SNF and the loaded MPCs handling systems shall be designed to provide the capability to minimize the generation of mixed wastes. [Derived by CRD 3.2.2.8]

3.7.2.1.2.5 Effluent Control

A. The on-site transfer segment shall be designed to provide means to limit to levels ALARA the release of radioactive materials in effluent during normal operations, and control the release of radioactive materials under accident conditions. [10CFR72.126(d)] [CRD 3.2.2.1.E]

B. Analyses shall be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in Section 3.2.2.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

C. Analyses of design basis accidents shall be made to show that releases to the general environment will be within the exposure limits given in Section 3.2.1.6.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

D. Systems designed to monitor the release of radioactive materials shall have means for calibration and testing their operability. [10CFR72.126(d)][CRD 3.2.2.1.E]

3.7.2.1.2.6 SNF Integrity

On-site transfer segment components for SNF transfer and handling into an MPC shall be designed to protect the SNF cladding against degradation that leads to gross ruptures or otherwise shall contain the fuel to prevent operational safety problems. [10CFR72.122(h)(1)][CRD 3.3.1.B]

3.7.2.1.2.7 Criticality Monitoring

A criticality monitoring system shall be maintained in each area where special nuclear material is handled, or used which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under 10CFR72 shall not be required. [10CFR72.124(c)][CRD 3.7.3.2.M]

3.7.2.2 On-Site Storage Segment

3.7.2.2.1 On-Site Storage Segment Description

This segment is the equipment for use by Purchasers that will be capable of storing MPCs on-site. The MPC is loaded using the On-Site Transfer Segment. The loaded MPC will be contained in the MPC transfer cask for transfer to the storage mode.

The MPC is stored on-site for a period of time prior to shipment to either the MRS facility or the MGDS. For shipment, the MPC is transferred from the storage mode to the MPC transportation cask. The transfer of the MPC to a transportation cask from an MPC storage mode may require an MPC transfer cask. For this contingency the On-Site Transfer Segment would

be utilized. Requirements for the development of the transportation cask subsystems to include the MPC Transportation Cask, the MPC, and ancillary equipment are addressed in the Transportation System Requirements Document.

The transfer and storage SSCs of the MPCs will be designed, constructed, and operated in accordance with 10CFR72.

Requirements for the development of this segment are addressed in Section 3.7.2.2.2.

3.7.2.2.1.1 On-Site Storage Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Perform Transfer System Operations (1.3.2)
C. Store MPC On-Site (1.3.2.3)
D. Transfer MPC from MPC Transfer Cask to Storage Mode for On-Site Storage (1.3.2.3.1)
E. Conduct Storage Mode Operations (1.3.2.3.2)
F. Transfer MPC from Storage to MPC Transportation Cask (1.3.2.3.3)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.2.2.1.2 On-Site Storage Segment Interfaces

The On-Site Storage Segment will interface with On-Site Transfer within the OSTS subelement.

Interfaces to other system elements are in Section 3.2.3.3.

The lower level DRDs identify and specify design requirements for interfaces between segments of the OSTS. As discussed in Section 3.2.3.1, the On-Site Storage Segment is dependent on major interfaces with existing Purchaser equipment.

3.7.2.2.2 On-Site Storage Segment Requirements

3.7.2.2.2.1 Handling

Handling and retrieving shall be performed in a manner without the release of radioactive materials to the environment or radiation exposures in excess of 10CFR20 limits. The storage mode must be designed to confine the waste for the duration of the license. [10CFR72.122(h)(5)][CRD 3.2.5.1.C]

3.7.2.2.2.2 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)][CRD 3.3.1.B]

3.7.2.2.2.3 SNF Criticality

The on-site storage segment storage mode shall be designed to maintain SNF, in an MPC, subcritical under credible conditions. [10CFR72.236(c)][CRD 3.2.2.5]

3.7.2.2.2.4 Criteria for SNF and Radioactive Waste Handling

A. The SNF and the loaded MPCs handling systems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal and accident conditions. The on-site storage segment must be designed to interface with the Purchaser facilities where it is to be used. These systems must be designed with:

1. Capability to test and monitor components important to safety

2. Suitable shielding for radioactive protection under normal and accident conditions

3. Confinement structures and systems

4. Heat-removal capability having testability and reliability consistent with its importance to safety

5. Means to minimize the quantity of radioactive wastes generated.

[10CFR72.128(a)][CRD 3.3.1.B]

B. Provisions shall be made for packaging site-generated low-level wastes in a form suitable for storage on-site awaiting transfer to disposal sites. [10CFR72.128(b)]

C. The SNF and the loaded MPCs handling systems shall be designed to provide the capability to minimize the generation of mixed wastes. [Derived by CRD 3.2.2.8]

3.7.2.2.2.5 Effluent Control

A. The on-site storage segment shall be designed to provide means to limit to levels ALARA the release of radioactive materials in effluent during normal operations, and control the release of radioactive materials under accident conditions. [10CFR72.126(d)][CRD 3.2.2.1.E]

B. Analyses shall be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in Section 3.2.2.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

C. Analyses of design basis accidents shall be made to show that releases to the general environment will be within the exposure limits given in Section 3.2.1.6.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

D. Systems designed to monitor the release of radioactive materials shall have means for calibration and testing their operability. [10CFR72.126(d)][CRD 3.2.2.1.E]

3.7.2.2.2.6 Storage Characteristics

Loaded MPC storage mode and other subsystems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal credible and accident conditions. These systems must be designed with:

A. Capability to test and monitor components important to safety

B. Suitable shielding for radioactive protection under normal and accident conditions

C. Confinement structures and systems

D. Heat-removal capability having testability and reliability consistent with its importance to safety

E. Means to minimize the quantity of radioactive wastes generated. [10CFR72.128(a)][10CFR72.236(c)-(h),(l)][CRD 3.3.1.B]

3.7.2.2.2.7 Retrievability

Storage systems shall be designed to allow ready retrieval of loaded MPCs for transport. [10CFR72.122(l)][10CFR72.236(m)][CRD 3.3.1.B]

3.7.2.2.2.8 SNF Integrity

A. On-site storage segment components for SNF transfer and handling into an MPC shall be designed to protect the SNF cladding against degradation that leads to gross ruptures or otherwise shall contain the fuel to prevent operational safety problems. [10CFR72.122(h)(1)][CRD 3.3.1.B]

B. The storage mode facilities at the on-site storage segment shall be designed to protect the spent fuel cladding inside an MPC during storage against degradation that leads to gross ruptures or otherwise shall confine the spent fuel such that the degradation of the fuel during storage will not pose operational safety problems with respect to its removal from storage. [10CFR72.122(h)(1)][CRD 3.3.1.B]

3.7.2.2.2.9 Criticality Monitoring

A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under 10CFR72 shall not be required. [10CFR72.124(c)][CRD 3.7.3.2.M]

3.7.2.2.2.10 Facility Access for Inspection

The on-site storage segment, as part of the Purchaser facility, shall afford to the IAEA representatives at all reasonable times opportunity to inspect MPCs and the premises and facilities wherein SNF and MPCs are handled or stored. [10CFR75.42(a)][CRD 3.3.8.2.C]

3.7.2.3 Bare SNF Transfer Segment

3.7.2.3.1 Bare SNF Transfer Segment Description

This segment identifies a system for loading MPCs at Purchaser sites with limited crane capacity and other restraints in the fuel pool area. Using a shielded device, bare SNF assemblies are transferred to an MPC at an out of fuel pool location. The MPC would be in a shielded overpack for handling and safety. The transfer would be to an MPC in either MPC transfer cask or MPC transportation cask.

Requirements for the development of the transportation cask subsystems to include the MPC Transportation Cask, the MPC, and ancillary equipment are addressed in the Transportation System Requirements Document. Requirements for the development of the other elements of this segment are addressed in the following sections.

3.7.2.3.1.1 Bare SNF Transfer Segment Functions

This segment shall be capable of performing all functions assigned to it in Section 3.1.4 and Appendix B. These functions are:

A. Store Waste (1.3)
B. Perform Transfer System Operations (1.3.2)
C. Transfer SNF into an MPC Outside of Fuel Pool (1.3.2.3)
D. Transfer SNF in Fuel Pool into SNF Transfer Device (1.3.2.3.1)
E. Transfer SNF from SNF Transfer Device into an MPC in MPC Transportation Cask Outside of Fuel Pool (1.3.2.3.2)
F. Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool (1.3.2.3.3)

Descriptions for these functions are included in Appendix A. [Derived by CRD 3.7.3.1.1]

3.7.2.3.1.2 Bare SNF Transfer Segment Interfaces

The Bare SNF Transfer Segment will interface with On-Site Transfer within the OSTS subelement.

Interfaces to other system elements are in Section 3.2.3.3.

The lower level DRDs identify and specify design requirements for interfaces between segments of the OSTS. As discussed in Section 3.2.3.1, the Bare SNF Transfer Segment is dependent on major interfaces with existing Purchaser equipment.

3.7.2.3.2 Bare SNF Transfer Segment Requirements

3.7.2.3.2.1 Handling

Handling and retrieving shall be performed in a manner without the release of radioactive materials to the environment or radiation exposures in excess of 10CFR20 limits. The storage mode must be designed to confine the waste for the duration of the license. [10CFR72.122(h)(5)][CRD 3.2.5.1.C]

3.7.2.3.2.2 Ventilation

Ventilation systems and off-gas systems shall be provided where necessary to ensure the confinement of airborne radioactive particulate materials during normal or off-normal conditions. [10CFR72.122(h)(3)][CRD 3.3.1.B]

3.7.2.3.2.3 SNF Criticality

A. The SNF and loaded MPCs handling, packaging, and transfer systems shall be designed to maintain nuclear subcriticality. The design must ensure that, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety before a nuclear criticality accident is possible. The design of handling, packaging, and transfer systems must include margins of safety for the nuclear criticality parameters. Those margins must be commensurate with the uncertainties in the data and methods used in calculations. They must demonstrate safety for the handling, packaging, and transfer conditions and in the nature of the immediate environment under accident conditions. [10CFR72.124(a)][CRD 3.2.2.5]

B. When practical, the bare SNF transfer segment shall be designed to maintain the SNF within the MPC in a favorable geometry or permanently fixed neutron absorbing materials (poisons), or both. Where solid neutron absorbing materials are used, the design of the OSTS must provide for positive means to verify their continued efficacy. [10CFR72.124(b)][CRD 3.2.2.5][CRD 3.7.3.2.L]

3.7.2.3.2.4 Criteria for SNF and Radioactive Waste Handling

A. The SNF and the loaded MPCs handling systems that might contain or handle radioactive materials associated with spent fuel shall be designed to ensure adequate safety under normal and accident conditions. The bare SNF transfer segment must be designed to interface with the Purchaser facilities when it is to be used. These systems must be designed with:

1. Capability to test and monitor components important to safety

2. Suitable shielding for radioactive protection under normal and accident conditions

3. Confinement structures and systems

4. Heat-removal capability having testability and reliability consistent with its importance to safety

5. Means to minimize the quantity of radioactive wastes generated.

[10CFR72.128(a)][CRD 3.3.1.B]

B. Provisions shall be made for packaging site-generated low-level wastes in a form suitable for storage on-site awaiting transfer to disposal sites. [10CFR72.128(b)]

C. The SNF and the loaded MPCs handling systems shall be designed to provide the capability to minimize the generation of mixed wastes. [Derived by CRD 3.2.2.8]

3.7.2.3.2.5 Effluent Control

A. The bare SNF transfer segment shall be designed to provide means to limit to levels ALARA the release of radioactive materials in effluent during normal operations, and control the release of radioactive materials under accident conditions. [10CFR72.126(d)] [CRD 3.2.2.1.E]

B. Analyses shall be made to show that releases to the general environment during normal operations and anticipated occurrences will be within the exposure limit given in Section 3.2.2.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

C. Analyses of design basis accidents shall be made to show that releases to the general environment will be within the exposure limits given in Section 3.2.1.6.2. [10CFR72.126(d)][CRD 3.2.2.1.E]

D. Systems designed to monitor the release of radioactive materials shall have means for calibration and testing their operability. [10CFR72.126(d)][CRD 3.2.2.1.E]

3.7.2.3.2.6 SNF Integrity

Bare SNF transfer segment components for SNF transfer and handling into an MPC shall be designed to protect the SNF cladding against degradation that leads to gross ruptures or otherwise shall contain the fuel to prevent operational safety problems. [10CFR72.122(h)(1)][CRD 3.3.1.B]

3.8 PRECEDENCE

A. The general order of precedence for requirements is:

1. Federal Law
    a. Statutes and Treaties
    b. Regulations and Executive Orders
    c. Other (e.g., DOE Orders)
2. State Law and Tribal Law
3. Local Ordinances
4. National and International Standards. [Derived by CRD 3.8.A]

B. In resolving questions of precedence involving DOE Orders or CFRs that address nuclear safety and radiation protection requirements covered by the CFRs issued by the NRC, the NRC requirements shall take precedence[1]. [MOA, NS/RW, 04/16/92]

Note: DOE Orders and some Executive Orders are not applicable to the OSTS because the procurement and operation of it is not within the CRWMS or Federal government responsibility.

3.9 QUALIFICATION/QUALITY ASSURANCE

3.9.1 QA Applicability to MRS Facility and OSTS Activities

The MRS facility and the OSTS[2] shall apply the Quality Assurance Requirements and Description Document to all the activities affecting quality performed by the MRS facility and the OSTS[3]. [QARD(DOE/RW-0333P), Section ii]

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[1] However, DOE Orders, or CFRs, or other standards may be used for guidance in meeting NRC requirements.

[2] QA applicability here is limited to those activities within the scope of the CRWMS. These may not include construction or operation of the OSTS.

[3] The requirements of sections 3.9.2 through 3.9.6 are provided for amplification.

3.9.2 Quality Affecting Equipment

The design of the MRS facility and the OSTS shall provide means to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits. [10CFR72.164]

3.9.3 Establishment of Program

A. The MRS facility and the OSTS shall establish, maintain, and execute a quality assurance program satisfying each of the applicable criteria of 10CFR72, and satisfying any specific provisions which are applicable to MRS facility and the OSTS activities. [10CFR72.140(b)]

B. The MRS facility and the OSTS shall execute the applicable criteria in a graded approach to an extent that is commensurate with the importance to safety. [10CFR72.140(b)]

C. The quality assurance program shall cover, throughout the life of the licensed activity, from the site selection through decommissioning, prior to termination of the license, the following activities: design, fabrication, construction, testing, operation, modification, and decommissioning of the structures, systems, and components of the MRS facility and the OSTS important to safety. [10CFR72.140(b)]

3.9.4 Program Activities

A. The MRS facility and the OSTS shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of 10CFR72 Subpart G. [10CFR72.144(a)]

B. The MRS facility and the OSTS shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with these procedures throughout the period during which the MRS facility and the OSTS is licensed. [10CFR72.144(a)]

C. The MRS facility and the OSTS design shall identify the structures, systems, and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organizations. [10CFR72.144(a)]

D. The MRS facility and the OSTS, through its quality assurance program, shall provide control over activities affecting the quality of the identified structures, systems, and components to an extent commensurate with the importance to safety, and as necessary to ensure conformance to the approved design of the MRS facility and the OSTS. [10CFR72.144(b)]

E. The MRS facility and the OSTS shall ensure that activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied. [10CFR72.144(b)]

F. The MRS facility and the OSTS design shall take into account the need for special controls, processes, test equipment, tools and skills to attain the required quality and the need for verification of quality by inspection and test. [10CFR72.144(b)]

G. The MRS facility and the OSTS design shall base the requirements and procedures of their quality assurance program on the following considerations concerning the complexity and proposed use of the structures, systems, or components:

1. The impact of malfunction or failure of the item on safety

2. The design and fabrication complexity or uniqueness of the item

3. The need for special controls and surveillance over processes and equipment

4. The degree to which functional compliance can be demonstrated by inspection or test

5. The quality history and degree of standardization of the item.

[10CFR72.144(c)]

3.9.5 Inspection Program

A. The MRS facility and the OSTS shall establish and execute a program for inspection of activities affecting quality by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. The inspection must be performed by individuals other than those who performed the activity being inspected. [10CFR72.160]

B. Examinations, measurements, or tests of material or products processed shall be performed for each work operation where necessary to assure quality. [10CFR72.160]

C. If direct inspection of processed material or products cannot be carried out, indirect control by monitoring processing methods, equipment, and personnel shall be provided. Both inspection and process monitoring must be provided when quality control is inadequate without both. [10CFR72.160]

D. If mandatory inspection hold points, which require witnessing or inspecting by a designated representative and beyond which work should not proceed without the consent of the designated representative, are required, the specific hold points shall be indicated in appropriate documents. [10CFR72.160]

3.9.6 Conditions Adverse to Quality

A. The MRS facility and the OSTS shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. [10CFR72.172]

B. In the case of a significant condition adverse to quality, the measures shall ensure that the cause of the condition is determined and corrective action is taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented and reported to appropriate levels of management. [10CFR72.172]

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4. CONFORMANCE VERIFICATION

4.1 RESPONSIBILITIES

This section relates the requirements of this document to the compliance methods of section 4.2 that will be used to verify compliance with the requirements. The test and evaluation program and the conformance verification activities are not intended to replace activities associated with the NRC license application or the satisfaction of that license.

4.2 METHODS

The methods of compliance to be used are:

A. **Analysis.** Analysis is the process needed to verify a requirement by rational thinking, tradeoff studies, modeling, and processing test data and accumulated results to reach a conclusion. Analysis involves the processing of accumulated results and conclusions, intended to provide proof that verification of compliance with each requirement has been accomplished. The analytical results may be comprised of a compilation or interpretation of existing information or derived from lower level examinations, tests, demonstrations, or analyses.

B. **Examination.** Examination is the process of investigating a product to verify that required features are incorporated. Examination consists of investigation, without the use of special laboratory appliances, procedures, supplies, or services, to determine conformance to those specified requirements that can be determined by such investigations. Examination is generally nondestructive and includes, but is not limited to, visual, auditory, olfactory, tactile, and other investigations, simple physical manipulation, gauging, and measurement.

C. **Test.** Test is the quantitative process whereby data is collected over a specified time period, under controlled conditions, in order to document the as-built performance of a product. A test denotes the determination of the properties or elements of items (or components thereof) by technical means, including functional operation, the application of established principles and procedures and the collection of quantitative data. The analysis of data derived from testing is an integral part of the method.

D. **Demonstration.** Demonstration is the qualitative process of exercising a product to verify its operability, where data may or may not be collected. Demonstration differs from test by directness of approach in the verification of a requirement and is accomplished without the use of instrumentation or special equipment. Thus, operation of a representative item in or near its intended environment would be defined as a Demonstration rather than a Test. Demonstration attempts to verify, qualitatively, the performance of a function, where as Test involves verifying performance within a specific range of measurement.

4.3 CROSS REFERENCE

Table 4-1 correlates the requirements of Sections 3 and 5 with the method to be used to comply with the requirements. Documentation of compliance will be accomplished through the use of detailed verification procedures to be developed and performed on all procured, constructed, and developed equipment, structures, and software.

In the following table, items marked "N/A" (not applicable) have no verification required. These items are titles or explanatory materials. The other columns "A" (Analysis), "E" (Examination), "T" (Test), and "D" (Demonstration) refer to the verification methods identified in section 4.2.

When more than one method of compliance is marked in Table 4-1, compliance must be verified by one or more of the methods marked.

Table 4-1. Verification Matrix

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.1	SYSTEM DEFINITION		X			
3.1.1	MRS System Functions - Store Waste (1.3)	X				
3.1.1.1	MRS Subelement Functions - Store Waste at the MRS	X				
3.1.1.2	OSTS Functions - Perform Transfer System Operations	X				
3.1.1.3	MRS System Functions List	X				
3.1.2	MRS Functional Relationships	X				
3.1.3	System Description	X				
3.1.4	Function to Architecture Cross-Reference	X				
3.1.5	Major Considerations and Assumptions	X				
3.1.5.1	Siting Considerations	X				
3.1.5.2	Cask Maintenance Facility	X				
3.1.5.3	Design Capacity	X				
3.1.5.4	Unloaded Transport Cask Storage	X				
3.1.5.5	Operations Control Center Location	X				
3.1.5.6	Storage Mode	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.1.5.7	Duplication of Requirements	X				
3.1.5.8	Low-level Radwaste Disposal	X				
3.1.5.9	SNF Transport	X				
3.1.5.10	OSTS	X				
3.1.5.11	MPC Transport	X				
3.1.5.12	MPC Storage	X				
3.1.5.13	MPC Seal	X				
3.1.5.14	SNF Ownership	X				
3.1.5.15	Design Basis SNF	X				
3.2	CHARACTERISTICS	X				
3.2.1	Performance Characteristics	X				
3.2.1.A		X				
3.2.1.B		X				
3.2.1.1	MRS Facility Initial Operation Requirements	X				
3.2.1.1.1	SNF and Loaded MPC Receipt		X			X
3.2.1.1.2	Receipt Rate		X			X
3.2.1.2	MRS Facility Transition Operation Requirements		X			X
3.2.1.3	MRS Facility Steady State Operation Requirements		X		X	
3.2.1.4	MRS Facility End of Life Cycle Operation Requirements		X		X	
3.2.1.5	MRS Facility Decommissioning Requirements	X				
3.2.1.5.1	Design Compatibility	X				
3.2.1.5.1.A			X			
3.2.1.5.1.B			X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.1.5.2	Decommissioning Safety		X	X		
3.2.1.5.3	Site Releasability		X	X		
3.2.1.5.4	Facility Decontamination		X	X		
3.2.1.5.5	Design Considerations		X	X		
3.2.1.5.6	Facility Dismantling		X			
3.2.1.6	MRS Facility Off-normal Requirements	X				
3.2.1.6.1	Emergency Accessibility	X				
3.2.1.6.1.A			X	X		
3.2.1.6.1.B			X	X		
3.2.1.6.2	Off-site Dose Limit		X			
3.2.1.7	OSTS Initial Operation Requirements			X		
3.2.1.8	OSTS Normal Operation Requirements	X				
3.2.1.8.1	SNF Storage		X	X		X
3.2.1.8.2	SNF Shipment		X	X		X
3.2.1.9	OSTS Decommissioning Requirements	X				
3.2.1.9.1	Decommissioning Safety		X	X		
3.2.1.9.2	Site Releasability		X	X		
3.2.1.9.3	Facility Decontamination		X	X		
3.2.1.9.4	Facility Dismantling		X			
3.2.1.10	OSTS Off-normal Requirements	X				
3.2.1.10.1	Emergency Accessibility		X	X		
3.2.1.10.2	Off-site Dose Limit		X	X		
3.2.2	Radiological Protection	X				
3.2.2.1	Overall Dose Rate		X	X		
3.2.2.2	Annual Public Dose Limit		X			
3.2.2.3	Radiation Protection Program	X				
3.2.2.3.A			X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.2.3.B			X	X		
3.2.2.4	Occupational Dose Limits for Adults	X				
3.2.2.4.A			X	X		
3.2.2.4.B				X		
3.2.2.5	Occupational Dose Limits for Minors		X	X		
3.2.2.6	Dose Limits to an Embryo/Fetus		X	X		
3.2.2.7	Public Dose Limits	X				
3.2.2.7.A			X			
3.2.2.7.B			X			
3.2.2.7.C			X	X		
3.2.2.8	Compliance with Public Dose Limits		X		X	
3.2.2.9	Surveys			X		
3.2.2.10	Radiation Exposure Monitoring	X				
3.2.2.10.A				X		
3.2.2.10.B				X		
3.2.2.11	MRS Facility Exposure Control	X				
3.2.2.11.A			X	X		
3.2.2.11.B			X			
3.2.2.11.C			X	X		
3.2.2.11.D			X	X		
3.2.2.11.E			X	X		
3.2.2.11.F			X	X		
3.2.2.11.G			X	X		
3.2.2.11.H			X	X		
3.2.2.12	Emissions		X			
3.2.2.13	OSTS Radiological Protection	X				
3.2.2.13.A			X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.2.13.B				X		
3.2.3	Interface Requirements	X				
3.2.3.1	Interfaces External to the CRWMS			X		
3.2.3.2	MRS Facility Interfaces with Other CRWMS Elements	X				
3.2.3.2.1	MRS Facility-MGDS Interface Requirements	X				
3.2.3.2.1.A				X		
3.2.3.2.1.B			X			
3.2.3.2.1.C				X		
3.2.3.2.1.D				X		
3.2.3.2.1.E				X		
3.2.3.2.1.F			X	X		
3.2.3.2.1.G				X		
3.2.3.2.2	MRS Facility-Waste Acceptance Interface Requirements	X				
3.2.3.2.2.A				X		
3.2.3.2.2.B			X			
3.2.3.2.2.C			X			
3.2.3.2.2.D					X	
3.2.3.2.3	MRS Facility-Transportation Interface Requirements	X				
3.2.3.2.3.A				X		
3.2.3.2.3.B				X		
3.2.3.2.3.C				X		
3.2.3.2.3.D				X		
3.2.3.2.3.E				X		
3.2.3.2.3.F				X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.3.2.3.G				X		
3.2.3.2.3.H				X		
3.2.3.2.3.I				X		
3.2.3.2.3.J			X			
3.2.3.2.3.K			X			
3.2.3.2.3.L			X			
3.2.3.2.3.M			X			
3.2.3.2.3.N			X			
3.2.3.2.3.O			X			
3.2.3.2.3.P			X			
3.2.3.2.3.Q			X	X		
3.2.3.2.3.R				X		X
3.2.3.2.3.S			X	X		
3.2.3.2.3.T			X	X		X
3.2.3.2.3.U			X	X		
3.2.3.2.3.V			X	X		X
3.2.3.2.4	MRS Facility Segment Interface Summary		X	X		
3.2.3.3	OSTS Interfaces with CRWMS Elements	X				
3.2.3.3.1	OSTS-MGDS Interface Requirements	X				
3.2.3.3.2	OSTS-Waste Acceptance Interface Requirements	X				
3.2.3.3.3	OSTS-Transportation Interface Requirements	X				
3.2.3.3.3.A			X	X		X
3.2.3.3.3.B			X	X		
3.2.3.3.3.C			X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.3.3.3.D			X	X		
3.2.3.3.3.E			X			
3.2.3.3.3.F			X			
3.2.3.3.3.G			X	X		
3.2.3.3.3.H			X	X		X
3.2.3.3.3.I			X	X		
3.2.3.3.3.J			X	X		X
3.2.3.3.3.K			X	X		
3.2.3.3.3.L			X			
3.2.3.3.3.M			X	X		
3.2.3.3.3.N				X		
3.2.3.3.4	OSTS-MRS Facility Interface Requirements	X				
3.2.3.3.5	OSTS Segment Interface Summary	X				
3.2.3.3.5.A			X	X		
3.2.3.3.5.B			X	X		
3.2.4	Physical Characteristics and Requirements			X		
3.2.4.1	Protective Coatings and Materials	X				
3.2.4.1.1	Protective Coatings	X				
3.2.4.1.1.A			X	X		
3.2.4.1.1.B			X	X		
3.2.4.1.2	Waterproofing	X				
3.2.4.1.2.A			X	X		
3.2.4.1.2.B			X	X		
3.2.4.1.2.C			X	X		
3.2.4.1.2.D			X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.4.2	Habitability	X				
3.2.4.2.1	Environmental Controls		X			
3.2.4.2.2	Heating, Ventilation, and Air-conditioning		X		X	
3.2.4.2.3	Illumination		X		X	
3.2.4.2.4	Acoustical Noise		X		X	
3.2.4.2.5	Vibration		X		X	
3.2.4.3	Security	X				
3.2.4.3.1	Controlled Area			X		
3.2.4.3.2	Controlled Area Crossing		X	X		
3.2.4.3.3	Physical Protection	X				
3.2.4.3.3.A			X	X		
3.2.4.3.3.B			X	X		
3.2.4.3.4	Physical Barriers	X				
3.2.4.3.4.A			X	X		
3.2.4.3.4.B			X	X		
3.2.4.3.4.C				X		X
3.2.4.3.4.D				X		
3.2.4.3.4.E				X		X
3.2.4.3.4.F				X		
3.2.4.3.5	Access Control	X				
3.2.4.3.5.A			X	X		
3.2.4.3.5.B			X	X		
3.2.4.3.5.C			X	X		X
3.2.4.3.5.D				X		
3.2.4.3.5.E				X		
3.2.4.3.5.F				X		X

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.4.3.5.G				X		
3.2.4.3.5.H				X		
3.2.4.3.5.I			X	X		
3.2.4.3.5.J			X	X		
3.2.4.3.6	Vehicle Inspection		X	X		X
3.2.4.3.7	Detection Aids	X				
3.2.4.3.7.A			X	X		X
3.2.4.3.7.B			X		X	
3.2.4.3.7.C				X		X
3.2.4.3.8	Communications	X				
3.2.4.3.8.A				X		X
3.2.4.3.8.B				X		
3.2.4.3.8.C				X		X
3.2.4.3.8.D				X		X
3.2.4.3.9	Security of Stored Material			X		
3.2.4.3.10	Control of Material not in Storage			X		
3.2.4.3.11	High Radiation Area Access Control	X				
3.2.4.3.11.A			X	X	X	
3.2.4.3.11.B				X		X
3.2.4.3.11.C				X		
3.2.4.3.12	Very High Radiation Area Access Control		X	X		
3.2.4.3.13	Security Equipment	X				
3.2.4.3.13.A				X		
3.2.4.3.13.B				X		
3.2.4.3.13.C				X		
3.2.4.3.14	OSTS Security		X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.4.4	Health Protection	X				
3.2.4.4.1	Workplace Safety		X	X		
3.2.4.4.2	Federal Employee Occupational Medical Program			X		
3.2.4.4.3	Respiratory Protection	X				
3.2.4.4.3.A	Equipment Certification			X		
3.2.4.4.3.B	Respiratory Protection Program		X	X		
3.2.4.4.3.C	Respirator Use			X		
3.2.4.4.4	Emergency Respiratory Protection			X		
3.2.4.4.5	Work Environment Sampling			X		
3.2.4.5	Radioactive Materials Monitoring	X				
3.2.4.5.1	Radiological Alarm Systems	X				
3.2.4.5.1.A			X	X		
3.2.4.5.1.B			X	X		X
3.2.4.5.1.C				X		
3.2.4.5.2	Effluent and Direct Radiation Monitoring			X		
3.2.4.5.3	Effluent Control		X	X		X
3.2.4.5.4	Instrument and Equipment Calibration			X		
3.2.4.5.5	Airborne Radioactive Material Control	X				
3.2.4.5.5.A			X	X		
3.2.4.5.5.B			X	X		
3.2.4.5.6	Surveillance		X	X		
3.2.4.6	Shielding and Protective Clothing	X				
3.2.4.6.1	Shielding Design	X				
3.2.4.6.1.A	Normally Occupied Areas		X	X		
3.2.4.6.1.B	Intermittently Occupied Areas		X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.4.6.1.C	Concrete		X	X		
3.2.4.6.1.D	Penetrations			X		
3.2.4.6.2	Remote Shielded Operation		X			
3.2.4.6.3	Change Rooms	X				
3.2.4.6.3.A				X		
3.2.4.6.3.B				X		
3.2.4.6.3.C				X		
3.2.4.6.4	Protective Equipment			X		
3.2.4.7	Design Basis Events	X				
3.2.4.7.1	Aircraft		X			
3.2.4.7.2	External Blasts and Missiles		X			
3.2.4.7.3	Internal Blasts and Missiles		X			
3.2.4.7.4	Man-induced Events		X			
3.2.5	System Quality Factors	X				
3.2.5.1	Reliability	X				
3.2.5.1.1	Reliability Program Requirements		X	X		
3.2.5.1.2	Reliability of Equipment		X			
3.2.5.1.3	SSC Reliability		X			
3.2.5.1.4	Utility Service Reliability		X	X		
3.2.5.1.5	Emergency Power Reliability		X	X		X
3.2.5.1.6	Mission Reliability	X				
3.2.5.1.6.A				X		
3.2.5.1.6.B				X		
3.2.5.2	Maintainability and Inspectability	X				
3.2.5.2.1	Testing and Maintenance			X		
3.2.5.2.2	Physical Clearance	X				
3.2.5.2.2.A	Corridors			X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.5.2.2.B	Maintenance Accessibility			X		
3.2.5.2.3	Mean Time to Repair		X			
3.2.5.2.4	Replacement Equipment	X				
3.2.5.2.4.A				X		
3.2.5.2.4.B				X		
3.2.5.2.4.C				X		
3.2.5.2.5	Fault Isolation		X	X		
3.2.5.2.6	Maintenance in Radioactive Environments			X		
3.2.5.2.7	Important to Safety Equipment		X	X		
3.2.5.2.8	Mean Downtime		X			
3.2.5.2.9	Design for Maintainability	X				
3.2.5.2.9.A			X	X		
3.2.5.2.9.B				X		
3.2.5.2.9.C				X		
3.2.5.2.9.D				X		
3.2.5.3	Availability	X				
3.2.5.3.1	Availability Parameters	X				
3.2.5.3.1.1	MRS Facility Parameters		X		X	
3.2.5.3.1.2	OSTS Parameters		X		X	
3.2.5.3.2	Standby Equipment			X		
3.2.5.4	Service Life	X				
3.2.5.4.A			X	X		
3.2.5.4.B			X	X		
3.2.5.5	Overall Utilization	X				
3.2.5.5.A			X			
3.2.5.5.B			X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.6	Environmental Requirements	X				
3.2.6.1	Natural Environment	X				
3.2.6.1.1	Natural Phenomena	X				
3.2.6.1.1.A			X			
3.2.6.1.1.B			X	X		
3.2.6.1.1.C				X		
3.2.6.1.2	Earthquake	X				
3.2.6.1.2.A			X	X		
3.2.6.1.2.B			X	X		
3.2.6.1.2.C				X		
3.2.6.1.2.D			X		X	
3.2.6.1.3	Tornado and Extreme Wind	X				
3.2.6.1.3.A			X			
3.2.6.1.3.B			X			
3.2.6.1.3.C			X			
3.2.6.1.3.D			X			
3.2.6.1.4	Floods		X			
3.2.6.1.5	Earth and Groundwater	X				
3.2.6.1.5.A			X	X		
3.2.6.1.5.B			X	X		
3.2.6.1.6	Thermal Analysis		X			
3.2.6.1.7	Rain and Snow Loads		X			
3.2.6.1.8	Flood Protection	X				
3.2.6.1.8.A				X		
3.2.6.1.8.B				X		
3.2.6.2	Induced Environment	X				
3.2.6.2.1	Fire and Explosion Protection	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.2.6.2.1.A			X	X		
3.2.6.2.1.B			X	X		
3.2.6.2.1.C			X	X		
3.2.6.2.1.D			X	X		
3.2.6.2.2	Fire Resistance	X				
3.2.6.2.2.A			X			
3.2.6.2.2.B			X			
3.2.6.2.2.C				X		
3.2.6.2.3	Vibration		X			
3.2.6.2.4	Creep and Shrinkage		X			
3.2.6.2.5	Internal Effects		X			
3.2.7	Transportability/Modularity	X				
3.2.7.A			X	X		
3.2.7.B			X	X		
3.2.8	Flexibility, Expansion, and Integration	X				
3.2.8.1	Additional Handling Facilities	X				
3.2.8.1.A				X		
3.2.8.1.B				X		
3.2.8.2	Additional Facilities			X		
3.2.8.3	Storage Capacity	X				
3.2.8.3.A			X	X		
3.2.8.3.B		X				
3.2.8.4	OSTS Operating Flexibility		X	X		
3.2.9	Portability and Load Carrying			X		
3.3	DESIGN AND CONSTRUCTION	X				
3.3.1	General Design Criteria	X				
3.3.1.1	Design Criteria	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.3.1.1.A			X	X		
3.3.1.1.B			X	X		
3.3.1.1.C			X	X		
3.3.1.1.D				X		
3.3.1.2	Design Objectives	X				
3.3.1.2.A				X		
3.3.1.2.B			X			
3.3.1.3	Quality Standards		X	X	X	X
3.3.1.4	Sharing of Structures, Systems, and Components		X	X		
3.3.1.5	Proven Technologies		X			
3.3.2	Electromagnetic Radiation	X				
3.3.2.1	Electromagnetic Shielding		X	X	X	
3.3.2.2	Line Location			X		
3.3.2.3	Power Poles		X	X		X
3.3.2.4	Lighting Fixtures		X	X		X
3.3.2.5	Communication Circuits		X	X		
3.3.3	Nameplates and Markings	X				
3.3.3.A				X		
3.3.3.B				X		
3.3.3.C				X		
3.3.3.D				X		
3.3.3.E				X		
3.3.4	Workmanship	X				
3.3.4.1	Special Processes		X	X		
3.3.4.2	Criteria			X		
3.3.5	Interchangeability			X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.3.6	Safety		X			
3.3.6.1	Safety Labels and Placards			X		
3.3.6.2	Pipe, Hose, and Tube Line Identification			X		
3.3.6.3	Workspace Hazards			X		
3.3.6.4	Emergency Lighting	X				
3.3.6.4.A				X	X	
3.3.6.4.B				X		X
3.3.6.4.C				X	X	
3.3.6.5	Equipment Related Hazards			X		
3.3.6.6	Work Platforms			X		
3.3.6.7	Electrical, Mechanical, Fluid, and Toxic Hazards	X				
3.3.6.7.A				X		
3.3.6.7.B				X		
3.3.6.7.C				X		
3.3.6.7.D			X	X		
3.3.6.7.E				X		
3.3.6.8	Posting Requirements	X				
3.3.6.8.A	Posting of Radiation Areas			X		
3.3.6.8.B	Posting of High Radiation Areas			X		
3.3.6.8.C	Posting of Very High Radiation Areas			X		
3.3.6.8.D	Posting of Airborne Radioactivity Areas			X		
3.3.6.8.E	Posting of Areas or Rooms in Which Licensed Material is Used or Stored	X				
3.3.6.9	Exceptions to Posting Requirements			X		
3.3.6.10	Labeling Containers	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.3.6.10.A				X		
3.3.6.10.B			X	X		
3.3.6.10.C				X		
3.3.6.11	General Safety Requirements	X				
3.3.6.11.A				X		
3.3.6.11.B				X		
3.3.6.11.C				X		
3.3.6.12	Ventilation			X		
3.3.6.13	Welding			X		
3.3.7	Human Factors Engineering	X				
3.3.7.1	Workstations and Control Rooms			X		
3.3.7.2	Voice Communications Equipment			X		
3.3.7.3	Alarms and Warning Systems			X		
3.3.7.4	Controls			X		
3.3.7.5	Visual Displays			X		
3.3.7.6	Control Panel Layout			X		
3.3.7.7	Control Display Integration			X		
3.3.7.8	Labels, Markings, and Signs			X		
3.3.7.9	Visual Display Terminal (VDT) Workstation			X		
3.3.7.10	Anthropometry			X		
3.3.7.11	Remote Handling and Operation			X		
3.3.7.12	Vehicles and Material Handling			X		
3.3.7.13	Accessibility and Useability by the Physically Handicapped			X		
3.3.7.14	User-Computer Software Interface			X		
3.3.8	Methods and Controls	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.3.8.1	Material Management	X				
3.3.8.1.1	Identification and Control			X		
3.3.8.1.2	Nonconforming Items			X		
3.3.8.2	Inventory Control	X				
3.3.8.2.1	Inventory	X				
3.3.8.2.1.A				X		
3.3.8.2.1.B				X		
3.3.8.2.1.C				X		
3.3.8.2.1.D				X		
3.3.8.2.2	Accounting and Control Systems			X		
3.3.8.3	Radioactive Material Handling	X				
3.3.9	Government Furnished Property	X				
3.3.9.A				X		
3.3.9.B				X		
3.3.10	Computer Resources			X		
3.3.11	Environmental Protection	X				
3.3.11.1	Air Pollution Control	X				
3.3.11.1.A			X	X	X	
3.3.11.1.B			X	X	X	
3.3.11.2	Drinking Water Protection			X		
3.3.11.3	Discharge of Dredged or Fill Material			X		
3.3.11.4	Toxic Substances Control			X		
3.3.11.5	Pesticide Control			X		
3.3.11.6	State and Local Laws			X		
3.4	DOCUMENTATION	X				
3.4.1	Specifications	X				
3.4.1.1	Presentation of Design Basis			X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.4.1.2	Interface Control			X		
3.4.1.3	Quality Affecting Specifications			X		
3.4.2	Drawings	X				
3.4.2.1	Presentation of Design Basis			X		
3.4.2.2	Quality Affecting Drawings			X		
3.4.3	Maintenance, Operators, and Technical Manuals	X				
3.4.3.1	Operational Radiation Restrictions			X		
3.4.3.2	Procedures for Opening Packages			X		
3.4.3.3	NRC Notification			X		
3.4.3.4	Radioactive Effluent Procedures			X		
3.4.3.5	Requirements for Creation of Maintenance, Operators, and Technical Manuals		X	X		
3.4.4	Test Plans and Procedures	X				
3.4.4.1	Test Program	X				
3.4.4.1.A			X	X		
3.4.4.1.B			X	X		
3.4.4.1.C			X	X		
3.4.4.2	Inspection and Test Status	X				
3.4.4.2.A				X		
3.4.4.2.B				X		
3.4.4.3	Environmental Monitoring			X		
3.4.5	Quality Assurance Documentation	X				
3.4.5.1	Material and Equipment Conformance	X				
3.4.5.1.A				X		
3.4.5.1.B				X		
3.4.5.2	Records Maintenance	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.4.5.2.A				X		
3.4.5.2.B				X		
3.4.5.2.C				X		
3.4.5.2.D				X		
3.4.6	Construction Records			X		
3.4.7	Computer Documentation Standard Usage and Practices			X		
3.4.8	Records Management	X				
3.5	LOGISTICS	X				
3.5.1	Maintenance	X				
3.5.1.1	Standardization and Calibration	X				
3.5.1.1.A				X		
3.5.1.1.B				X		
3.5.1.1.C				X		
3.5.1.2	On-line Maintenance			X		
3.5.1.3	Intermediate Maintenance	X				
3.5.1.3.A				X		
3.5.1.3.B				X		
3.5.1.4	Salvaging, Off-site Repair, and Vendor Repair			X		
3.5.1.5	Equipment Maintenance	X				
3.5.1.5.A				X	X	
3.5.1.5.B				X		
3.5.1.5.C			X	X		
3.5.2	Supply	X				
3.5.2.1	Logistics Support Analysis		X	X		
3.5.2.2	Standardization	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.5.2.2.A				X		
3.5.2.2.B				X		
3.5.3	Facilities and Facility Equipment	X				
3.5.3.1	Warehouses	X				
3.5.3.1.A				X		
3.5.3.1.B			X	X	X	
3.5.3.1.C				X		
3.5.3.1.D				X		
3.5.3.1.E				X		
3.5.3.2	Repair Shops	X				
3.5.3.2.A				X		
3.5.3.2.B				X		
3.5.3.2.C				X		
3.5.3.3	Shipping Facility	X				
3.5.3.3.A				X		
3.5.3.3.B				X		
3.5.3.3.C				X		
3.6	PERSONNEL AND TRAINING	X				
3.6.1	Personnel	X				
3.6.1.1	Physical Health	X				
3.6.1.1.A				X		
3.6.1.1.B				X		
3.6.1.2	Employee Population		X			
3.6.2	MRS Facility Training	X				
3.6.2.1	Identification of Training Requirements	X				
3.6.2.1.A				X		
3.6.2.1.B				X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.6.2.1.C				X		
3.6.2.1.D				X		
3.6.2.1.E				X		
3.6.2.2	Quality Assurance Training	X				
3.6.2.2.1	Quality Assurance Training Program			X		
3.6.2.2.2	Equipment Maintenance Training			X		
3.6.2.3	Health Physics Training	X				
3.6.2.3.A				X		
3.6.2.3.B				X		
3.6.2.3.C				X		
3.6.2.4	Operator Training	X				
3.6.2.4.1	Operating Personnel			X		
3.6.2.4.2	Supervisory Personnel			X		
3.6.2.4.3	Operator Training and Certification			X		
3.6.2.5	Other Training	X				
3.6.2.5.1	Not Important to Safety Equipment Training			X		
3.6.2.5.2	Job-related Safety and Health Training			X		
3.6.2.5.3	Hazardous Material Training			X		
3.6.2.5.4	Fire Brigade Training			X		
3.7	SEGMENT REQUIREMENTS	X				
3.7.1	MRS Facility Segment Requirements	X				
3.7.1.1	Site Development Segment	X				
3.7.1.1.1	Site Development Segment Description	X				
3.7.1.1.1.1	Site Development Segment Functions		X	X		
3.7.1.1.1.2	Site Development Segment Interfaces	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.1.2	Site Development Segment Requirements	X				
3.7.1.1.2.1	Illumination		X	X	X	
3.7.1.1.2.2	Environmental Contamination		X			
3.7.1.1.2.3	Adverse Impacts on Wetlands and Flood Plains	X				
3.7.1.1.2.3.A			X	X		
3.7.1.1.2.3.B			X	X		
3.7.1.1.2.3.C			X			
3.7.1.1.2.4	Flood Plain Action Policy		X			
3.7.1.1.2.5	Minimization of Flood Plain Impact		X			
3.7.1.1.2.6	Railway Design			X		
3.7.1.1.2.7	Paving and Surfacing	X				
3.7.1.1.2.7.A				X		
3.7.1.1.2.7.B				X		
3.7.1.2	Utilities Segment	X				
3.7.1.2.1	Utilities Segment Description	X				
3.7.1.2.1.1	Utilities Segment Functions		X	X		
3.7.1.2.1.2	Utilities Segment Interfaces	X				
3.7.1.2.2	Utilities Segment Requirements	X				
3.7.1.2.2.1	Utilities Services	X				
3.7.1.2.2.1.A	Emergency Capability		X	X	X	X
3.7.1.2.2.1.B	Testing and Operation		X			X
3.7.1.2.2.1.C	Emergency Power		X		X	X
3.7.1.2.2.1.D	Shared Utilities		X	X		
3.7.1.2.2.2	Effluent Systems			X	X	
3.7.1.2.2.3	Lead Free Water System	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.2.2.3.A				X		
3.7.1.2.2.3.B				X		
3.7.1.2.2.4	Effluent Limitations			X		
3.7.1.2.2.5	Compliance with Effluent Standards			X		
3.7.1.2.2.6	Underground Storage Tank (UST) System			X		
3.7.1.2.2.7	Hazardous Waste Determination			X		
3.7.1.2.2.8	Monitoring and Records	X				
3.7.1.2.2.8.A			X	X		
3.7.1.2.2.8.B				X		
3.7.1.2.2.9	Drinking Water Standards		X	X	X	
3.7.1.2.2.10	Instrumentation and Control	X				
3.7.1.2.2.10.A			X	X	X	X
3.7.1.2.2.10.B			X	X		
3.7.1.2.2.11	Fire Protection System		X	X		
3.7.1.3	Security Facilities Segment	X				
3.7.1.3.1	Security Facilities Segment Description	X				
3.7.1.3.1.1	Security Facilities Segment Functions		X	X		
3.7.1.3.1.2	Security Facilities Segment Interfaces	X				
3.7.1.3.2	Security Facilities Segment Requirements	X				
3.7.1.3.2.1	Transaction Reporting			X		
3.7.1.3.2.2	Radioactive Material Packaging			X	X	
3.7.1.3.2.3	Search	X				
3.7.1.3.2.3.A				X		
3.7.1.3.2.3.B				X		
3.7.1.3.2.4	Procedures for Receiving Packages	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.3.2.4.A				X		
3.7.1.3.2.4.B				X		
3.7.1.3.2.4.C				X		
3.7.1.3.2.4.D				X		
3.7.1.4	Preparation and Transfer Segment	X				
3.7.1.4.1	Preparation and Transfer Segment Description	X				
3.7.1.4.1.1	Preparation and Transfer Segment Functions		X	X		
3.7.1.4.1.2	Preparation and Transfer Segment Interfaces	X				
3.7.1.4.2	Preparation and Transfer Segment Requirements	X				
3.7.1.4.2.1	Criticality Monitoring			X		
3.7.1.4.2.2	SNF and Loaded MPC Handling		X		X	
3.7.1.4.2.3	Transportation Cask System Suitability	X				
3.7.1.4.2.3.A				X	X	
3.7.1.4.2.3.B				X	X	
3.7.1.4.2.3.C				X	X	
3.7.1.4.2.3.D				X	X	
3.7.1.4.2.4	Transportation Cask System Loading			X		
3.7.1.4.2.5	Transportation Cask System Closure			X		
3.7.1.4.2.6	Transportation Cask System Shipment			X	X	
3.7.1.4.2.7	Transportation Casks			X		
3.7.1.4.2.8	Ventilation		X	X		
3.7.1.4.2.9	SNF Criticality	X				
3.7.1.4.2.9.A			X			
3.7.1.4.2.9.B			X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.4.2.10	Cask Cleaning			X		
3.7.1.4.2.11	Criteria for SNF and Radioactive Waste Handling	X				
3.7.1.4.2.11.A				X		
3.7.1.4.2.11.B				X		
3.7.1.4.2.11.C			X	X		
3.7.1.4.2.12	Effluent Control	X				
3.7.1.4.2.12.A			X			
3.7.1.4.2.12.B			X			
3.7.1.4.2.12.C			X			
3.7.1.4.2.12.D			X	X	X	
3.7.1.4.2.13	Instrumentation and Control	X				
3.7.1.4.2.13.A				X		
3.7.1.4.2.13.B			X			
3.7.1.4.2.14	Emergency Capabilities		X	X	X	X
3.7.1.5	Storage Mode Facility Segment	X				
3.7.1.5.1	Storage Mode Facility Segment Description	X				
3.7.1.5.1.1	Storage Mode Facility Segment Functions		X	X		
3.7.1.5.1.2	Storage Mode Facility Segment Interfaces	X				
3.7.1.5.2	Storage Mode facility Segment Requirements	X				
3.7.1.5.2.1	Storage Capacity	X				
3.7.1.5.2.1.A				X		
3.7.1.5.2.1.B				X		
3.7.1.5.2.2	Loaded MPC Storage Criticality	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.5.2.2.A			X			
3.7.1.5.2.2.B			X			
3.7.1.5.2.3	Storage Characteristics		X	X		
3.7.1.5.2.4	Retrievability		X			
3.7.1.5.2.5	Waste Form	X				
3.7.1.5.2.5.A			X	X		
3.7.1.5.2.5.B			X			
3.7.1.5.2.6	SNF Integrity		X			
3.7.1.5.2.7	Pool Storage	X				
3.7.1.5.2.7.A			X			
3.7.1.5.2.7.B			X	X		
3.7.1.5.2.7.C				X		
3.7.1.5.2.7.D				X		
3.7.1.5.2.8	Storage Monitoring	X				
3.7.1.5.2.8.A			X	X		
3.7.1.5.2.8.B				X		
3.7.1.5.2.9	Facility Access for Inspection			X		
3.7.1.5.2.10	Ventilation		X			
3.7.1.6	Site Vehicles Segment	X				
3.7.1.6.1	Site Vehicles Segment Description	X				
3.7.1.6.1.1	Site Vehicles Segment Functions		X	X		
3.7.1.6.1.2	Site Vehicles Segment Interfaces	X				
3.7.1.6.2	Site Vehicles Segment Requirements	X				
3.7.1.6.2.1	Switch Engine			X		
3.7.1.6.2.2	Site Tractors			X		
3.7.1.6.2.3	Site Cranes			X		
3.7.1.7	Support Facilities Segment	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.7.1	Support Facilities Segment Description	X				
3.7.1.7.1.1	Support Facilities Segment Functions		X	X		
3.7.1.7.1.2	Support Facilities Segment Interfaces	X				
3.7.1.7.2	Support Facilities Segment Requirements	X				
3.7.1.7.2.1	SNF Process Records	X				
3.7.1.7.2.1.A				X		
3.7.1.7.2.1.B				X		
3.7.1.7.2.2	Material Control		X	X		
3.7.1.7.2.3	Administrative Controls		X	X		
3.7.1.7.2.4	Duplicate Records Storage	X				
3.7.1.7.2.4.A				X		
3.7.1.7.2.4.B				X		
3.7.1.7.2.5	Records Retention			X		
3.7.1.7.2.6	Shipment Records	X				
3.7.1.7.2.6.A				X		
3.7.1.7.2.6.B			X			
3.7.1.7.2.6.C				X		
3.7.1.7.2.7	NRC Office Space	X				
3.7.1.7.2.7.A				X		
3.7.1.7.2.7.B				X		
3.7.1.7.2.7.C				X		
3.7.1.7.2.7.D				X		
3.7.1.7.2.7.E				X		
3.7.1.7.2.7.F				X		
3.7.1.7.2.8	Underground Storage Tank (UST) System			X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.7.2.9	Occupational Safety and Health Records	X				
3.7.1.7.2.9.A				X		
3.7.1.7.2.9.B				X		
3.7.1.7.2.9.C				X		
3.7.1.7.2.10	Record Maintenance	X				
3.7.1.7.2.10.A				X		
3.7.1.7.2.10.B				X		
3.7.1.7.2.11	MRS Facility Records Inspection			X		
3.7.1.7.2.12	Monitoring and Records	X				
3.7.1.7.2.12.A				X		
3.7.1.7.2.12.B				X		
3.7.1.7.2.12.C				X		
3.7.1.7.2.13	Records of Radiation Protection Programs	X				
3.7.1.7.2.13.A				X		
3.7.1.7.2.13.B				X		
3.7.1.7.2.13.C				X		
3.7.1.7.2.14	Records of Surveys	X				
3.7.1.7.2.14.A				X		
3.7.1.7.2.14.B				X		
3.7.1.7.2.15	Records of Prior Occupational Dose	X				
3.7.1.7.2.15.A				X		
3.7.1.7.2.15.B				X		
3.7.1.7.2.16	Records of Planned Special Exposures	X				
3.7.1.7.2.16.A				X		
3.7.1.7.2.16.B				X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.7.2.17	Records of Individual Monitoring Results	X				
3.7.1.7.2.17.A				X		
3.7.1.7.2.17.B				X		
3.7.1.7.2.17.C				X		
3.7.1.7.2.17.D				X		
3.7.1.7.2.17.E				X		
3.7.1.7.2.17.F				X		
3.7.1.7.2.17.G				X		
3.7.1.7.2.18	Records of Public Dose			X		
3.7.1.7.2.19	Records of Waste Disposal	X				
3.7.1.7.2.19.A				X		
3.7.1.7.2.19.B				X		
3.7.1.7.2.20	Records of Testing Entry Control Devices	X				
3.7.1.7.2.20.A				X		
3.7.1.7.2.20.B				X		
3.7.1.7.2.20.C				X		
3.7.1.7.2.21	Form of Records	X				
3.7.1.7.2.21.A				X		
3.7.1.7.2.21.B			X			
3.7.1.7.2.22	Cask Documentation			X		
3.7.1.8	Cask Maintenance Facility (CMF) Segment	X				
3.7.1.8.1	Cask Maintenance Facility Segment Description	X				
3.7.1.8.1.1	Cask Maintenance Facility Segment Functions		X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.8.1.2	Cask Maintenance Facility Segment Interfaces	X				
3.7.1.8.2	Cask Maintenance Facility Segment Requirements	X				
3.7.1.8.2.1	General Capability Requirements		X			
3.7.1.8.2.2	Packaging Materials		X	X		
3.7.1.8.2.3	Cask Systems Documentation, Test, and Maintenance Records	X				
3.7.1.8.2.3.A				X		
3.7.1.8.2.3.B			X			
3.7.1.8.2.3.C			X			
3.7.1.8.2.4	Decontamination and Cleaning	X				
3.7.1.8.2.4.A			X			
3.7.1.8.2.4.B			X			
3.7.1.8.2.5	Cask Handling Capabilities		X			X
3.7.1.8.2.6	Performance of Tests and Inspections		X	X	X	X
3.7.1.8.2.7	Replacement of Components			X		X
3.7.1.8.2.8	Site-Generated Radioactive Waste Handling	X				
3.7.1.8.2.8.A			X			
3.7.1.8.2.8.B			X			
3.7.1.8.2.8.C			X			
3.7.1.8.2.9	Cask Reconfigurations	X				
3.7.1.8.2.9.A			X			
3.7.1.8.2.9.B			X			
3.7.1.8.2.9.C			X			
3.7.1.8.2.9.D			X			
3.7.1.8.2.9.E			X			

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.1.8.2.10	Tool and Spare Part Storage	X				
3.7.1.8.2.10.A			X			
3.7.1.8.2.10.B				X		
3.7.1.8.2.10.C			X			
3.7.1.8.2.11	Cask Visits	X				
3.7.1.8.2.11.A	During Initial Operation		X	X		
3.7.1.8.2.11.B	After Initial Operation		X	X		
3.7.1.8.2.12	Cask Decommissioning		X			
3.7.1.8.2.13	Ventilation		X			
3.7.2	OSTS Segment Requirements	X				
3.7.2.1	On-Site Transfer Segment	X				
3.7.2.1.1	On-Site Transfer Segment Description	X				
3.7.2.1.1.1	On-Site Transfer Segment Functions		X	X		
3.7.2.1.1.2	On-Site Transfer Segment Interfaces			X		
3.7.2.1.2	On-Site Transfer Segment Requirements	X				
3.7.2.1.2.1	Handling		X	X		
3.7.2.1.2.2	Ventilation		X	X		
3.7.2.1.2.3	SNF Criticality	X				
3.7.2.1.2.3.A			X			
3.7.2.1.2.3.B			X			
3.7.2.1.2.4	Criteria for SNF and Radioactive Waste Handling	X				
3.7.2.1.2.4.A				X		
3.7.2.1.2.4.B				X		
3.7.2.1.2.4.C				X		
3.7.2.1.2.5	Effluent Control	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.2.1.2.5.A			X			
3.7.2.1.2.5.B			X			
3.7.2.1.2.5.C			X			
3.7.2.1.2.5.D			X	X		
3.7.2.1.2.6	SNF Integrity		X			
3.7.2.1.2.7	Criticality Monitoring			X		
3.7.2.2	On-Site Storage Segment	X				
3.7.2.2.1	On-Site Storage Segment Description	X				
3.7.2.2.1.1	On-Site Storage Segment Functions			X		
3.7.2.2.1.2	On-Site Storage Segment Interfaces			X		
3.7.2.2.2	On-Site Storage Segment Requirements	X				
3.7.2.2.2.1	Handling		X		X	
3.7.2.2.2.2	Ventilation		X	X		
3.7.2.2.2.3	SNF Criticality		X			
3.7.2.2.2.4	Criteria for SNF and Radioactive Waste Handling	X				
3.7.2.2.2.4.A				X		
3.7.2.2.2.4.B				X		
3.7.2.2.2.4.C				X		
3.7.2.2.2.5	Effluent Control	X				
3.7.2.2.2.5.A			X			
3.7.2.2.2.5.B			X			
3.7.2.2.2.5.C			X			
3.7.2.2.2.5.D			X	X		
3.7.2.2.2.6	Storage Characteristics		X	X		
3.7.2.2.2.7	Retrievability		X			
3.7.2.2.2.8	SNF Integrity	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.7.2.2.2.8.A			X			
3.7.2.2.2.8.B			X			
3.7.2.2.2.9	Criticality Monitoring			X		
3.7.2.2.2.10	Facility Access for Inspection			X		
3.7.2.3	Bare SNF Transfer Segment	X				
3.7.2.3.1	Bare SNF Transfer Segment Description	X				
3.7.2.3.1.1	Bare SNF Transfer Segment Functions			X		
3.7.2.3.1.2	Bare SNF Transfer Segment Interfaces	X				
3.7.2.3.2	Bare SNF Transfer Segment Requirements	X				
3.7.2.3.2.1	Handling		X		X	
3.7.2.3.2.2	Ventilation		X	X		
3.7.2.3.2.3	SNF Criticality	X				
3.7.2.3.2.3.A			X			
3.7.2.3.2.3.B			X			
3.7.2.3.2.4	Criteria for SNF and Radioactive Waste Handling	X				
3.7.2.3.2.4.A				X		
3.7.2.3.2.4.B				X		
3.7.2.3.2.4.C				X		
3.7.2.3.2.5	Effluent Control	X				
3.7.2.3.2.5.A			X			
3.7.2.3.2.5.B			X			
3.7.2.3.2.5.C			X			
3.7.2.3.2.5.D			X	X		
3.7.2.3.2.6	SNF Integrity		X			
3.8	PRECEDENCE	X				

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
3.8.A		X				
3.8.B				X		
3.9	QUALIFICATION/QUALITY ASSURANCE	X				
3.9.1	QA Applicability to MRS Facility and OSTS Activities			X		
3.9.2	Quality Affecting Equipment			X		
3.9.3	Establishment of Program	X				
3.9.3.A				X		
3.9.3.B			X	X		
3.9.3.C				X		
3.9.4	Program Activities	X				
3.9.4.A				X		
3.9.4.B				X		
3.9.4.C			X	X		
3.9.4.D			X	X		
3.9.4.E			X	X		
3.9.4.F			X	X		
3.9.4.G			X			
3.9.5	Inspection Program	X				
3.9.5.A				X		
3.9.5.B				X		
3.9.5.C				X		
3.9.5.D				X		
3.9.6	Conditions Adverse to Quality	X				
3.9.6.A				X		
3.9.6.B			X	X		

Table 4-1. Verification Matrix (Continued)

SECTION 3&5 PARA	TITLE	N / A	A	E	T	D
5.1	KEY DECISIONS	X				
5.1.A				X		
5.1.B				X		
5.2	REQUIREMENTS	X				
5.2.A			X			
5.2.B			X			
5.2.C			X			

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5. PREPARATION FOR OPERATIONS

5.1 KEY DECISIONS

A. Preparation for operations is governed by a series of key decision points as defined in DOE Order 4700.1. The Energy System Acquisition Advisory Board (ESAAB) supports the DOE Acquisition Executive by providing advice and assistance at those points. The approval to commence operation is scheduled prior to transition from acquisition and construction to operation of the CRWMS elements. Preparation of applications for the licenses, certificates, and permits which must be issued prior to commencement of operations shall be undertaken in a timely manner to ensure their review, approval and issuance prior to approval being granted for operations to begin. Transition to the operations phase is not formally made until demonstrated capability to meet technical performance goals specified in CRWMS requirements documents and specifications are achieved, and required licenses, certificates, and permits have been issued. These conditions are confirmed by the ESAAB. [CRD]

B. In accordance with DOE Order 4700.1, a presentation package shall be developed to support ESAAB determination of the readiness of each element of CRWMS to proceed with operations. As a minimum, the presentation packages to support the ESAAB in the review process will contain: a description of the project; background data; major technical and performance requirements; licenses, certificates and permits; readiness to proceed with operations; and problems, issues, or items of concern. [CRD]

5.2 REQUIREMENTS

A. In addition to satisfying the requirements of the specifications, all elements of the CRWMS shall establish programs to ensure, at the commencement of operations, the availability of sufficient trained personnel to operate the elements and validated documentation to support the operations. [CRD]

B. The elements shall additionally establish logistics support systems, to include ensuring the availability of sufficient spares to support the element maintenance concept and the design availability factors used in the design. [CRD]

C. Specific plans and procedures for acceptance, operational, and integrated testing, as well as preparation of test documentation, shall be governed by the test and evaluation plans. [CRD]

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6. NOTES

6.1 GLOSSARY

As low as is reasonably achievable (ALARA) means making every reasonable effort to maintain exposures to radiation as far below the dose limits in 10CFR20 as is practically consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest. [10CFR20.1003]

Canister is the structure surrounding the waste form (e.g., HLW immobilized in borosilicate glass) that facilitates handling, storage, transportation, and/or disposal. A canister is a metal receptacle with the following purpose: (1) for solidified HLW, its purpose is a pour mold and (2) for SNF, it may provide structural support for intact SNF, loose rods, nonfuel components, or containment of radionuclides. (See definition of multi-purpose canister.)

Cask is a container for shipping or storing spent nuclear fuel and/or canistered high-level waste that meets all applicable regulatory requirements.

Cask system is defined under transportation cask system.

Certificate of compliance (CoC) is a certificate approving for use, with identified limitations, a specific packaging for quantities of radioactive materials exceeding A1/A2 quantities as defined in 10CFR71 and 49CFR173. A CoC may be issued by the NRC, DOT, or DOE. As used in this document, CoC refers to a certificate issued by the NRC. [DOE Order 1540.3 Section 4.a]

Civilian Radioactive Waste Management System (CRWMS) is the composite of sites, facilities, systems, equipment, materials, information, activities, and the personnel required to perform those activities necessary to manage spent nuclear fuel and high-level radioactive waste disposal.

Container is the component of the waste package that is placed around the waste form or the canistered waste form.

Controlled area means:
(1) an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason. [10CFR20.1003]
(2) that area immediately surrounding an MRS for which the licensee (DOE) exercises authority over its use and within which MRS operations are performed. [10CFR72.3]

Decommission means to remove safely from service and reduce residual radioactivity to a level that permits: for land or facilities, release of the property for unrestricted use and termination of license; and for casks, release of the cask for appropriate disposal.

Disposal is the isolation of radioactive wastes from the accessible environment. [10CFR60.2]. Disposal means the emplacement in a repository of high-level radioactive waste, spent nuclear fuel, or other highly radioactive material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste. [10CFR961.11, NWPA Section 2(9)]

Disposal system is any combination of engineered and natural barriers that isolate spent nuclear fuel or radioactive waste after disposal. [40CFR191.12(a)]

Flow-through occurs at the MRS facility when an MPC transportation cask is connected directly to the dedicated train bound for the MGDS without being opened in the MRS.

Function flow diagram is a diagram that graphically illustrates the relationships among functions.

Function is a primary statement of purpose; it defines what a system or subsystem must accomplish to meet the system mission.

Functional analysis is the first step in the systems engineering process that defines a baseline of functions and function performance requirements that must be met in order to adequately accomplish the operation, support, test, and production requirements of a system.

Functional interface is the interaction between functions, as in the flow of material or information between a sequence of activities.

Greenfield refers to the condition of the site prior to any development for the MRS facilities or testing.

High-level radioactive waste (HLW) means (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (2) other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation. The CRWMS will only accept solidified HLW. For the purposes of this document, HLW is vitrified borosilicate glass cast in a stainless steel canister. [NWPA Section 2(12), 10CFR72.3, 10CFR960.2, 10CFR961.11]

Important to safety means necessary: (1) to maintain the conditions required to store spent fuel safely; (2) to prevent damage to the spent fuel container during handling and storage; or (3) to provide reasonable assurance that spent fuel can be received, handled, packaged, stored, and retrieved without undue risk to the health and safety of the public.

Interface requirement means a requirement that applies to the inputs to, or outputs from, the function or the physical connection or dependence between architectural items.

Intermodal transfer is the physical transfer of a piece of cargo from one mode of transportation (e.g., highway, rail, barge) to another. When the term is used to describe transfer of a cask, it will normally imply transferring from heavy-haul truck to rail or barge or the reverse. The cask is not opened during intermodal transfers.

Isolation zone means an area adjacent to a physical barrier, clear of all objects which could conceal or shield an individual. [10CFR73.2]

Licensed material is source material, special nuclear material, or byproduct material received, processed, used, transferred, or disposed of under a general or specific license issued by the Nuclear Regulatory Commission. [10CFR20.1003]

Licensee is a person who is authorized to conduct activities under a license or construction permit issued by the Nuclear Regulatory Commission.

Loaded means an MPC/cask/canister that (1) contains its intended complement of SNF assemblies, (2) the contents have been verified and (3) has been closed and the DOE (OCRWM) approved tamper indicating seal is certified. (In this configuration, the MPC qualifies as a canistered waste form that is acceptable into the CRWMS.)

Material access area means any location which contains special nuclear material.

Mission critical refers to those systems, structures, and components (and related activities) whose importance to the successful accomplishment of the CRWMS mission is determined by management to warrant the selected application of QA Program controls.

Multi-purpose canister (MPC) refers to a sealed, metallic container maintaining multiple SNF assemblies in a dry, inert environment and overpacked separately and uniquely for the various system elements of storage, transportation, and disposal. (See definition of Waste Form)

N-square diagram is a type of function flow diagram. The N-square diagram has been used extensively to develop data on interfaces. The system functions are placed on the diagonal of a N-by-N matrix. The remainder of the squares of the matrix represent interface inputs and outputs. Inputs to a function appear in the column above and below the function, and outputs from a function appear in the row to the left and right of a function. Where a blank square exists there is no system and system element interfaces. The N-square diagram may also be used to document hardware-to-hardware interfaces where hardware items are placed on the diagonal and their interfaces shown in the remaining squares of the matrix.

Nuclear Waste Negotiator means the Office of the Nuclear Waste Negotiator established by NWPAA Sec. 402.

Off-normal occurrences are abnormal or unplanned events or conditions that adversely affect, potentially affect, or are indicative of degradation in the safety, security, environmental or health protection performance or operation of a facility.

Off-normal transportation casks are those casks that have any abnormality (e.g. incomplete forms) not involving suspicion of tampering or sabotage.

On-Site Transfer and Storage (OSTS) subelement is the equipment for transfer and storage, at Purchaser sites, of spent nuclear fuel (SNF) in MPCs. The development and design of the OSTS are presumed to be performed by the CRWMS. The procurement and operation of the OSTS are presumed to be at the discretion of the Purchaser.

Overpack is a structural component used to hold and protect the MPC so that the combination meets the NRC requirements for its application. There are several types of overpacks: one for transportation, 10CFR71; one for transfer, 10CFR72; one for storage, 10CFR72; and one for disposal, 10CFR60. An overpack is designed for its particular use in conjunction with the MPC.

Owner is any person who has title to spent nuclear fuel or high-level radioactive waste. [10CFR961.3]

Pass-through occurs at the MRS facility when the spent fuel assemblies sealed in a truck transportation cask are unloaded and transferred directly into an MPC and loaded into a transportation cask for shipment to the MGDS, thereby bypassing the MRS storage mode.

Physical barriers are: (1) fences constructed of No. 11 American wire gauge or heavier wire fabric, topped by three strands or more of barbed wire or similar material on brackets angled inward or outward between 30° and 45° from vertical, with an overall height including the barbed topping of not less that 8 feet; (2) building walls, ceilings, and floors constructed of stone, brick, cinder block, concrete, steel, or similar materials (openings in which are secured by gates, doors, or covers of construction and fastening of sufficient strength such that the integrity of the wall is not lessened by an opening), or walls of similar construction, not a part of a building, provided with barbed topping described above, of a height not less than 8 feet; (3) Any other physical obstruction constructed in a manner and of materials suitable for the purpose for which the obstruction is intended. [10CFR73.2]

Physical interface is the boundary at which physical systems interact, as in a necessary fit between elements, segments, subsystems, etc.

Physical system means the Civilian Radioactive Waste Management System (CRWMS) consisting of the composite of the sites, and all facilities, systems, equipment, materials, information, activities, and the personnel required to perform those activities necessary to manage waste disposal.

Prime mover is the vehicle providing motive power to the transporter.

Producer is any generator of high-level radioactive waste resulting from atomic energy defense activities or any producer of vitrified commercial HLW.

Protected area is any area encompassed by physical barriers and to which access is controlled. [10CFR73.2]

Purchaser is any person, other than a Federal agency, who is licensed by the Nuclear Regulatory Commission to use a utilization or production facility under the authority of Sections 103 or 104 of the Atomic Energy Act of 1954 (42USC2133, 2134) or who has title to SNF or HLW and who has executed a contract or other contractual agreement with DOE. Purchaser SNF includes Government-owned SNF from commercial industry and civilian development programs. For the purposes of this document, West Valley Demonstration Project, which has commercial HLW, is considered a Purchaser only for contract/agreement purposes; otherwise WVDP is considered a Producer.

Requirement is a qualitative or quantitative statement of how well a function must be performed.

Segment is a distinct, top-level component of the overall architecture of each system element to which functions and requirements are allocated.

Special nuclear material means (1) Plutonium, Uranium 233, Uranium enriched in the isotope 233 or in the isotope 235, and any other material which the NRC, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954 as amended, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material. [10CFR70.4]

Specialty engineering encompasses those disciplines that support the design process by applying knowledge from a specific area to ensure system operability in its operational environment. They include reliability, availability, maintainability, human factors engineering, safeguards and security, integrated logistics support, transportability, system safety, electromagnetic compatibility, parts/materials/processes and other specialist areas generally involved in development of systems. These specialties are integrated into the development effort through the system engineering process.

Spent nuclear fuel (SNF) is fuel which has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not separated by reprocessing [NWPA Section 2(23), 10CFR961.11]. {Specifically in this document, SNF includes (1) intact, non-defective fuel assemblies; (2) failed fuel assemblies in canisters; (3) fuel assemblies in canisters; (4) consolidated fuel rods in canisters; (5) nonfuel components inserted in PWR fuel assemblies, including, but not limited to, control rod assemblies, burnable poison assemblies, thimble plug assemblies, neutron source assemblies, instrumentation assemblies; (6) fuel channels attached to BWR fuel assemblies; and (7) nonfuel components and structural parts of assemblies in canisters.}

Storage Mode, as used in the MRS-SRD for the MPC concept, is the combination of the storage overpack with an MPC. The type of overpack used is to be determined through the design process for the OSTS and MRS facility.

Suspect transportation casks means any cask received at the MRS that has high radiation levels or is suspected of being tampered with or sabotaged during transit.

System element is one of the elements of the CRWMS (Waste Acceptance, Transportation, MRS, or MGDS). This differs from the "project" that may be initiated by DOE to manage and control development of one or more system element (e.g., the Yucca Mountain Project or the MRS Project).

Transportable storage cask (TSC) is any cask certified by the NRC for the purposes of transporting SNF as described in 10CFR71, and storing SNF as described in 10CFR72, Subpart L.

Transportation cask subsystem as a minimum, includes the complete cask, an MPC (when required), truck trailer or rail car (defined as the transporter), a tiedown system, an intermodal transfer device (when required), special tools and ancillary equipment.

Transporter is a cargo-carrying vehicle used for transportation of cargo. It includes semi-trailers, rail cars, intermodal transportation skids and equipment such as tie-down components, personnel barriers, etc. needed to make the loaded cargo-carrying vehicle transport-ready.

Unloaded cask is any cask that has had the SNF removed from it.

Vital area is an area which contains vital equipment. [10CFR73.2]

Vital equipment is any system, equipment, device, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital. [10CFR73.2]

Waste is spent nuclear fuel (SNF) and high-level radioactive waste (HLW).

Waste form is the radioactive waste material and any encapsulating or stabilizing matrix. A loaded MPC is a canistered waste form. [10CFR60.2]

Waste package is the waste form and any containers, shielding, packing, and other absorbent materials immediately surrounding an individual waste container. [10CFR60.2]

6.2 ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADP	Automated Data Processing
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ALARA	As Low As is Reasonably Achievable
ALI	Annual Limit on Intake
ANS	American Nuclear Society
ANSI	American National Standards Institute
AREA	American Railway Engineering Association
ARI	Air-conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating Refrigerating and Air-conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATE	Automatic Test Equipment
AWS	American Welding Society
BIA	Brick Institute of America
BITE	Built-In Test Equipment
BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
CI	Configuration Item
CMAA	Crane Manufacturers Association of America
CMF	Cask Maintenance Facility
CMOCC	Central Management and Operations Control Center
CRD	CRWMS Requirements Document
CRWMS	Civilian Radioactive Waste Management System
CWA	the Clean Water Act
DBA	Design Basis Accident
DE	Design Earthquake
DOD	Department Of Defense
DOE	Department Of Energy
DOT	Department Of Transportation
DRD	Design Requirements Document
EDE	Effective Dose Equivalent
EPA	Environmental Protection Agency
ESAAB	Energy System Acquisition Advisory Board
FY	Fiscal Year
HDBK	Handbook
HEPA	High-Efficiency Particulate Air
HFS	Human Factors Society
HLW	High-Level radioactive Waste
HVAC	Heating, Ventilation, and Air-Conditioning

IAEA	International Atomic Energy Agency
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
LSA	Logistic Support Analysis
M & O	Management and Operating contractor
MBMA	Metal Building Manufacturers Association
MESC	Multiple Element Sealed Canisters
MGDS	Mined Geologic Disposal System
MIL	Military
MOA	Memorandum Of Agreement
MPC	Multi-Purpose Canister
mrem	millirem
MRS	Monitored Retrievable Storage installation
MRS-SRD	Monitored Retrievable Storage System Requirements Document
MSHA	Mine Safety and Health Administration
mSv	milliSievert
MTTR	Mean Time To Repair
MTU	Metric Ton(s) of initial Uranium
NAAMM	National Association of Architectural Metal Manufacturers
NAPHCC	National Association of Plumbing-Heating-Cooling Contractors
NCMA	National Concrete Masonry Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRC	Nuclear Regulatory Commission
NS	Nuclear Safety
NUREG	Nuclear Regulatory Guideline
NVLAP	National Voluntary Laboratory Accreditation Program
NWPA	Nuclear Waste Policy Act of 1982
NWPAA	Nuclear Waste Policy Amendments Act of 1987
OCRWM	Office of Civilian Radioactive Waste Management
OSHA	Occupational Safety and Health Act
OSTS	On-Site Transfer and Storage subelement
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PMFL	Probable Maximum Flood
psig	Pounds per Square Inch Gauge
PSR	Physical System Requirements document
PWR	Pressurized Water Reactor
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RW	Office of Civilian Radioactive Waste Management (DOE)
SAR	Safety Analysis Report
SEMP	Systems Engineering Management Plan

SNF	Spent Nuclear Fuel
SRD	System Requirements Document
SSC	Structure, System, and Component
STD	Standard
Sv	Sievert
TBD	To Be Determined
TBR	To Be Resolved
TDPP	Technical Document Preparation Plan
TSC	Transportable Storage Cask
UBC	Uniform Building Code
UCRL	University of California Research Laboratory
UFAS	Uniform Federal Accessibility Standards
USC	United States Code
UST	Underground Storage Tank
VDT	Video Display Terminal

6.3 REQUIREMENTS CROSS REFERENCE

The following tables identify how the MRS-SRD responds to the requirements of the CRD. In these tables, the heading "MRS-SRD Paragraph" identifies the requirement number in this document. The heading "CRD Paragraph" identifies the CRD requirement allocated to the MRS that is responded to by the identified MRS-SRD requirement. In all cases, the "source document" is the document containing the source of the requirement in the MRS-SRD. When a source document is enclosed in parentheses, the document identified is referenced by the requirement or used in the derivation of the requirement, but is not the literal source of the requirement.

Table 6-1. Requirements Cross Referenced by SRD Paragraph

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.1	NWPAA Sec. 142(b), NWPA Sec. 141(b)(1)	3.2.1.A, 3.2.1.B, 3.7.3.2.A, 3.7.3.2.B[1]
3.2.1.1.1	A00000000-01717-6700-00001	3.2.1.1.E
3.2.1.1.2	DOE/RW-0412, A00000000-01717-6700-00001, A00000000-01717-2200-00001	3.2.1.C
3.2.1.2	DOE/RW-0412, A00000000-01717-6700-00001, A00000000-01717-2200-00001	3.2.1.C
3.2.1.3	A00000000-01717-6700-00001, A00000000-01717-2200-00001	3.2.1.C
3.2.1.4	A00000000-01717-6700-00001, A00000000-01717-2200-00001	3.2.1.C
3.2.1.5.1.A	CRD	3.7.3.2.H
3.2.1.5.1.B	10CFR72.30(a)	3.7.3.2.I
3.2.1.5.2	10CFR72.54(d)	3.2.1.2.B
3.2.1.5.3	10CFR72.54(e)(2)	3.2.1.2.C
3.2.1.5.4	10CFR72.130	3.7.3.2.J
3.2.1.5.5	DOE Order 6430.1A, Sec. 1300-11.2	3.2.1.2.E
3.2.1.5.6	CRD	3.2.1.2.C
3.2.1.6.1.A	10CFR72.122(g)	3.2.1.3
3.2.1.6.1.B	10CFR72.122(g)	3.2.1.3

[1] Sections 3.2.1.A, B, and Sections 3.7.3.2.A, B of the CRD are addressed as part of the MRS mission stated in Section 3.1 of the MRS-SRD.

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.1.6.2	10CFR72.106(b)	3.2.1.1.G
3.2.1.7	NWPA 302(a)(5), DOE/RW-0412	3.2.1.C, 3.2.1.1.E
3.2.1.8.1	DOE/RW-0412	3.2.1.C
3.2.1.8.2	DOE/RW-0412, A00000000-01717-6700-00001, A00000000-01717-2200-00001	3.2.1C, 3.2.1.1.E
3.2.1.9.1	10CFR72.54(d)	3.2.1.2.B
3.2.1.9.2	10CFR72.54(e)(2), 10CFR72.212(b)(4)	3.2.1.2.C
3.2.1.9.3	10CFR72.130	3.7.3.2.J
3.2.1.9.4	10CFR72.212(b)(4)	3.2.1.2.C
3.2.1.10.1	10CFR71.122(g)	3.2.1.3
3.2.1.10.2	10CFR72.212(b)(4)	3.2.1.1.G, 3.3.1.B
3.2.2.1	10CFR72.122(e)	3.7.3.2.K
3.2.2.2	10CFR72.104(a), 40CFR191.03(a)	3.2.2.2.D
3.2.2.3.A	10CFR20.1101(a)	3.2.2.1.C
3.2.2.3.B	10CFR20.1101(b)	3.2.2.1.C
3.2.2.4.A	10CFR20.1201(a)(1)(2)	3.2.2.1.D, 3.2.2.2.A, 3.2.2.4.A
3.2.2.4.B	10CFR20.1201(c)	3.2.2.4.A
3.2.2.5	10CFR20.1207	Appendix A
3.2.2.6	10CFR20.1208(a)	Appendix A
3.2.2.7.A	10CFR20.1301(a)(1), (10CFR20.2003)	3.2.2.1.D, 3.2.2.2.B
3.2.2.7.B	10CFR20.1301(a)(2)	3.2.2.1.D, 3.2.2.2.B
3.2.2.7.C	10CFR20.1301(b)	3.2.2.1.D
3.2.2.8	10CFR20.1302(b), (10CFR20.1301), (10CFR20.1001-20.2401)	Appendix A
3.2.2.9	10CFR20.1302(a), 10CFR20.1501(a)	Appendix A
3.2.2.10.A	10CFR20.1502(a), (10CFR20.1201(a)), (10CFR20.1207-20.1208)	3.2.2.4.A
3.2.2.10.B	10CFR20.1502(b), (10CFR20.1001-20.2401)	3.2.2.4.A
3.2.2.11.A	10CFR72.126(a)	3.2.2.2.E
3.2.2.11.B	10CFR72.126(a)	3.2.2.2.E
3.2.2.11.C	10CFR72.126(a)(1)	3.2.2.2.E

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.2.11.D	10CFR72.126(a)(2)	3.2.2.2.E
3.2.2.11.E	10CFR72.126(a)(3)	3.2.2.2.E
3.2.2.11.F	10CFR72.126(a)(4)	3.2.2.2.E
3.2.2.11.G	10CFR72.126(a)(5)	3.2.2.2.E
3.2.2.11.H	10CFR72.126(a)(6)	3.2.2.2.E
3.2.2.12	40CFR61.92	Appendix A
3.2.2.13.A	CRD	3.3.1.B
3.2.2.13.B	10CFR20.1101, 10CFR72.44(d), 10CFR72.236(e), (10CFR20.1201, 10CFR20.1301, 10CFR72.104)	3.3.1.B
3.2.3.1	Derived by CRD	3.2.3.1
3.2.3.2	N/A	
3.2.3.2.1.A	NWPA Sec. 141(g), 10CFR72.96(b)	3.7.3.2.C
3.2.3.2.1.B	NWPA Sec. 114(d), 10CFR72.96(c)	3.7.3.2.C
3.2.3.2.1.C	NWPAA Sec. 145(g), 10CFR72.96(d)	3.7.3.2.C
3.2.3.2.1.D	NWPAA Sec. 148(d)(1), 10CFR72.44(g)(1), (NWPA Sec. 115(d))	3.7.3.2.F
3.2.3.2.1.E	NWPAA Sec. 148(d)(2), 10CFR72.44(g)(2)	3.3.1.B
3.2.3.2.1.F	NWPAA Sec. 148(d)(3)(4), 10CFR72.44(g)(3)(4)	3.7.3.2.G
3.2.3.2.1.G	10CFR71.89, (10CFR20.205)	3.2.2.7
3.2.3.2.2.A	10CFR961.11 Article VI.A.1, (10CFR961.11 Appendix E)	3.7.3.2.E, 3.7.3.2.N
3.2.3.2.2.B	Derived by CRD	3.7.3.1.1
3.2.3.2.2.C	10CFR961.11 Article VI.B.3.(b)	3.2.1.1.A, 3.7.3.1.1
3.2.3.2.2.D	Derived by CRD	3.7.3.1.1
3.2.3.2.3.A	Derived by CRD	3.7.3.1.1
3.2.3.2.3.B	Derived by CRD	3.7.3.1.1
3.2.3.2.3.C	CRD	3.2.1.1.F
3.2.3.2.3.D	A00000000-01717-2200-00001	3.7.3.1.1
3.2.3.2.3.E	49CFR177.842(f), 49CFR174.700(d)	3.2.1.1.F
3.2.3.2.3.F	10CFR961.11 Article IV.B.2	3.2.1.1.F
3.2.3.2.3.G	CRD	3.6.2.1.F
3.2.3.2.3.H	10CFR73.26(b)(1)	Appendix A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.3.2.3.I	DOE/RW-0239, A00000000-01717-6700-00001	3.2.1.1.I
3.2.3.2.3.J	Derived by CRD	3.7.3.1.1
3.2.3.2.3.K	Derived by CRD	3.2.1.1.H
3.2.3.2.3.L	CRD (10CFR72)	3.2.1.1.H, 3.3.1.B
3.2.3.2.3.M	10CFR72.124(a)	3.2.2.5
3.2.3.2.3.N	10CFR72.122(h)(1), 10CFR72.236(f)	3.2.1.1.H
3.2.3.2.3.O	CRD	3.2.1.1.H
3.2.3.2.3.P	10CFR72.104(a), 10CFR72.122(h)(5)	3.2.2.1.E, 3.2.2.5, 3.2.5.1.C
3.2.3.2.3.Q	10CFR72.122(l)	3.3.1.B
3.2.3.2.3.R	10CFR71.87(f), 10CFR72.122(h)(5)	3.2.1.1.C
3.2.3.2.3.S	10CFR72.128(a)	3.2.1.1.J
3.2.3.2.3.T	10CFR71.71(c)(2)	3.2.1.1.H
3.2.3.2.3.U	10CFR72.236(e)	3.2.1.1.G
3.2.3.2.3.V	10CFR72.122(l)	3.3.1.B
3.2.3.2.4	DOE Order 4700.1 Ch III B.2.c(2)(c)	3.2.3.2.B
3.2.3.3.2	10CFR72.212(b)(3)	3.3.1.B
3.2.3.3.3.A	DOE Order 4700.1 Ch III.B.2.c(2)(c)	3.2.1.1.C, 3.2.3.2.B
3.2.3.3.3.B	DOE Order 4700.1 Ch III.B.2.c(2)(c)	3.2.3.2.B, 3.3.1.B
3.2.3.3.3.C	10CFR72.124(a)	3.2.2.5
3.2.3.3.3.D	10CFR72.122(h)(1), 10CFR72.236(f)	3.2.1.1.H
3.2.3.3.3.E	10CFR72.122(h)(5), 10CFR72.236(b)(c)(g)	3.2.5.1.C, 3.3.1.B, 3.2.1.1.H
3.2.3.3.3.F	10CFR72.104(a), 10CFR72.122(h)(5), 10CFR72.236(l)	3.2.2.1.E, 3.2.2.5
3.2.3.3.3.G	10CFR75.1, 10CFR72.122(h), 10CFR72.236(h)	3.3.1.B
3.2.3.3.3.H	10CFR71.87(f), 10CFR72.122(h)(5), 10CFR72.236(m)	3.2.1.1.C
3.2.3.3.3.I	10CFR72.128(a)	3.2.1.1.J
3.2.3.3.3.J	10CFR72.236(m)	3.2.1.1.H, 3.3.1.B
3.2.3.3.3.K	10CFR72.236(m)	3.2.1.1.H
3.2.3.3.3.L	10CFR71.71(c)(2)	3.2.1.1.H
3.2.3.3.3.M	10CFR72.236(h)	3.3.1.B

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.3.3.3.N	10CFR72.122(l)	3.3.1.B
3.2.3.3.5.A	10CFR72.236(m), DOE Order 4700.1 Ch III B.2.c(2)(c)	3.2.3.2.B
3.2.3.3.5.B	DOE Order 4700.1 Ch III B.2.c(2)(c)	3.2.3.2.B
3.2.4	Derived by CRD	3.2.4
3.2.4.1.1.A	DOE Order 6430.1A Sec. 0900-99.0, (DOE Order 6430.1A Sec. 0950)	3.2.4.1
3.2.4.1.1.B	DOE Order 6430.1A Sec. 0900-99.0, (ASTM D4256), (ASTM D5144-91)	3.2.4.1
3.2.4.1.2.A	DOE Order 6430.1A Sec. 0710-1.2, (ACI 515.1R-7985)	3.3.1.A
3.2.4.1.2.B	DOE Order 6430.1A Sec. 0710-1.2, (NCMA TEK-55), (NCMA TEK-121)	3.3.1.A
3.2.4.1.2.C	DOE Order 6430.1A Sec. 0710-1.2, (BIA 7-F)	3.3.1.A
3.2.4.1.2.D	DOE Order 6430.1A Sec. 0710-1.2	3.3.1.A
3.2.4.2.1	CRD, (29CFR1910.141), (NUREG-0700 Sec. 6.1.5)	3.2.4.2.1
3.2.4.2.2	Derived by CRD, (NUREG-0700 Sec. 6.1.5), (MIL-STD-1472D Sec. 5.8.1)	3.2.4.2.2
3.2.4.2.3	Derived by CRD, (NUREG-0700 Sec. 6.1.5), (MIL-STD-1472D Sec. 5.8.2)	3.2.4.2.3
3.2.4.2.4	CRD, (29CFR1910.95), (MIL-STD-1472D Sec. 5.8.3), (NUREG-0700 Sec. 6.1.5)	3.2.4.2.4, 3.3.6.4.B
3.2.4.2.5	CRD, (MIL-STD-1472D Sec. 5.8.4), (ANSI/ASA 38)	3.2.4.2.5
3.2.4.3.1	10CFR72.106(a)(b)	3.3.1.B
3.2.4.3.2	10CFR72.106(c)	3.3.1.B
3.2.4.3.3.A	10CFR73.40(a)	3.2.4.3.1.B
3.2.4.3.3.B	10CFR73.40(a)	3.2.4.3.1.B
3.2.4.3.4.A	10CFR73.50(b)(1)	3.2.4.3.1.B
3.2.4.3.4.B	10CFR73.50(b)(2)	3.2.4.3.1.B
3.2.4.3.4.C	10CFR73.50(b)(3)	3.2.4.3.1.B
3.2.4.3.4.D	10CFR73.50(b)(4)	3.2.4.3.1.B
3.2.4.3.4.E	10CFR73.50(b)(4)	3.2.4.3.1.B
3.2.4.3.4.F	10CFR73.50(b)(4)	3.2.4.3.1.B
3.2.4.3.5.A	10CFR73.50(c)	3.2.4.3.1.B

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.4.3.5.B	10CFR73.50(c)	3.2.4.3.1.B
3.2.4.3.5.C	10CFR73.50(c)(1)	3.2.4.3.1.B
3.2.4.3.5.D	10CFR73.50(c)(2)	3.2.4.3.1.B
3.2.4.3.5.E	10CFR73.50(c)(3)(4)	3.2.4.3.1.B
3.2.4.3.5.F	10CFR73.50(c)(4)	3.2.4.3.1.B
3.2.4.3.5.G	10CFR73.50(c)(5)	3.2.4.3.1.B
3.2.4.3.5.H	CRD	3.2.4.3.1.B
3.2.4.3.5.I	10CFR73.50(c)(7)	3.2.4.3.1.B
3.2.4.3.5.J	10CFR73.50(c), 10CFR72.210(b)(4)	3.2.4.3.1.B
3.2.4.3.6	DOE Order 6430.1A Sec. 1300-10.2.4	3.2.4.3.1.C
3.2.4.3.7.A	10CFR73.50(d)(1)	3.2.4.3.1.B
3.2.4.3.7.B	10CFR73.50(d)(1), (GSA-FSS-W-A-450/1-17)	3.2.4.3.1.B
3.2.4.3.7.C	10CFR73.50(d)(2)	3.2.4.3.1.B
3.2.4.3.8.A	10CFR73.50(e)(1)	3.2.4.3.1.B
3.2.4.3.8.B	10CFR73.50(e)(2)	3.2.4.3.1.B
3.2.4.3.8.C	10CFR73.50(e)(3)	3.2.4.3.1.B
3.2.4.3.8.D	10CFR73.50(e)(4)	3.2.4.3.1.B
3.2.4.3.9	10CFR20.1801	3.2.4.3.1.A
3.2.4.3.10	10CFR20.1802	3.2.4.3.1.A
3.2.4.3.11.A	10CFR20.1601(a)(b)(c)	3.2.4.3.2
3.2.4.3.11.B	10CFR20.1601(d)	3.2.4.3.2
3.2.4.3.11.C	10CFR20.1601(e)	3.2.4.3.2
3.2.4.3.12	10CFR20.1602, (10CFR20.1601)	3.2.4.3.2
3.2.4.3.13.A	10CFR73.50(f)(1)	3.2.4.3.1.B
3.2.4.3.13.B	10CFR73.50(f)(2)	3.2.4.3.1.B
3.2.4.3.13.C	10CFR73.50(f)(3)	3.2.4.3.1.B
3.2.4.3.14	10CFR73.40(a), 10CFR73.55(a)	3.2.4.3.1.B, 3.3.1.A
3.2.4.4.1	29USC651 et seq., Sec. 654(a)(b), (29USC651 et seq.)	3.3.6.1.A, 3.3.6.1.B
3.2.4.4.2	DOE Order 3790.1A, p. VIII-3(5)	Appendix A
3.2.4.4.3.A	10CFR20.1703(a)(1)(2)	3.2.4.4.A
3.2.4.4.3.B	10CFR20.1703(a)(3)	3.2.4.4.A, 3.2.4.4.B

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.4.4.3.C	10CFR20.1703(a)(6)	3.2.4.4.A
3.2.4.4.4	10CFR20.1703(c)	3.2.4.4.A
3.2.4.4.5	DOE Order 3790.1A, p. I-2,(3)(a)(5)	Appendix A
3.2.4.5.1.A	10CFR72.126(b)	3.2.2.2.E
3.2.4.5.1.B	10CFR72.126(b)	3.2.2.2.E
3.2.4.5.1.C	CRD	3.2.2.2.E
3.2.4.5.2	10CFR72.126(c)(2)	3.2.2.2.E
3.2.4.5.3	10CFR72.126(d)	3.2.2.1.E
3.2.4.5.4	10CFR20.1501(b)	3.2.2.4.A
3.2.4.5.5.A	10CFR20.1701	3.2.2.3
3.2.4.5.5.B	10CFR20.1702	3.2.2.3
3.2.4.5.6	10CFR72.44(c)(3)	3.3.1.B
3.2.4.6.1.A	DOE Order 6430.1A Sec. 1300-6.2	3.2.2.1.A
3.2.4.6.1.B	DOE Order 6430.1A Sec. 1300-6.2	3.2.2.1.A
3.2.4.6.1.C	DOE Order 6430.1A Sec. 1300-6.2, (ANSI/ANS 6.4), (ACI 349), (ANSI/ANS 6.4.2), (ACI 318)	3.2.2.1.A
3.2.4.6.1.D	DOE Order 6430.1A Sec. 1300-6.2	3.2.2.1.A
3.2.4.6.2	DOE Order 6430.1A Sec. 1300-6.3	3.2.2.1.A
3.2.4.6.3.A	DOE Order 6430.1A Sec. 1300-6.8	3.2.2.1.A
3.2.4.6.3.B	DOE Order 6430.1A Sec. 1300-6.8	3.2.2.1.A
3.2.4.6.3.C	DOE Order 6430.1A Sec. 1300-6.8	3.2.2.1.A
3.2.4.6.4	CRD, (29CFR1910 Subpart I), (29CFR1926 Subpart E), (NUREG-0700 Sec. 6.1.4), (DOE Order 6430.1A Sec. 1300-12.4.5)	3.3.6.4.A, 3.3.6.4.C
3.2.4.7.1	DOE Order 6430.1A Sec. 0111-99.0	3.3.1.A
3.2.4.7.2	DOE Order 6430.1A Sec. 0111-99.0	3.3.1.A
3.2.4.7.3	DOE Order 6430.1A Sec. 0111-99.0.7	3.3.1.A
3.2.4.7.4	10CFR72.94(a)(b)(c)	3.3.1.B
3.2.5.1	Derived by CRD	3.2.5.1.A
3.2.5.1.1	Derived by CRD	3.2.5.1.B
3.2.5.1.2	Derived by CRD, (MIL-STD-882B), (10CFR20)	3.2.5.1.D
3.2.5.1.3	10CFR72.122(c)	3.2.6.2.A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.5.1.4	10CFR72.122(k)(1)	3.3.6.10.C
3.2.5.1.5	10CFR72.122(k)(3)	3.3.6.10.C
3.2.5.1.6.A	Derived by CRD	3.2.5.1.E
3.2.5.1.6.B	Derived by CRD	3.2.5.1.E
3.2.5.2.1	10CFR72.122(f)	3.2.5.2.A, 3.5.1
3.2.5.2.2.A	DOE Order 6430.1A Sec. 0110-99.0.4	3.3.1.A
3.2.5.2.2.B	DOE Order 6430.1A Sec. 1300-3.5	3.3.1.A
3.2.5.2.3	CRD	3.2.5.2.D
3.2.5.2.4.A	CRD	3.2.5.2.D
3.2.5.2.4.B	CRD	3.2.5.2.D
3.2.5.2.4.C	CRD	3.2.5.2.D
3.2.5.2.5	CRD	3.2.5.2.D
3.2.5.2.6	10CFR72.126(a)(5)	3.2.2.2.E, 3.2.5.2.E
3.2.5.2.7	CRD	3.2.5.2.D
3.2.5.2.8	CRD	3.2.5.2.D
3.2.5.2.9.A	DOE Order 4700.1, p. V-17, q	Appendix A
3.2.5.2.9.B	CRD, (UCRL 15673 Sec. 1)	3.2.5.2.B
3.2.5.2.9.C	CRD, (UCRL 15673 Sec. 2)	3.2.5.2.D
3.2.5.2.9.D	CRD, (UCRL 15763 Sec. 3)	3.2.5.2.D
3.2.5.3.1	Derived by CRD	3.2.5.3.A, 3.2.5.3.B
3.2.5.3.1.1	Derived by CRD	3.2.5.3.A, 3.2.5.3.B
3.2.5.3.1.2	Derived by CRD	3.2.5.3.A, 3.2.5.3.B
3.2.5.3.2	Derived by CRD	3.2.5.3.A
3.2.5.4.A	10CFR72.42(a)	3.2.5.4, 3.7.3.2.D
3.2.5.4.B	10CFR72.42(a), 10CFR51.23(a)	3.2.5.4
3.2.5.5.A	Derived by CRD	3.2.5.5.B
3.2.5.5.B	Derived by CRD	3.2.5.5.B
3.2.6.1.1.A	10CFR72.122(b)(2)	3.2.6.1, 3.2.6.1.A, 3.2.6.1.B
3.2.6.1.1.B	10CFR72.122(b)(2)	3.2.6.1.C, 3.2.6.2.B
3.2.6.1.1.C	10CFR72.122(b)(3)	3.2.6.1.A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.6.1.2.A	10CFR72.102(a)(f), (10CFR100 Appendix A)	3.2.6.1.A
3.2.6.1.2.B	10CFR72.102(b)(f), (10CFR100 Appendix A)	3.2.6.1.A
3.2.6.1.2.C	DOE Order 6430.1A, Sec. 0111-2.7.1, (UBC), (UCRL 15910)	3.3.1.A
3.2.6.1.2.D.1	10CFR72.102(a)(1)	3.2.6.1.A
3.2.6.1.2.D.2	10CFR72.102(b)	3.2.6.1.A
3.2.6.1.2.D.3	10CFR72.102(c)	3.2.6.1.A
3.2.6.1.2.D.4	10CFR72.102(d)	3.2.6.1.A
3.2.6.1.2.D.5	10CFR72.102(e)	3.2.6.1.A
3.2.6.1.2.D.6	10CFR72.102(e)	3.2.6.1.A
3.2.6.1.3.A	CRD, (NRC Regulatory Guide 1.76)	3.2.6.1.A
3.2.6.1.3.B	CRD, (NUREG-0800 Sec. 3.5.1.4), (UCRL 53526)	3.2.6.1.A
3.2.6.1.3.C	DOE Order 6430.1A Sec. 0111-99.0.2	3.2.6.1.A
3.2.6.1.3.D	DOE Order 6430.1A Sec. 0111-2.4.2, (ANSI/ASCE 7-88), (UCRL 15910)	3.3.1.A
3.2.6.1.4	DOE Order 6430.1A Sec. 0111-99.0.3, (UCRL 15910)	3.2.6.1.A
3.2.6.1.5.A	DOE Order 6430.1A Sec. 0111-2.8.2	3.2.6.1.A
3.2.6.1.5.B	DOE Order 6430.1A Sec. 0111-2.8.2	3.2.6.1.A
3.2.6.1.6	DOE Order 6430.1A Sec. 0111-2.8.4	3.2.6.1.A
3.2.6.1.7	DOE Order 6430.1A Sec. 0111-2.3.2, (ANSI/ASCE 7-88)	3.2.6.1.A
3.2.6.1.8.A	Executive Order 11988, Sec. 2(b)	3.2.6.1.A
3.2.6.1.8.B	Executive Order 11988, Sec. 2(b)	3.2.6.1.A
3.2.6.2.1.A	10CFR72.122(c)	3.2.6.2.A
3.2.6.2.1.B	10CFR72.122(c)	3.2.6.2.A
3.2.6.2.1.C	10CFR72.122(c)	3.3.6.3.C
3.2.6.2.1.D	10CFR72.122(c)	3.2.6.2.A
3.2.6.2.2.A	DOE Order 6430.1A Sec. 0110-99.0.6	3.2.6.2.A
3.2.6.2.2.B	DOE Order 6430.1A Sec. 0110-99.0.6	3.2.6.2.A
3.2.6.2.2.C	DOE Order 6430.1A Sec. 0110-99.0.6	3.2.6.2.A
3.2.6.2.3	DOE Order 6430.1A Sec. 0111-2.8.1	3.3.1.A
3.2.6.2.4	DOE Order 6430.1A Sec. 0111-2.8.5	3.3.1.A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.2.6.2.5	10CFR72.122(b)(1)	3.2.6.1.C
3.2.7.A	Derived by CRD	3.2.7
3.2.7.B	Derived by CRD	3.2.7
3.2.8.1.A	DOE/RW-0316P	3.2.8
3.2.8.1.B	CRD	3.2.8
3.2.8.2	DOE/RW-0316P	3.2.8
3.2.8.3.A	Derived by CRD, (10CFR72.44(g))	3.2.8
3.2.8.3.B	Derived by CRD	3.2.8
3.2.8.4	Derived by CRD	3.2.8
3.2.9	Derived by CRD	3.2.9
3.3.1.1.A	CRD, (10CFR72)	3.3.1.B
3.3.1.1.B	CRD, (DOE Order 6430.1A)	3.3.1.A, 3.3.6.10.B
3.3.1.1.C	DOE Order 6430.1A, Sec. 0101-1	3.3.1.A
3.3.1.1.D	CRD, (DOE Order 6430.1A, Sec. 0101-2)	3.3.1.A
3.3.1.2.A	DOE Order 4700.1, p. V-33, part C, Sec. 2(a)	Appendix A
3.3.1.2.B	10CFR72.40(a)(13)(i)	3.3.1.B
3.3.1.3	10CFR72.122(a)	3.3.1.B
3.3.1.4	10CFR72.122(d)	3.3.1.B
3.3.1.5	10CFR72.24(i)	3.3.1.B
3.3.2.1	DOE Order 6430.1A Sec. 0110-99.8.4	3.3.2.C
3.3.2.2	DOE Order 6430.1A Sec. 1630-2.2.1, (ANSI C2)	3.3.1.A
3.3.2.3	DOE Order 6430.1A Sec. 1630-2.2.2	3.3.1.A
3.3.2.4	DOE Order 6430.1A Sec. 1655-99.8	3.3.2.B
3.3.2.5	CRD	3.3.2.A
3.3.3.A	DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3
3.3.3.B	DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3
3.3.3.C	DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3
3.3.3.D	DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3
3.3.3.E	DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3
3.3.4.1	10CFR72.158	3.3.4.A, 3.6.1.B
3.3.4.2	DOE Order 6430.1A Sec. 0109	3.3.4.B, 3.3.1.C

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.3.5	Derived by CRD	3.3.5
3.3.6	Derived by CRD	3.3.6.2.A, 3.3.6.2.B, 3.3.6.2.C, 3.3.6.2.D
3.3.6.1	CRD, (29CFR1910 Subpart J), (29CFR1926 Subpart G), (MIL-STD-1472D Sec. 5.13.2)	3.3.6.3.A, 3.3.6.6.A
3.3.6.2	Derived by CRD	3.3.6.6.B
3.3.6.3	CRD, (29CFR1910 Subpart E, L), (29CFR1926 Subpart F), (MIL-STD-1472D Sec. 5.13.4)	3.3.6.3.A, 3.3.6.6.C
3.3.6.4.A	Derived by CRD, (NUREG-0700 Sec. 6.1.5.4.a)	3.3.6.7.B
3.3.6.4.B	Derived by CRD, (NUREG-0700 Sec. 6.1.5.4.b)	3.3.6.7.A
3.3.6.4.C	CRD, (NUREG-0700 Sec. 6.1.5.4.c)	3.3.6.7.C
3.3.6.5	Derived by CRD, (29CFR1910 Subpart N, O, P), (29CFR1926 Subpart H, I, O), (MIL-STD-1472D Sec. 5.13.5)	3.3.6.8.A, 3.3.6.8.C, 3.3.6.8.D
3.3.6.6	CRD, (29CFR1910 Subpart D, F), (29CFR1926 Subpart L, M), (MIL-STD-1472D Sec. 5.13.6)	3.3.6.3.A, 3.3.6.9.A, 3.3.6.9.B
3.3.6.7.A	CRD, (29CFR1910 Subpart S), (29CFR1926 Subpart K), (ANSI/NFPA 70), (ANSI C2), (MIL-STD-1472D Sec. 5.13.7.1)	3.3.6.10.A, 3.3.6.10.D
3.3.6.7.B	CRD, (29CFR1910 Subpart O), (29CFR1926 Subpart O), (MIL-STD-1472D Sec. 5.13.7.2)	3.3.6.3.G, 3.3.6.8.C
3.3.6.7.C	CRD, (29CFR1910 Subpart H), (MIL-STD-1472D Sec. 5.13.7.3, 5.13.7.4)	3.3.6.3.G, 3.3.6.3.F
3.3.6.7.D	29CFR1910.151(c)	3.3.6.8.F
3.3.6.7.E	CRD, (29CFR1910.147)	3.3.6.8.B
3.3.6.8.A	10CFR20.1902(a)	3.2.2.1.B
3.3.6.8.B	10CFR20.1902(b)	3.2.2.1.B
3.3.6.8.C	10CFR20.1902(c)	3.2.2.1.B
3.3.6.8.D	10CFR20.1902(d)	3.2.2.1.B
3.3.6.8.E	10CFR20.1902(e), (10CFR20.1001-20.2401)	3.2.2.1.B
3.3.6.9	10CFR20.1903(a)	3.2.2.1.B
3.3.6.10.A	10CFR20.1904(a)	3.2.2.1.B
3.3.6.10.B	10CFR20.1904(a)	3.2.2.1.B

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.3.6.10.C	10CFR20.1904(b)	3.2.2.1.B
3.3.6.11.A	29USC651 et seq. 654(a)(b)	3.3.6.1.A
3.3.6.11.B	29USC651 et seq. 654(a)(b)	3.3.6.1.B
3.3.6.11.C	29USC651 et seq. 654(a)(b)	3.3.6.1.B
3.3.6.12	CRD, (29CFR1910.94)	3.3.6.3.E
3.3.6.13	CRD, (29CFR1910 Subpart Q)	3.3.6.8.E
3.3.7.1	Derived by CRD, (NUREG-0700 Sec. 6.1)	3.3.7.1
3.3.7.2	Derived by CRD, (NUREG-0700 Sec. 6.2.1), (MIL-STD-1472D Sec. 5.3.10)	3.3.7.2
3.3.7.3	Derived by CRD, (NUREG-0700 Sec. 6.2.2, 6.3)	3.3.7.3
3.3.7.4	Derived by CRD, (NUREG-0700 Sec. 6.4)	3.3.7.4
3.3.7.5	Derived by CRD, (NUREG-0700 Sec. 6.5)	3.3.7.5
3.3.7.6	Derived by CRD, (NUREG-0700 Sec. 6.8)	3.3.7.6
3.3.7.7	Derived by CRD, (NUREG-0700 Sec. 6.9)	3.3.7.7
3.3.7.8	Derived by CRD, (NUREG-0700 Sec. 6.6)	3.3.7.8
3.3.7.9	Derived by CRD, (ANSI/HFS Std. No. 100-1988)	3.3.7.9
3.3.7.10	Derived by CRD, (MIL-STD-1472D Sec. 5.6.3), (DOD-HDBK-743A)	3.3.7.10
3.3.7.11	Derived by CRD, (MIL-STD-1472D Sec. 5.10)	3.3.7.11
3.3.7.12	Derived by CRD, (MIL-STD-1472D Sec. 5.12, 5.14.1)	3.3.7.12
3.3.7.13	Derived by CRD, (DOE Order 6430.1A Sec. 1300-13)	3.3.7.13
3.3.7.14	Derived by CRD, (MTR 10090)	3.3.7.14
3.3.8.1.1	10CFR72.156	3.3.8.1.A, 3.3.8.2.B
3.3.8.1.2	10CFR72.170	3.3.8.1.B
3.3.8.2.1.A	10CFR72.72(b)	3.3.8.2.A
3.3.8.2.1.B	Derived	3.3.8.2.A
3.3.8.2.1.C	10CFR72.72(c)	3.3.8.2.A
3.3.8.2.1.D	10CFR72.72(c)	3.3.8.2.A
3.3.8.2.2	10CFR75.1	3.3.8.2.C
3.3.9.A	Derived by CRD	3.3.9
3.3.9.B	Derived by CRD	3.3.9.B, 3.3.9.C

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.3.10	Derived by CRD	3.3.10.A, 3.3.10.B
3.3.11.1.A	40CFR61.01, 40CFR60.1	3.3.11.B
3.3.11.1.B	40CFR61.01, 40CFR60.1	3.3.1.B, 3.3.11.B
3.3.11.2	40CFR144.11	3.3.11.D
3.3.11.3	33CFR323.3, (33CFR323.4)	3.3.11.C
3.3.11.4	15USC2601 et seq.	3.3.11.E
3.3.11.5	40CFR165.2	3.3.11.F
3.3.11.6	40CFR50.2(d), 40CFR60.10, 40CFR142.4	3.3.11.A
3.4.1.1	10CFR72.146(a)	3.4.1.A
3.4.1.2	10CFR72.146(b)	3.4.1.A
3.4.1.3	10CFR72.150	3.4.1.B
3.4.2.1	10CFR72.146(a)	3.4.2.A
3.4.2.2	10CFR72.150	3.3.1.B
3.4.3.1	10CFR72.104(b)(c)	3.3.1.B
3.4.3.2	10CFR20.1906(e)(1)(2)	3.2.2.4.B
3.4.3.3	10CFR72.74(a)(b)	3.3.1.B
3.4.3.4	10CFR72.44(d)(1), (10CFR20)	3.3.1.B
3.4.3.5	10CFR72.146(a)	3.4.3
3.4.4.1.A	10CFR72.162	3.4.4
3.4.4.1.B	10CFR72.162	3.4.4
3.4.4.1.C	10CFR72.162	3.4.4
3.4.4.2.A	10CFR72.168(a)	3.3.1.B
3.4.4.2.B	10CFR72.168(b)	3.3.1.B
3.4.4.3	10CFR72.44(d)(2)	3.3.1.B
3.4.5.1.A	10CFR72.154(b)	3.3.8.1.C, 3.4.5
3.4.5.1.B	10CFR72.154(b)	3.4.5
3.4.5.2.A	10CFR72.174	3.4.5
3.4.5.2.B	10CFR72.174	3.4.5
3.4.5.2.C	10CFR72.174	3.4.5
3.4.5.2.D	CRD, (QARD)	3.5.3.A, 3.4.5
3.4.6	Derived by CRD	3.4.6.A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.4.7	CRD, (QARD)	3.4.7
3.5.1.1.A	Derived	3.5.1
3.5.1.1.B	CRD	3.5.1.2
3.5.1.1.C	CRD	3.5.1.2
3.5.1.2	Derived	3.5.1
3.5.1.3.A	Derived	3.5.1
3.5.1.3.B	Derived	3.5.1
3.5.1.4	Derived	3.5.1
3.5.1.5.A	Derived by CRD	3.5.1.1.B
3.5.1.5.B	Derived by CRD, (DOE Order 4330.4A Sec. I, 3.5)	3.5.1.1.C
3.5.1.5.C	Derived by CRD	3.5.1.1.A
3.5.2.1	Derived by CRD	3.5.2, 3.5.4
3.5.2.2.A	CRD	3.3.8.1.D
3.5.2.2.B	CRD	3.3.8.1.D
3.5.3.1.A	CRD	3.5.3.C
3.5.3.1.B	Derived	3.5.3.C
3.5.3.1.C	Derived	3.3.8.2.B, 3.5.3.C
3.5.3.1.D	Derived	3.5.3.C
3.5.3.1.E	Derived	3.5.3.C
3.5.3.2.A	Derived	3.5.3.E
3.5.3.2.B	Derived	3.5.3.E
3.5.3.2.C	CRD	3.5.3.A
3.5.3.3.A	Derived	3.5.3.E
3.5.3.3.B	Derived	3.5.3.E
3.5.3.3.C	CRD	3.5.3.A
3.6.1.1.A	10CFR72.194	3.6.1.C
3.6.1.1.B	10CFR72.194	3.6.1.C
3.6.1.2	Derived	3.7.3.1.1
3.6.2.1.A	Derived by CRD	3.6.2.1.D
3.6.2.1.B	Derived by CRD	3.6.2.1.D
3.6.2.1.C	Derived by CRD	3.6.2.1.D

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.6.2.1.D	Derived by CRD	3.6.2.1.D
3.6.2.1.E	Derived by CRD	3.6.2.1.D
3.6.2.2.1	10CFR72.144(d)	3.6.2.1.A
3.6.2.2.2	CRD, (DOE Order 4330.4A)	3.5.3.D, 3.6.2.1.C
3.6.2.3.A	10CFR20.1501(c), (10CFR20.1201)	3.6.2.2
3.6.2.3.B	10CFR20.1501(c)(1)(2)	3.6.2.2
3.6.2.3.C	Derived, (NRC Regulatory Guide 8.8), (NRC Regulatory Guide 8.10)	3.6.2.2
3.6.2.4.1	10CFR72.190	3.6.1.A
3.6.2.4.2	10CFR72.190	3.6.1.A
3.6.2.4.3	10CFR72.192	3.6.2.1.E
3.6.2.5.1	Derived	3.6.2.1.A
3.6.2.5.2	DOE Order 3790.1A, p. V-1, (2)(b), (29USC651 et seq.), (Executive Order 12196), (29CFR1960)	Appendix A
3.6.2.5.3	29CFR1910.120(q)(6), 49CFR172.702(b)	Appendix A, 3.6.2.1.F
3.6.2.5.4	29CFR1910.156(c)(1)	Appendix A
3.7.1.1.1.1	Derived by CRD	3.7.3.1.1
3.7.1.1.2.1	10CFR73.50(b)(5), (10CFR73.50(b)(3)(4))	3.2.4.3.1.B
3.7.1.1.2.2	10CFR72.122(b)(4)	3.3.1.B
3.7.1.1.2.3.A	10CFR1022.3(a)	Appendix A
3.7.1.1.2.3.B	10CFR1022.3(b), (42USC4001 et seq.)	Appendix A
3.7.1.1.2.3.C	10CFR1022.3(d)	Appendix A
3.7.1.1.2.4	10CFR1022.5(b)	Appendix A
3.7.1.1.2.5	10CFR1022.15(a), (Executive Order 11988)	Appendix A
3.7.1.1.2.6	DOE Order 6430.1A, Sec. 0245, (AREA)	3.3.1.A
3.7.1.1.2.7.A	DOE Order 6430.1A, Sec. 0250, (Fed-Std-795)	3.3.1.A
3.7.1.1.2.7.B	DOE Order 6430.1A, Sec. 0250, (AASHTO-GDHS-84)	3.3.1.A
3.7.1.2.1.1	Derived by CRD	3.7.3.1.1
3.7.1.2.2.1.A	10CFR72.122(k)(1)	3.3.1.B
3.7.1.2.2.1.B	10CFR72.122(k)(2)	3.3.1.B
3.7.1.2.2.1.C	10CFR72.122(k)(3)	3.3.6.10.C

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.2.2.1.D	10CFR72.122(k)(4)	3.3.1.B
3.7.1.2.2.2	10CFR72.126(c)(1)	3.3.1.B
3.7.1.2.2.3.A	42USC300f et seq., Sec. 300g-6(a)(d)	Appendix A
3.7.1.2.2.3.B	42USC300f et seq., Sec. 300g-6(a)	Appendix A
3.7.1.2.2.4	33USC1251 et seq., Sec. 1311(a), (33USC1251 et seq., Sec. 1311, 1312, 1316, 1317, 1328, 1342, 1344)	3.5.3.B
3.7.1.2.2.5	40CFR122.41(a)(1), (33USC1251 et seq., Sec. 307(a), 405(d))	3.5.3.B
3.7.1.2.2.6	40CFR280.10(a), (40CFR280, 40CFR280.10(b)(c)(d), 40CFR280.11, 280.12)	3.3.11.G
3.7.1.2.2.7	40CFR262.11, (40CFR261.2, 261.4, 261 Subpart D, C), (40CFR268), (40CFR260.21), (40CFR264), (40CFR265)	3.3.11.G
3.7.1.2.2.8.A	40CFR122.41(j)(1)	3.3.11.C
3.7.1.2.2.8.B	40CFR122.41(j)(4), (40CFR136), (40CFR503)	3.3.11.C
3.7.1.2.2.9	40CFR141.3	3.3.11.D
3.7.1.2.2.10.A	10CFR72.122(i)	3.3.6.3.D
3.7.1.2.2.10.B	10CFR72.122(j)	3.3.1.B
3.7.1.2.2.11	DOE Order 6430.1A, (DOE Order 6430.1A Sec. 0110-6, 1052, 1161-3, 1670-2, 1671-2)	3.3.6.3.B
3.7.1.3.1.1	Derived by CRD	3.7.3.1.1
3.7.1.3.2.1	10CFR72.78	3.3.1.B
3.7.1.3.2.2	10CFR71.47(d)	3.2.2.7
3.7.1.3.2.3.A	10CFR73.50(c)(1)	3.2.4.3.1.B
3.7.1.3.2.3.B	10CFR73.50(c)(1)	3.2.4.3.1.B
3.7.1.3.2.4.A	10CFR20.1906(a)	3.2.2.4.B
3.7.1.3.2.4.B	10CFR20.1906(b)	3.2.2.4.B
3.7.1.3.2.4.C	10CFR20.1906(c)	3.2.2.4.B
3.7.1.3.2.4.D	10CFR20.1906(f)	3.2.2.4.B
3.7.1.4.1.1	Derived by CRD	3.7.3.1.1
3.7.1.4.2.1	10CFR72.124(c)	3.2.2.5, 3.7.3.2.M
3.7.1.4.2.2	10CFR72.122(h)(5), (10CFR20)	3.2.5.1.C

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.4.2.3.A	10CFR71.87(a)	3.2.2.7
3.7.1.4.2.3.B	10CFR71.87(c)	3.2.2.7
3.7.1.4.2.3.C	10CFR71.87(e)	3.2.2.7
3.7.1.4.2.3.D	10CFR71.87(i)(2), (10CFR71 Table V)	3.2.2.7
3.7.1.4.2.4	10CFR71.87(f)(g)	3.2.2.7
3.7.1.4.2.5	10CFR71.43(b)(c)(e)(f)(g)	3.2.2.7
3.7.1.4.2.6	10CFR71.47, (10CFR19.12)	3.2.2.7
3.7.1.4.2.7	10CFR71.51	3.2.2.7
3.7.1.4.2.8	10CFR72.122(h)(3)	3.3.1.B
3.7.1.4.2.9.A	10CFR72.124(a)	3.2.2.5
3.7.1.4.2.9.B	10CFR72.124(b)	3.2.2.5, 3.7.3.2.L
3.7.1.4.2.10	Derived	3.2.1.1.F
3.7.1.4.2.11.A	10CFR72.128(a)	3.3.1.B
3.7.1.4.2.11.B	10CFR72.128(b)	3.2.2.6.B
3.7.1.4.2.11.C	Derived by CRD	3.2.2.8
3.7.1.4.2.12.A	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.1.4.2.12.B	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.1.4.2.12.C	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.1.4.2.12.D	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.1.4.2.13.A	10CFR72.122(i)	3.3.6.3.D
3.7.1.4.2.13.B	10CFR72.122(j)	3.3.1.B
3.7.1.4.2.14	10CFR72.122(k)(1)	3.3.1.B
3.7.1.5.1.1	Derived by CRD	3.7.3.1.1
3.7.1.5.2.1.A	NWPA Sec. 148(d)(3), 10CFR72.44(g)(3)	3.7.3.2.G

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.5.2.1.B	NWPA Sec. 148(d)(4), 10CFR72.44(g)(4)	3.7.3.2.G
3.7.1.5.2.2.A	10CFR72.124(a)	3.2.2.5
3.7.1.5.2.2.B	10CFR72.124(b)	3.2.2.5
3.7.1.5.2.3	10CFR72.128(a)	3.3.1.B
3.7.1.5.2.4	10CFR72.122(l)	3.3.1.B
3.7.1.5.2.5.A	10CFR72.120(b)	3.3.1.B
3.7.1.5.2.5.B	DOE/RW-0239	3.7.3.2.E
3.7.1.5.2.6	10CFR72.122(h)(1)	3.3.1.B
3.7.1.5.2.7.A	10CFR72.122(h)(2)	3.3.1.B
3.7.1.5.2.7.B	10CFR72.122(h)(2)	3.3.1.B
3.7.1.5.2.7.C	10CFR72.122(h)(2)	3.3.1.B
3.7.1.5.2.7.D	10CFR72.124(c)	3.3.1.B
3.7.1.5.2.8.A	10CFR72.122(h)(4)	3.3.1.B
3.7.1.5.2.8.B	10CFR72.124(c)	3.7.3.2.M
3.7.1.5.2.9	10CFR75.42(a)	3.3.8.2.C
3.7.1.5.2.10	10CFR72.122(h)(3)	3.3.1.B
3.7.1.6.1.1	Derived by CRD	3.7.3.1.1
3.7.1.6.2.1	Derived	3.7.3.1.1
3.7.1.6.2.2	Derived	3.7.3.1.1
3.7.1.6.2.3	DOE Order 6430.1A, Sec. 1460, (CMAA-70)	3.3.1.A
3.7.1.7.1.1	Derived by CRD	3.7.3.1.1
3.7.1.7.2.1.A	10CFR72.72(a)	3.4.8
3.7.1.7.2.1.B	10CFR72.72(a)	3.4.8
3.7.1.7.2.2	10CFR72.166	3.5.3.C
3.7.1.7.2.3	10CFR72.44(c)(5)	3.3.1.B
3.7.1.7.2.4.A	10CFR72.72(d)	3.4.8
3.7.1.7.2.4.B	10CFR72.72(d)	3.4.8
3.7.1.7.2.5	10CFR72.80(c)	3.4.8
3.7.1.7.2.6.A	10CFR71.91(a), (10CFR71.10)	3.2.2.7
3.7.1.7.2.6.B	10CFR71.91(b)	3.2.2.7
3.7.1.7.2.6.C	10CFR71.91(c), (10CFR71.85)	3.2.2.7

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.7.2.7.A	10CFR72.82(c)(1)	3.3.1.B
3.7.1.7.2.7.B	10CFR72.82(c)(1)	3.3.1.B
3.7.1.7.2.7.C	10CFR72.82(c)(1)	3.3.1.B
3.7.1.7.2.7.D	10CFR72.82(c)(2)	3.3.1.B
3.7.1.7.2.7.E	10CFR72.82(c)(2)	3.3.1.B
3.7.1.7.2.7.F	10CFR72.82(c)(2)	3.3.1.B
3.7.1.7.2.8	40CFR280.10(a), (40CFR280.11, 280.12)	3.3.11.G
3.7.1.7.2.9.A	29USC651 et seq., Sec. 657 (c)(1)	Appendix A
3.7.1.7.2.9.B	29USC651 et seq., Sec. 657 (c)(1)	Appendix A
3.7.1.7.2.9.C	29USC651 et seq., Sec. 657 (c)(1)	Appendix A
3.7.1.7.2.10.A	10CFR72.80(d)	3.4.8
3.7.1.7.2.10.B	DOE Order 3790.1A (5)(b)(2)(g)(3), (DOE Order 1324.2A)	Appendix A
3.7.1.7.2.11	10CFR75.42(d)(1)	3.3.8.2.C
3.7.1.7.2.12.A	40CFR122.41(j)(2), (40CFR503)	Appendix A
3.7.1.7.2.12.B	40CFR122.41(j)(2)	Appendix A
3.7.1.7.2.12.C	40CFR122.41(j)(3)	Appendix A
3.7.1.7.2.13.A	10CFR20.2102(a)	Appendix A
3.7.1.7.2.13.B	10CFR20.2102(b)	Appendix A
3.7.1.7.2.13.C	10CFR20.2102(b)	Appendix A
3.7.1.7.2.14.A	10CFR20.2103(a), (10CFR20.1501, 20.1906(b))	Appendix A
3.7.1.7.2.14.B	10CFR20.2103(b), (10CFR20.1703(a)(3)(i)(ii))	Appendix A
3.7.1.7.2.15.A	10CFR20.2104(f)	Appendix A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.7.2.15.B	10CFR20.2104(f)	Appendix A
3.7.1.7.2.16.A	10CFR20.2105(a), (10CFR20.1206)	Appendix A
3.7.1.7.2.16.B	10CFR20.2105(b)	Appendix A
3.7.1.7.2.17.A	10CFR20.2106(a), (10CFR20.1502)	Appendix A
3.7.1.7.2.17.B	10CFR20.2106(a)(b), (10CFR20.1202, 20.1204(c))	Appendix A
3.7.1.7.2.17.C	10CFR20.2106(c)	Appendix A
3.7.1.7.2.17.D	10CFR20.2106(d), (5USC500 et seq. Sec. 522(a)), (10CFR9)	Appendix A
3.7.1.7.2.17.E	10CFR20.2106(e)	Appendix A
3.7.1.7.2.17.F	10CFR20.2106(e)	Appendix A
3.7.1.7.2.17.G	10CFR20.2106(f)	Appendix A
3.7.1.7.2.18	10CFR20.2107	Appendix A
3.7.1.7.2.19.A	10CFR20.2108(a), (10CFR20.2002-20.2005)	Appendix A
3.7.1.7.2.19.B	10CFR20.2108(b)	Appendix A
3.7.1.7.2.20.A	10CFR20.2109(a), (10CFR20.1603(a)(9))	Appendix A
3.7.1.7.2.20.B	10CFR20.2109(b)	Appendix A
3.7.1.7.2.20.C	10CFR20.2109(b)	Appendix A
3.7.1.7.2.21.A	10CFR20.2110	Appendix A
3.7.1.7.2.21.B	10CFR20.2110	Appendix A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.1.7.2.22	10CFR71.12(c)(1)(2), (10CFR71 Subpart A, G, H)	3.2.2.7
3.7.1.8.1.1	Derived by CRD	3.7.3.1.1
3.7.1.8.2.1	Derived	3.5.1.4
3.7.1.8.2.2	10CFR71.127	3.2.2.7
3.7.1.8.2.3.A	Derived	3.5.1.4
3.7.1.8.2.3.B	10CFR71.12(c)(2), (10CFR71 Subpart A, G, H)	3.2.2.7
3.7.1.8.2.3.C	Derived, (10CFR71 Subpart A, G, H)	3.5.1.4
3.7.1.8.2.4.A	Derived	3.5.1.4
3.7.1.8.2.4.B	Derived	3.5.1.4
3.7.1.8.2.5	Derived	3.5.1.4
3.7.1.8.2.6	Derived, (10CFR71.93(b))	3.2.2.7
3.7.1.8.2.7	Derived	3.5.1.4
3.7.1.8.2.8.A	Derived	3.5.1.4
3.7.1.8.2.8.B	10CFR72.128(a)(5)	3.3.1.B
3.7.1.8.2.8.C	Derived	3.5.1.4
3.7.1.8.2.9.A	Derived	3.5.1.4
3.7.1.8.2.9.B	Derived	3.5.1.4
3.7.1.8.2.9.C	Derived	3.5.1.4
3.7.1.8.2.9.D	Derived	3.5.1.4
3.7.1.8.2.9.E	Derived by CRD	3.7.3.2.N
3.7.1.8.2.10.A	Derived	3.5.1.4
3.7.1.8.2.10.B	Derived	3.5.1.4
3.7.1.8.2.10.C	Derived	3.5.1.4
3.7.1.8.2.11.A	Derived	3.5.1.4
3.7.1.8.2.11.B	Derived	3.5.1.4
3.7.1.8.2.12	Derived	3.5.1.4
3.7.1.8.2.13	10CFR72.122(h)(3)	3.3.1.B

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.2.1.1.1	Derived by CRD	3.7.3.1.1
3.7.2.1.2.1	10CFR72.122(h)(5) (10CFR20)	3.2.5.1.C
3.7.2.1.2.2	10CFR72.122(h)(3)	3.3.1.B
3.7.2.1.2.3.A	10CFR72.124(a)	3.2.2.5
3.7.2.1.2.3.B	10CFR72.124(b)	3.2.2.5, 3.7.3.2.L
3.7.2.1.2.4.A	10CFR72.128(a)	3.3.1.B
3.7.2.1.2.4.B	10CFR72.128(b)	3.2.2.6.B
3.7.2.1.2.4.C	Derived by CRD	3.2.2.8
3.7.2.1.2.5.A	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.1.2.5.B	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.1.2.5.C	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.1.2.5.D	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.1.2.6	10CFR72.122(h)(1)	3.3.1.B
3.7.2.1.2.7	10CFR72.124(c) (10CFR72)	3.7.3.2.M
3.7.2.2.1.1	CRD	3.7.3.1.1
3.7.2.2.2.1	10CFR72.122(h)(5) (10CFR20)	3.2.5.1.C
3.7.2.2.2.2	10CFR72.122(h)(3)	3.3.1.B
3.7.2.2.2.3	10CFR72.236(c)	3.2.2.5
3.7.2.2.2.4.A	10CFR72.128(a)	3.3.1.B
3.7.2.2.2.4.B	10CFR72.128(b)	3.2.2.6.B
3.7.2.2.2.4.C	Derived by CRD	3.2.2.8
3.7.2.2.2.5.A	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.2.2.5.B	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.2.2.5.C	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.2.2.5.D	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.1.2.6	10CFR72.128(a)	3.3.1.B
3.7.2.1.2.7	10CFR72.122(l)	3.3.1.B
3.7.2.2.2.8.A	10CFR72.122(h)(1)	3.3.1.B
3.7.2.2.2.8.B	10CFR72.122(h)(1)	3.3.1.B
3.7.2.3.1.1	Derived by CRD	3.7.3.1.1
3.7.2.3.2.1	10CFR72.122(h)(5) (10CFR20)	3.2.5.1.C

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
3.7.2.3.2.2	10CFR72.122(h)(3)	3.3.1.B
3.7.2.3.2.3.A	10CFR72.124(a)	3.2.2.5
3.7.2.3.2.3.B	10CFR72.124(b)	3.2.2.5, 3.7.3.2.L
3.7.2.3.2.4.A	10CFR72.128(a)	3.3.1.B
3.7.2.3.2.4.B	10CFR72.128(b)	3.2.2.6.B
3.7.2.3.2.4.C	Derived by CRD	3.2.2.8
3.7.2.3.2.5.A	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.3.2.5.B	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.3.2.5.C	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.3.2.5.D	10CFR72.126(d)	3.2.2.1.E, 3.2.2.6.A
3.7.2.3.2.6	10CFR72.122(h)(1)	3.3.1.B
3.8.A	Derived by CRD	3.8.A
3.8.B	MOA NS/RW, 4/16/92	3.8.B
3.9.1	QARD(DOE/RW-0333P), Section ii	3.9.A
3.9.2	10CFR72.164	3.5.1.2
3.9.3.A	10CFR72.140(b)	3.9.A
3.9.3.B	10CFR72.140(b)	3.9.A
3.9.3.C	10CFR72.140(b)	3.9.A
3.9.4.A	10CFR72.144(a), (10CFR72 Subpart G)	3.9.A
3.9.4.B	10CFR72.144(a)	3.9.A
3.9.4.C	10CFR72.144(a)	3.9.A
3.9.4.D	10CFR72.144(b)	3.9.A
3.9.4.E	10CFR72.144(b)	3.9.A
3.9.4.F	10CFR72.144(b)	3.9.A
3.9.4.G	10CFR72.144(c)	3.9.A
3.9.5.A	10CFR72.160	3.9.A
3.9.5.B	10CFR72.160	3.9.A
3.9.5.C	10CFR72.160	3.9.A
3.9.5.D	10CFR72.160	3.9.A
3.9.6.A	10CFR72.172	3.9.A
3.9.6.B	10CFR72.172	3.9.A

Table 6-1. Requirements Cross Referenced by SRD Paragraph (Continued)

MRS-SRD Paragraph	Source Document	CRD Paragraph
5.1.A	Derived by CRD, (DOE Order 4700.1)	5.1.A
5.1.B	Derived by CRD, (DOE Order 4700.1)	5.1.B
5.2.A	Derived by CRD	5.2.A
5.2.B	Derived by CRD	5.2.B
5.2.C	Derived by CRD	5.2.C

Table 6-2. Requirements Cross Referenced by CRD Paragraph

CRD Paragraph	MRS-SRD Paragraph
3.2.1.A[1]	3.1
3.2.1.B[1]	3.1
3.2.1.C	3.2.1.1.2, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.7, 3.2.1.8.1, 3.2.1.8.2
3.2.1.1.A	3.2.3.2.2.C
3.2.1.1.B	N/A (WA)
3.2.1.1.C	3.2.3.2.3.R, 3.2.3.3.3.A, 3.2.3.3.3.H
3.2.1.1.D	N/A (WA, Trans, MGDS)
3.2.1.1.E	3.2.1.1.1, 3.2.1.7, 3.2.1.8.2
3.2.1.1.F	3.2.3.2.3.C, 3.2.3.2.3.E, 3.2.3.2.3.F, 3.7.1.4.2.10
3.2.1.1.G	3.2.1.6.2, 3.2.1.10.2, 3.2.3.2.3.U
3.2.1.1.H	3.2.3.2.3.K, 3.2.3.2.3.L, 3.2.3.2.3.N, 3.2.3.2.3.O, 3.2.3.2.3.T, 3.2.3.3.3.D, 3.2.3.2.3.E, 3.2.3.2.3.K
3.2.1.1.I	3.2.3.2.3.I
3.2.1.1.J	3.2.3.2.3.S, 3.2.3.3.3.I
3.2.1.2.A	N/A (MGDS)
3.2.1.2.B	3.2.1.5.2, 3.2.1.9.1
3.2.1.2.C	3.2.1.5.3, 3.2.1.5.6, 3.2.1.9.2, 3.2.1.9.4
3.2.1.2.D	N/A (Trans)
3.2.1.2.E	3.2.1.5.5

[1] Sections 3.2.1.A, B are addressed as part of the MRS mission stated in Section 3.1 of the MRS-SRD.

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.2.1.3	3.2.1.6.1.A, 3.2.1.6.1.B, 3.2.1.10.1, 3.2.3.3.3.G
3.2.2.1.A	3.2.4.6.1.A, 3.2.4.6.1.B, 3.2.4.6.1.C, 3.2.4.6.1.D, 3.2.4.6.2, 3.2.4.6.3.A, 3.2.4.6.3.B, 3.2.4.6.3.C
3.2.2.1.B	3.3.6.8.A, 3.3.6.8.B, 3.3.6.8.C, 3.3.6.8.D, 3.3.6.8.E, 3.3.6.9, 3.3.6.10.A, 3.3.6.10.B, 3.3.6.10.C
3.2.2.1.C	3.2.2.3.A, 3.2.2.3.B
3.2.2.1.D	3.2.2.4.A, 3.2.2.7.A, 3.2.2.7.B, 3.2.2.7.C
3.2.2.1.E	3.2.3.2.3.P, 3.2.4.5.3, 3.7.1.4.2.12.A, 3.7.1.4.2.12.B, 3.7.1.4.2.12.C, 3.7.1.4.2.12.D, 3.7.2.1.2.5.A, 3.7.2.1.2.5.B, 3.7.2.1.2.5.C, 3.7.2.1.2.5.D, 3.7.2.2.2.5.A, 3.7.2.2.2.5.B, 3.7.2.2.2.5.C, 3.7.2.2.2.5.D, 3.7.2.3.2.5.A, 3.7.2.3.2.5.B, 3.7.2.3.2.5.C, 3.7.2.3.2.5.D
3.2.2.2.A	3.2.2.4.A
3.2.2.2.B	3.2.2.7.A, 3.2.2.7.B
3.2.2.2.C	N/A (MGDS)
3.2.2.2.D	3.2.2.2
3.2.2.2.E	3.2.2.11.A, 3.2.2.11.B, 3.2.2.11.C, 3.2.2.11.D, 3.2.2.11.E, 3.2.2.11.F, 3.2.2.11.G, 3.2.2.11.H, 3.2.4.5.1.A, 3.2.4.5.1.B, 3.2.4.5.1.C, 3.2.4.5.2, 3.2.5.2.6
3.2.2.3	3.2.4.5.5.A, 3.2.4.5.5.B
3.2.2.4.A	3.2.2.4.A, 3.2.2.4.B, 3.2.2.10.A, 3.2.2.10.B, 3.2.4.5.4
3.2.2.4.B	3.4.3.2, 3.7.1.3.2.4.A, 3.7.1.3.2.4.B, 3.7.1.3.2.4.C, 3.7.1.3.2.4.D
3.2.2.5	3.2.3.2.3.M, 3.2.3.2.3.P, 3.2.3.3.3.C, 3.2.3.3.3.F, 3.7.1.4.2.1, 3.7.1.4.2.9.A, 3.7.1.4.2.9.B, 3.7.1.5.2.2.A, 3.7.1.5.2.2.B, 3.7.2.1.2.3.A, 3.7.2.1.2.3.B, 3.7.2.2.2.3.A, 3.7.2.3.2.3.A, 3.7.2.3.2.3.B
3.2.2.6.A[1]	3.7.1.4.2.12.A, 3.7.1.4.2.12.B, 3.7.1.4.2.12.C, 3.7.1.4.2.12.D, 3.7.2.1.2.5.A, 3.7.2.1.2.5.B, 3.7.2.1.2.5.C, 3.7.2.1.2.5.D, 3.7.2.2.2.5.A, 3.7.2.2.2.5.B, 3.7.2.2.2.5.C, 3.7.2.2.2.5.D, 3.7.2.3.2.5.A, 3.7.2.3.2.5.B, 3.7.2.3.2.5.C, 3.7.2.3.2.5.D
3.2.2.6.B[1]	3.7.1.4.2.11.B, 3.7.2.1.2.4.B, 3.7.2.2.2.4.B, 3.7.2.3.2.4.B

[1]While the limits of 10CFR20 are applicable, 10CFR72 provides directly applicable requirements for the MRS in these areas.

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.2.2.7	3.2.3.2.1.G, 3.7.1.3.2.2, 3.7.1.4.2.3.A, 3.7.1.4.2.3.B, 3.7.1.4.2.3.C, 3.7.1.4.2.3.D, 3.7.1.4.2.4, 3.7.1.4.2.5, 3.7.1.4.2.6, 3.7.1.4.2.7, 3.7.1.7.2.6.A, 3.7.1.7.2.6.B, 3.7.1.7.2.6.C, 3.7.1.7.2.22, 3.7.1.8.2.2, 3.7.1.8.2.3.B, 3.7.1.8.2.6
3.2.2.8	3.7.1.4.2.11.C, 3.7.2.1.2.4.C, 3.7.2.2.2.4.C, 3.7.2.3.2.4.C
3.2.3.1	3.2.3.1
3.2.3.2.A	Reserved in CRD
3.2.3.2.B	3.2.3.2.4, 3.2.3.3.3.A, 3.2.3.3.3.B, 3.2.3.3.5.A, 3.2.3.3.5.B
3.2.4	3.2.4
3.2.4.1	3.2.4.1.1.A, 3.2.4.1.1.B
3.2.4.2.1	3.2.4.2.1
3.2.4.2.2	3.2.4.2.2
3.2.4.2.3	3.2.4.2.3
3.2.4.2.4	3.2.4.2.4
3.2.4.2.5	3.2.4.2.5
3.2.4.2.6	N/A (MGDS)
3.2.4.3.1.A	3.2.4.3.9, 3.2.4.3.10
3.2.4.3.1.B	3.2.4.3.3.A, 3.2.4.3.3.B, 3.2.4.3.4.A, 3.2.4.3.4.B, 3.2.4.3.4.C, 3.2.4.3.4.D, 3.2.4.3.4.E, 3.2.4.3.4.F, 3.2.4.3.5.A, 3.2.4.3.5.B, 3.2.4.3.5.C, 3.2.4.3.5.D, 3.2.4.3.5.E, 3.2.4.3.5.F, 3.2.4.3.5.G, 3.2.4.3.5.H, 3.2.4.3.5.I, 3.2.4.3.5.J, 3.2.4.3.7.1.A, 3.2.4.3.7.1.B, 3.2.4.3.7.1.C, 3.2.4.3.8.A, 3.2.4.3.8.B, 3.2.4.3.8.C, 3.2.4.3.8.D, 3.2.4.3.13.A, 3.2.4.3.13.B, 3.2.4.3.13.C, 3.7.1.1.2.1, 3.7.1.3.2.3.A, 3.7.1.3.2.3.B, 3.2.4.3.14
3.2.4.3.1.C	3.2.4.3.6
3.2.4.3.1.D	N/A (MGDS)
3.2.4.3.2	3.2.4.3.11.A, 3.2.4.3.11.B, 3.2.4.3.11.C, 3.2.4.3.12
3.2.4.3.3	N/A (MGDS)
3.2.4.4.A	3.2.4.4.3.A, 3.2.4.4.3.B, 3.2.4.4.3.C, 3.2.4.4.4
3.2.4.4.B	3.2.4.4.3.B
3.2.5.1.A	3.2.5.1
3.2.5.1.B	3.2.5.1.1
3.2.5.1.C	3.2.3.2.3.P, 3.2.3.3.3.E, 3.7.1.4.2.2, 3.7.2.1.2.1, 3.7.2.2.2.1, 3.7.2.3.2.1

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.2.5.1.D	3.2.5.1.2
3.2.5.1.E	3.2.5.1.6.A, 3.2.5.1.6.B
3.2.5.2.A	3.2.5.2.1
3.2.5.2.B	3.2.5.2.9.B
3.2.5.2.C	Reserved in CRD
3.2.5.2.D	3.2.5.2.3, 3.2.5.2.4.A, 3.2.5.2.4.B, 3.2.5.2.4.C, 3.2.5.2.5, 3.2.5.2.7, 3.2.5.2.8, 3.2.5.2.9.C, 3.2.5.2.9.D
3.2.5.2.E	3.2.5.2.6
3.2.5.3.A	3.2.5.3.1, 3.2.5.3.2, 3.2.5.3.1.1, 3.2.5.3.1.2
3.2.5.3.B	3.2.5.3.1, 3.2.5.3.1.1, 3.2.5.3.1.2
3.2.5.4	3.2.5.4.A, 3.2.5.4.B
3.2.5.5.A	Reserved in CRD
3.2.5.5.B	3.2.5.5.A, 3.2.5.5.B
3.2.6	Reserved in CRD
3.2.6.1	3.2.6.1.1.A
3.2.6.1.A	3.2.6.1.1.A, 3.2.6.1.1.C, 3.2.6.1.2.A, 3.2.6.1.2.B, 3.2.6.1.2.D, 3.2.6.1.3.A, 3.2.6.1.3.B, 3.2.6.1.3.C, 3.2.6.1.4, 3.2.6.1.5.A, 3.2.6.1.5.B, 3.2.6.1.6, 3.2.6.1.7, 3.2.6.1.8.A, 3.2.6.1.8.B
3.2.6.1.B	3.2.6.1.1.A
3.2.6.1.C	3.2.6.1.1.B, 3.2.6.2.5
3.2.6.2.A	3.2.5.1.3, 3.2.6.2.1.A, 3.2.6.2.1.B, 3.2.6.2.1.D, 3.2.6.2.2.A, 3.2.6.2.2.B, 3.2.6.2.2.C
3.2.6.2.B	3.2.6.1.1.B
3.2.6.2.C	N/A (Trans)
3.2.6.2.D	N/A (Trans)
3.2.7	3.2.7.A, 3.2.7.B
3.2.8	3.2.8.1.A, 3.2.8.1.B, 3.2.8.2, 3.2.8.3.A, 3.2.8.3.B, 3.2.8.4
3.2.9	3.2.9
3.3.1.A	3.2.4.1.2.A, 3.2.4.1.2.B, 3.2.4.1.2.C, 3.2.4.1.2.D, 3.2.4.7.1, 3.2.4.7.2, 3.2.4.7.3, 3.2.5.2.2.A, 3.2.5.2.2.B, 3.2.6.1.2.C, 3.2.6.1.3.D, 3.2.6.2.3, 3.2.6.2.4, 3.3.1.1.B, 3.3.1.1.C, 3.3.1.1.D, 3.3.2.2, 3.3.2.3, 3.7.1.1.2.6, 3.7.1.1.2.7.A, 3.7.1.1.2.7.B, 3.7.1.6.2.3

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.3.1.B	3.2.1.10.2, 3.2.2.13.A, 3.2.2.13.B, 3.2.3.2.1.E, 3.2.3.2.3.L, 3.2.3.2.3.Q, 3.2.3.2.3.V, 3.2.3.3.2, 3.2.3.3.3.B, 3.2.3.3.3.E, 3.2.3.3.3.G, 3.2.3.3.3.J, 3.2.3.3.3.L, 3.2.3.3.3.M, 3.2.3.3.3.N, 3.2.4.3.1, 3.2.4.3.2, 3.2.4.3.14, 3.2.4.5.6, 3.2.4.7.4, 3.3.1.1.A, 3.3.1.2.B, 3.3.1.3, 3.3.1.4, 3.3.1.5, 3.3.11.1.B, 3.4.2.2, 3.4.3.1, 3.4.3.3, 3.4.3.4, 3.4.4.2.A, 3.4.4.2.B, 3.4.4.3, 3.7.1.1.2.2, 3.7.1.2.2.1.A, 3.7.1.2.2.1.B, 3.7.1.2.2.1.D, 3.7.1.2.2.2, 3.7.1.2.2.10.B, 3.7.1.3.2.1, 3.7.1.4.2.8, 3.7.1.4.2.11.A, 3.7.1.4.2.13.B,, 3.7.1.4.2.14, 3.7.1.5.2.3, 3.7.1.5.2.4, 3.7.1.5.2.5.A, 3.7.1.5.2.6, 3.7.1.5.2.7.A, 3.7.1.5.2.7.B, 3.7.1.5.2.7.C, 3.7.1.5.2.7.D, 3.7.1.5.2.8.A, 3.7.1.5.2.10, 3.7.1.7.2.3, 3.7.1.7.2.7.A, 3.7.1.7.2.7.B, 3.7.1.7.2.7.C, 3.7.1.7.2.7.D, 3.7.1.7.2.7.E, 3.7.1.7.2.7.F, 3.7.1.8.2.8.B, 3.7.1.8.2.13, 3.7.2.1.2.2, 3.7.2.1.2.4.A, 3.7.2.2.2.6, 3.7.2.2.2.6, 3.7.2.1.2.6, 3.7.2.2.2.2, 3.7.2.2.2.4.A, 3.7.2.2.2.8.A, 3.7.2.2.2.8.B, 3.7.2.3.2.2, 3.7.2.3.2.4.A, 3.7.2.3.2.6
3.3.1.C	3.3.4.2
3.3.2.A	3.3.2.5
3.3.2.B	3.3.2.4
3.3.2.C	3.3.2.1
3.3.3	3.3.3.A, 3.3.3.B, 3.3.3.C, 3.3.3.D, 3.3.3.E
3.3.4.A	3.3.4.1
3.3.4.B	3.3.4.2
3.3.5	3.3.5
3.3.6.1.A	3.2.4.4.1, 3.3.6.11.A
3.3.6.1.B	3.3.6.11.B, 3.3.6.11.C, 3.2.4.4.1
3.3.6.2.A	3.3.6.A
3.3.6.2.B	3.3.6.B
3.3.6.2.C	3.3.6.C
3.3.6.2.D	3.3.6.D
3.3.6.2.E	N/A (MGDS)
3.3.6.3.A	3.3.6.1, 3.3.6.3, 3.3.6.6
3.3.6.3.B	3.7.1.2.2.11
3.3.6.3.C	3.2.6.2.1.C
3.3.6.3.D	3.7.1.2.2.10.A, 3.7.1.4.2.13.A
3.3.6.3.E	3.3.6.12

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.3.6.3.F	3.3.6.7.C
3.3.6.3.G	3.3.6.7.B, 3.3.6.7.C
3.3.6.3.H	Reserved in CRD
3.3.6.4.A	3.2.4.6.4
3.3.6.4.B	3.2.4.2.4
3.3.6.4.C	3.2.4.6.4
3.3.6.5	N/A (MGDS)
3.3.6.6.A	3.3.6.1
3.3.6.6.B	3.3.6.2
3.3.6.6.C	3.3.6.3
3.3.6.7.A	3.3.6.4.B
3.3.6.7.B	3.3.6.4.A
3.3.6.7.C	3.3.6.4.C
3.3.6.8.A	3.3.6.5
3.3.6.8.B	3.3.6.7.E
3.3.6.8.C	3.3.6.5, 3.3.6.7.B
3.3.6.8.D	3.3.6.5
3.3.6.8.E	3.3.6.13
3.3.6.8.F	3.3.6.7.D
3.3.6.9.A	3.3.6.6
3.3.6.9.B	3.3.6.6
3.3.6.10.A	3.3.6.7.A
3.3.6.10.B	3.3.1.1.B
3.3.6.10.C	3.2.5.1.4, 3.2.5.1.5, 3.7.1.2.2.1.C
3.3.6.10.D	3.3.6.7.A
3.3.7.1	3.3.7.1
3.3.7.2	3.3.7.2
3.3.7.3	3.3.7.3
3.3.7.4	3.3.7.4
3.3.7.5	3.3.7.5
3.3.7.6	3.3.7.6
3.3.7.7	3.3.7.7

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.3.7.8	3.3.7.8
3.3.7.9	3.3.7.9
3.3.7.10	3.3.7.10
3.3.7.11	3.3.7.11
3.3.7.12	3.3.7.12
3.3.7.13	3.3.7.13
3.3.7.14	3.3.7.14
3.3.8.1.A	3.3.8.1.1
3.3.8.1.B	3.3.8.1.2
3.3.8.1.C	3.4.5.1.A
3.3.8.1.D	3.5.2.2.A, 3.5.2.2.B
3.3.8.2.A	3.3.8.2.1.A, 3.3.8.2.1.B, 3.3.8.2.1.C, 3.3.8.2.1.D
3.3.8.2.B	3.3.8.1.1, 3.5.3.1.C
3.3.8.2.C	3.3.8.2.2, 3.7.1.5.2.9, 3.7.1.7.2.11, 3.7.2.1.2.15
3.3.9	3.3.9.A
3.3.9.B	3.3.9.B
3.3.9.C	3.3.9.B
3.3.10.A	3.3.10
3.3.10.B	3.3.10
3.3.11.A	3.3.11.6
3.3.11.B	3.3.11.1.A, 3.3.11.1.B
3.3.11.C	3.3.11.3, 3.7.1.2.2.8.A, 3.7.1.2.2.8.B
3.3.11.D	3.3.11.2, 3.7.1.2.2.9
3.3.11.E	3.3.11.4
3.3.11.F	3.3.11.5
3.3.11.G	3.7.1.2.2.6, 3.7.1.2.2.7, 3.7.1.7.2.8
3.4.1.A	3.4.1.1, 3.4.1.2
3.4.1.B	3.4.1.3
3.4.2.A	3.4.2.1
3.4.2.B	Reserved in CRD
3.4.3	3.4.3.5
3.4.4	3.4.4.1.A, 3.4.4.1.B, 3.4.4.1.C

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.4.5	3.4.5.1.A, 3.4.5.1.B, 3.4.5.2.A, 3.4.5.2.B, 3.4.5.2.C, 3.4.5.2.D
3.4.6.A	3.4.6
3.4.6.B	N/A (MGDS)
3.4.7	3.4.7
3.4.8	3.7.1.7.2.1.A, 3.7.1.7.2.1.B, 3.7.1.7.2.4.A, 3.7.1.7.2.4.B, 3.7.1.7.2.5, 3.7.1.7.2.10.A
3.5.1	3.2.5.2.1, 3.5.1.1.A, 3.5.1.2, 3.5.1.3.A, 3.5.1.3.B, 3.5.1.4
3.5.1.1.A	3.5.1.5.C
3.5.1.1.B	3.5.1.5.A
3.5.1.1.C	3.5.1.5.B
3.5.1.2	3.5.1.1.B, 3.5.1.1.C, 3.9.2
3.5.1.3	Reserved in CRD
3.5.1.4	3.7.1.8.2.1, 3.7.1.8.2.3.A, 3.7.1.8.2.3.C, 3.7.1.8.2.4.A, 3.7.1.8.2.4.B, 3.7.1.8.2.5, 3.7.1.8.2.7, 3.7.1.8.2.8.A, 3.7.1.8.2.8.C, 3.7.1.8.2.9.A, 3.7.1.8.2.9.B, 3.7.1.8.2.9.C, 3.7.1.8.2.9.D, 3.7.1.8.2.10.A, 3.7.1.8.2.10.B, 3.7.1.8.2.10.C, 3.7.1.8.2.11.A, 3.7.1.8.2.11.B, 3.7.1.8.2.12
3.5.2	3.5.2.1
3.5.3.A	3.4.5.2.D, 3.5.3.2.C, 3.5.3.3.C
3.5.3.B	3.7.1.2.2.4, 3.7.1.2.2.5
3.5.3.C	3.5.3.1.A, 3.5.3.1.B, 3.5.3.1.C, 3.5.3.1.D, 3.5.3.1.E, 3.7.1.7.2.2
3.5.3.D	3.6.2.2.2
3.5.3.E	3.5.3.2.A, 3.5.3.2.B, 3.5.3.3.A, 3.5.3.3.B
3.5.4	3.5.2.1
3.6.1.A	3.6.2.4.1, 3.6.2.4.2
3.6.1.B	3.3.4.1
3.6.1.C	3.6.1.1.A, 3.6.1.1.B
3.6.2.1.A	3.6.2.2.1, 3.6.2.5.1
3.6.2.1.B	Reserved in CRD
3.6.2.1.C	3.6.2.2.2
3.6.2.1.D	3.6.2.1.A, 3.6.2.1.B, 3.6.2.1.C, 3.6.2.1.D, 3.6.2.1.E
3.6.2.1.E	3.6.2.4.3
3.6.2.1.F	3.2.3.2.3.G, 3.6.2.5.3

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
3.6.2.2	3.6.2.3.A, 3.6.2.3.B, 3.6.2.3.C
3.7.1	N/A (WA)
3.7.2	N/A (Trans)
3.7.3.1.1	3.2.3.2.2.B, 3.2.3.2.2.C, 3.2.3.2.2.D, 3.2.3.2.3.A, 3.2.3.2.3.B, 3.2.3.2.3.D, 3.2.3.2.3.J, 3.6.1.2, 3.7.1.1.1.1, 3.7.1.2.1.1, 3.7.1.3.1.1, 3.7.1.4.1.1, 3.7.1.5.1.1, 3.7.1.6.1.1, 3.7.1.6.2.1, 3.7.1.6.2.2, 3.7.1.7.1.1, 3.7.1.8.1.1, 3.7.2.1.1.1, 3.7.2.2.1.1
3.7.3.1.2	N/A
3.7.3.2.A[1]	3.1
3.7.3.2.B[1]	3.1
3.7.3.2.C	3.2.3.2.1.A, 3.2.3.2.1.B, 3.2.3.2.1.C
3.7.3.2.D	3.2.5.4.A
3.7.3.2.E	3.2.3.2.2.A, 3.7.1.5.2.5.B
3.7.3.2.F	3.2.3.2.1.D
3.7.3.2.G	3.2.3.2.1.F, 3.7.1.5.2.1.A, 3.7.1.5.2.1.B
3.7.3.2.H	3.2.1.5.1.A
3.7.3.2.I	3.2.1.5.1.B
3.7.3.2.J	3.2.1.5.4, 3.2.1.9.3
3.7.3.2.K	3.2.2.1
3.7.3.2.L	3.7.1.4.2.9.B, 3.7.2.1.2.3.B, 3.7.2.3.2.3.B
3.7.3.2.M	3.7.1.4.2.1, 3.7.1.5.2.8.B, 3.7.2.1.2.14
3.7.3.2.N	3.2.3.2.2.A, 3.7.1.8.2.9.E
3.7.4	N/A (MGDS)
3.8.A	3.8.A
3.8.B	3.8.B
3.8.C	N/A (MGDS)
3.9.A	3.9.1, 3.9.3.A, 3.9.3.B, 3.9.3.C, 3.9.4.A, 3.9.4.B, 3.9.4.C, 3.9.4.D, 3.9.4.E, 3.9.4.F, 3.9.4.G, 3.9.5.A, 3.9.5.B, 3.9.5.C, 3.9.5.D, 3.9.6.A, 3.9.6.B
3.9.B	Reserved in CRD

[1] Sections 3.7.3.2.A, B are addressed as part of the MRS mission stated in Section 3.1 of the MRS-SRD.

Table 6-2. Requirements Cross Referenced by CRD Paragraph (Continued)

CRD Paragraph	MRS-SRD Paragraph
5.1.A	5.1.A
5.1.B	5.1.B
5.2.A	5.2.A
5.2.B	5.2.B
5.2.C	5.2.C
Appendix A (10CFR20)	3.2.2.5, 3.2.2.6, 3.2.2.8, 3.2.2.9, 3.7.1.7.2.13.A, 3.7.1.7.2.13.B, 3.7.1.7.2.13.C, 3.7.1.7.2.14.A, 3.7.1.7.2.14.B, 3.7.1.7.2.15.A, 3.7.1.7.2.15.B, 3.7.1.7.2.16.A, 3.7.1.7.2.16.B, 3.7.1.7.2.17.A, 3.7.1.7.2.17.B, 3.7.1.7.2.17.C, 3.7.1.7.2.17.D, 3.7.1.7.2.17.E, 3.7.1.7.2.17.F, 3.7.1.7.2.17.G, 3.7.1.7.2.18, 3.7.1.7.2.19.A, 3.7.1.7.2.19.B, 3.7.1.7.2.20.A, 3.7.1.7.2.20.B, 3.7.1.7.2.20.C, 3.7.1.7.2.21.A, 3.7.1.7.2.21.B
Appendix A (10CFR73)	3.2.3.2.3.H
Appendix A (10CFR1022)	3.7.1.1.2.3.A, 3.7.1.1.2.3.B, 3.7.1.1.2.3.C, 3.7.1.1.2.4, 3.7.1.1.2.5
Appendix A (29CFR1910)	3.6.2.5.3, 3.6.2.5.4
Appendix A (40CFR61)	3.2.2.12
Appendix A (40CFR122)	3.7.1.7.2.12.A, 3.7.1.7.2.12.B, 3.7.1.7.2.12.C
Appendix A (29USC651 et seq.)	3.7.1.7.2.9.A, 3.7.1.7.2.9.B, 3.7.1.7.2.9.C
Appendix A (42USC300f et seq.)	3.7.1.2.2.3.A, 3.7.1.2.2.3.B
Appendix A (DOE Order 3790.1A)	3.2.4.4.2, 3.2.4.4.5, 3.6.2.5.2, 3.7.1.7.2.10.B
Appendix A (DOE Order 4700.1)	3.2.5.2.9.A, 3.3.1.2.A
Appendix A (A00000000-01717-2200-00001)	3.2.1.1.2, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.8.2, 3.2.3.2.3.D

Table 6-3. Requirements Cross Referenced by Source Document

Source Document	MRS-SRD Paragraph
(10CFR9)	3.7.1.7.2.17.D
(10CFR19.12)	3.7.1.4.2.6
(10CFR20)	3.2.5.1.2, 3.4.3.4, 3.7.1.4.2.2, 3.7.2.1.2.1, 3.7.2.2.2.1
(10CFR20.205)	3.2.3.2.1.G
(10CFR20.1001-20.2401)	3.2.2.8, 3.2.2.10.B, 3.3.6.8.E
10CFR20.1101	3.2.2.13.B
10CFR20.1101(a)	3.2.2.3.A
10CFR20.1101(b)	3.2.2.3.B
(10CFR20.1201)	3.6.2.3.A, 3.2.2.13.B
10CFR20.1201(a)(1)(2)	3.2.2.4.A
(10CFR20.1201(a))	3.2.2.10.A
10CFR20.1201(c)	3.2.2.4.B
(10CFR20.1202, 20.1204(c))	3.7.1.7.2.17.B
(10CFR20.1206)	3.7.1.7.2.16.A
10CFR20.1207	3.2.2.5
(10CFR20.1207-20.1208)	3.2.2.10.A
10CFR20.1208(a)	3.2.2.6
(10CFR20.1301)	3.2.2.8, 3.2.2.13.B
10CFR20.1301(a)(1)	3.2.2.7.A
10CFR20.1301(a)(2)	3.2.2.7.B
10CFR20.1301(b)	3.2.2.7.C
10CFR20.1302(a)	3.2.2.9
10CFR20.1302(b)	3.2.2.8
(10CFR20.1501, 20.1906(b))	3.7.1.7.2.14.A
10CFR20.1501(a)	3.2.2.9
10CFR20.1501(b)	3.2.4.5.4
10CFR20.1501(c)	3.6.2.3.A
10CFR20.1501(c)(1)(2)	3.6.2.3.B
(10CFR20.1502)	3.7.1.7.2.17.A
10CFR20.1502(a)	3.2.2.10.A
10CFR20.1502(b)	3.2.2.10.B

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
(10CFR20.1601)	3.2.4.3.12
10CFR20.1601(a)(b)(c)	3.2.4.3.11.A
10CFR20.1601(d)	3.2.4.3.11.B
10CFR20.1601(e)	3.2.4.3.11.C
10CFR20.1602	3.2.4.3.12
(10CFR20.1603(a)(9))	3.7.1.7.2.20.A
10CFR20.1701	3.2.4.5.5.A
10CFR20.1702	3.2.4.5.5.B
10CFR20.1703(a)(1)(2)	3.2.4.4.3.A
10CFR20.1703(a)(3)	3.2.4.4.3.B
(10CFR20.1703(a)(3)(i)(ii))	3.7.1.7.2.14.B
10CFR20.1703(a)(6)	3.2.4.4.3.C
10CFR20.1703(c)	3.2.4.4.4
10CFR20.1801	3.2.4.3.9
10CFR20.1802	3.2.4.3.10
10CFR20.1902(a)	3.3.6.8.A
10CFR20.1902(b)	3.3.6.8.B
10CFR20.1902(c)	3.3.6.8.C
10CFR20.1902(d)	3.3.6.8.D
10CFR20.1902(e)	3.3.6.8.E
10CFR20.1903(a)	3.3.6.9
10CFR20.1904(a)	3.3.6.10.A, 3.3.6.10.B
10CFR20.1904(b)	3.3.6.10.C
10CFR20.1906(a)	3.7.1.3.2.4.A
10CFR20.1906(b)	3.7.1.3.2.4.B
10CFR20.1906(c)	3.7.1.3.2.4.C
10CFR20.1906(e)(1)(2)	3.4.3.2
10CFR20.1906(f)	3.7.1.3.2.4.D
(10CFR20.2002-20.2005)	3.7.1.7.2.19.A
(10CFR20.2003)	3.2.2.7.A
10CFR20.2102(a)	3.7.1.7.2.13.A
10CFR20.2102(b)	3.7.1.7.2.13.B, 3.7.1.7.2.13.C

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR20.2103(a)	3.7.1.7.2.14.A
10CFR20.2103(b)	3.7.1.7.2.14.B
10CFR20.2104(f)	3.7.1.7.2.15.A, 3.7.1.7.2.15.B
10CFR20.2105(a)	3.7.1.7.2.16.A
10CFR20.2105(b)	3.7.1.7.2.16.B
10CFR20.2106(a)	3.7.1.7.2.17.A
10CFR20.2106(a)(b)	3.7.1.7.2.17.B
10CFR20.2106(c)	3.7.1.7.2.17.C
10CFR20.2106(d)	3.7.1.7.2.17.D
10CFR20.2106(e)	3.7.1.7.2.17.E, 3.7.1.7.2.17.F
10CFR20.2106(f)	3.7.1.7.2.17.G
10CFR20.2107	3.7.1.7.2.18
10CFR20.2108(a)	3.7.1.7.2.19.A
10CFR20.2108(b)	3.7.1.7.2.19.B
10CFR20.2109(a)	3.7.1.7.2.20.A
10CFR20.2109(b)	3.7.1.7.2.20.B, 3.7.1.7.2.20.C
10CFR20.2110	3.7.1.7.2.21.A, 3.7.1.7.2.21.B
10CFR51.23(a)	3.2.5.4.B
(10CFR71 Table V)	3.7.1.4.2.3.D
(10CFR71 Subpart A, G, H)	3.7.1.7.2.22, 3.7.1.8.2.3.B, 3.7.1.8.2.3.C
(10CFR71.10)	3.7.1.7.2.6.A
10CFR71.12(c)(1)(2)	3.7.1.7.2.22
10CFR71.12(c)(2)	3.7.1.8.2.3.B
10CFR71.43(b)(c)(e)(f)(g)	3.7.1.4.2.5
10CFR71.47	3.7.1.4.2.6
10CFR71.47(d)	3.7.1.3.2.2
10CFR71.51	3.7.1.4.2.7
10CFR71.71(c)(2)	3.2.3.2.3.T, 3.2.3.3.3.L
(10CFR71.85)	3.7.1.7.2.6.C
10CFR71.87(a)	3.7.1.4.2.3.A
10CFR71.87(c)	3.7.1.4.2.3.B
10CFR71.87(e)	3.7.1.4.2.3.C

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR71.87(f)	3.2.3.2.3.R
10CFR71.87(f)(g)	3.7.1.4.2.4
10CFR71.87(i)(2)	3.7.1.4.2.3.D
10CFR71.89	3.2.3.2.1.G
10CFR71.91(a)	3.7.1.7.2.6.A
10CFR71.91(b)	3.7.1.7.2.6.B
10CFR71.91(c)	3.7.1.7.2.6.C
(10CFR71.93(b))	3.7.1.8.2.6
10CFR71.127	3.7.1.8.2.2
(10CFR72)	3.3.1.1.A, 3.2.3.2.3.L, 3.7.2.1.2.7
(10CFR72 Subpart G)	3.9.4.A
10CFR72.24(i)	3.3.1.5
10CFR72.30(a)	3.2.1.5.1.B
10CFR72.40(a)(13)(i)	3.3.1.2.B
10CFR72.42(a)	3.2.5.4.A, 3.2.5.4.B
10CFR72.44(c)(3)	3.2.4.5.6
10CFR72.44(c)(5)	3.7.1.7.2.3
10CFR72.44(d)	3.2.2.13.B
10CFR72.44(d)(1)	3.4.3.4
10CFR72.44(d)(2)	3.4.4.3
(10CFR72.44(g))	3.2.8.3.A
10CFR72.44(g)(1)	3.2.3.2.1.D
10CFR72.44(g)(2)	3.2.3.2.1.E
10CFR72.44(g)(3)	3.7.1.5.2.1.A
10CFR72.44(g)(3)(4)	3.2.3.2.1.F
10CFR72.44(g)(4)	3.7.1.5.2.1.B
10CFR72.54(d)	3.2.1.5.2, 3.2.1.9.1
10CFR72.54(e)(2)	3.2.1.5.3, 3.2.1.9.2
10CFR72.72(a)	3.7.1.7.2.1.A, 3.7.1.7.2.1.B
10CFR72.72(b)	3.3.8.2.1.A
10CFR72.72(c)	3.3.8.2.1.C, 3.3.8.2.1.D
10CFR72.72(d)	3.7.1.7.2.4.A, 3.7.1.7.2.4.B

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR72.74(a)(b)	3.4.3.3
10CFR72.78	3.7.1.3.2.1
10CFR72.80(c)	3.7.1.7.2.5
10CFR72.80(d)	3.7.1.7.2.10.A
10CFR72.82(c)(1)	3.7.1.7.2.7.A, 3.7.1.7.2.7.B, 3.7.1.7.2.7.C
10CFR72.82(c)(2)	3.7.1.7.2.7.D, 3.7.1.7.2.7.E, 3.7.1.7.2.7.F
10CFR72.82(c)(3)	3.7.1.5.2.9
10CFR72.94(a)(b)(c)	3.2.4.7.4
10CFR72.96(b)	3.2.3.2.1.A
10CFR72.96(c)	3.2.3.2.1.B
10CFR72.96(d)	3.2.3.2.1.C
10CFR72.102(a)(1)	3.2.6.1.2.D.1
10CFR72.102(a)(f)	3.2.6.1.2.A
10CFR72.102(b)	3.2.6.1.2.D.2
10CFR72.102(b)(f)	3.2.6.1.2.B
10CFR72.102(c)	3.2.6.1.2.D.3
10CFR72.102(d)	3.2.6.1.2.D.4
10CFR72.102(e)	3.2.6.1.2.D.5, 3.2.6.1.2.D.6
(10CFR72.104)	3.2.2.13.B
10CFR72.104(a)	3.2.2.2, 3.2.3.2.3.P, 3.2.3.3.3.F
10CFR72.104(b)(c)	3.4.3.1
10CFR72.106(a)(b)	3.2.4.3.1
10CFR72.106(b)	3.2.1.6.2
10CFR72.106(c)	3.2.4.3.2
10CFR72.120(b)	3.7.1.5.2.5.A
10CFR72.122(a)	3.3.1.3
10CFR72.122(b)(1)	3.2.6.2.5
10CFR72.122(b)(2)	3.2.6.1.1.A, 3.2.6.1.1.B
10CFR72.122(b)(3)	3.2.6.1.1.C
10CFR72.122(b)(4)	3.7.1.1.2.2
10CFR72.122(c)	3.2.5.1.3, 3.2.6.2.1.A, 3.2.6.2.1.B, 3.2.6.2.1.C, 3.2.6.2.1.D

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR72.122(d)	3.3.1.4
10CFR72.122(e)	3.2.2.1
10CFR72.122(f)	3.2.5.2.1
10CFR72.122(g)	3.2.1.6.1.A, 3.2.1.6.1.B, 3.2.1.10.1
10CFR72.122(h)	3.2.3.3.3.G, 3.2.3.2.3.Q
10CFR72.122(h)(1)	3.2.3.2.3.N, 3.2.3.3.3.D, 3.7.1.5.2.6, 3.7.2.1.2.6, 3.7.2.2.2.8.A, 3.7.2.2.2.8.B, 3.7.2.3.2.6
10CFR72.122(h)(2)	3.7.1.5.2.7.A, 3.7.1.5.2.7.B, 3.7.1.5.2.7.C
10CFR72.122(h)(3)	3.7.1.4.2.8, 3.7.1.5.2.10, 3.7.1.8.2.13, 3.7.2.1.2.2, 3.7.2.2.2.2, 3.7.2.3.2.2
10CFR72.122(h)(4)	3.7.1.5.2.8.A
10CFR72.122(h)(5)	3.2.3.2.3.P, 3.2.3.2.3.R, 3.2.3.3.3.E, 3.2.3.3.3.F, 3.2.3.3.3.H, 3.7.1.4.2.2, 3.7.2.1.2.1, 3.7.2.2.2.1, 3.7.2.3.2.1
10CFR72.122(i)	3.7.1.2.2.10.A, 3.7.1.4.2.13.A
10CFR72.122(j)	3.7.1.2.2.10.B, 3.7.1.4.2.13.B
10CFR72.122(k)(1)	3.2.5.1.4, 3.7.1.2.2.1.A, 3.7.1.4.2.14
10CFR72.122(k)(2)	3.7.1.2.2.1.B
10CFR72.122(k)(3)	3.2.5.1.5, 3.7.1.2.2.1.C
10CFR72.122(k)(4)	3.7.1.2.2.1.D
10CFR72.122(l)	3.2.3.2.3.Q, 3.2.3.2.3.V, 3.2.3.3.3.N, 3.7.1.5.2.4, 3.7.2.2.2.7
10CFR72.124(a)	3.7.1.4.2.9.A, 3.7.1.5.2.2.A, 3.2.3.2.3.M, 3.2.3.3.3.C, 3.7.2.1.2.3.A, 3.7.2.3.2.3.A
10CFR72.124(b)	3.7.1.4.2.9.B, 3.7.1.5.2.2.B, 3.7.2.1.2.3.B, 3.7.2.3.2.3.B
10CFR72.124(c)	3.7.1.4.2.1, 3.7.1.5.2.7.D, 3.7.1.5.2.8.B, 3.7.2.1.2.7
10CFR72.126(a)	3.2.2.11.A, 3.2.2.11.B
10CFR72.126(a)(1)	3.2.2.11.C
10CFR72.126(a)(2)	3.2.2.11.D
10CFR72.126(a)(3)	3.2.2.11.E
10CFR72.126(a)(4)	3.2.2.11.F

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR72.126(a)(5)	3.2.2.11.G, 3.2.5.2.6
10CFR72.126(a)(6)	3.2.2.11.H
10CFR72.126(b)	3.2.4.5.1.A, 3.2.4.5.1.B
10CFR72.126(c)(1)	3.7.1.2.2.2
10CFR72.126(c)(2)	3.2.4.5.2
10CFR72.126(d)	3.2.4.5.3, 3.7.1.4.2.12.A, 3.7.1.4.2.12.B, 3.7.1.4.2.12.C, 3.7.1.4.2.12.D, 3.7.2.1.2.5.A, 3.7.2.1.2.5.B, 3.7.2.1.2.5.C, 3.7.2.1.2.5.D, 3.7.2.2.2.5.A, 3.7.2.2.2.5.B, 3.7.2.2.2.5.C, 3.7.2.2.2.5.D, 3.7.2.3.2.5.A, 3.7.2.3.2.5.B, 3.7.2.3.2.5,C, 3.7.2.3.2.5.D
10CFR72.128(a)	3.7.1.4.2.11.A, 3.7.1.5.2.3, 3.7.2.1.2.4.A, 3.7.2.2.2.4.A, 3.7.2.2.2.6, 3.7.2.3.2.4.A
10CFR72.128(a)(5)	3.2.3.2.3.S, 3.2.3.3.3.I, 3.7.1.8.2.8.B
10CFR72.128(b)	3.7.1.4.2.11.B, 3.7.2.1.2.4.B, 3.7.2.2.2.4.B, 3.7.2.3.4.B
10CFR72.130	3.2.1.5.4, 3.2.1.9.3
10CFR72.140(b)	3.9.3.A, 3.9.3.B, 3.9.3.C
10CFR72.144(a)	3.9.4.A, 3.9.4.B, 3.9.4.C
10CFR72.144(b)	3.9.4.D, 3.9.4.E, 3.9.4.F
10CFR72.144(c)	3.9.4.G
10CFR72.144(d)	3.6.2.2.1
10CFR72.146(a)	3.4.1.1, 3.4.2.1, 3.4.3.5
10CFR72.146(b)	3.4.1.2
10CFR72.150	3.4.1.3, 3.4.2.2
10CFR72.154(b)	3.4.5.1.A, 3.4.5.1.B
10CFR72.156	3.3.8.1.1
10CFR72.158	3.3.4.1
10CFR72.160	3.9.5.A, 3.9.5.B, 3.9.5.C, 3.9.5.D
10CFR72.162	3.4.4.1.A, 3.4.4.1.B, 3.4.4.1.C
10CFR72.164	3.9.2
10CFR72.166	3.7.1.7.2.2
10CFR72.168(a)	3.4.4.2.A

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR72.168(b)	3.4.4.2.B
10CFR72.170	3.3.8.1.2
10CFR72.172	3.9.6.A, 3.9.6.B
10CFR72.174	3.4.5.2.A, 3.4.5.2.B, 3.4.5.2.C
10CFR72.190	3.6.2.4.1, 3.6.2.4.2
10CFR72.192	3.6.2.4.3
10CFR72.194	3.6.1.1.A, 3.6.1.1.B
10CFR72.212(b)(3)	3.2.3.3.2
10CFR72.212(b)(4)	3.2.1.9.2, 3.2.1.9.4, 3.2.1.10.2, 3.2.4.3.5.J
10CFR72.236(b)(c)(g)	3.2.3.3.3.E
10CFR72.236(c)	3.7.2.2.2.3
10CFR72.236(e)	3.2.2.13.B, 3.2.3.2.3.U
10CFR72.236(f)	3.2.3.2.3.N, 3.2.3.3.3.D
10CFR72.236(h)	3.2.3.3.3.G, 3.2.3.3.3.M
10CFR72.236(l)	3.2.3.3.3.F
10CFR72.236(m)	3.2.3.2.4, 3.2.3.3.3.H, 3.2.3.3.3.J, 3.2.3.3.3.K, 3.2.3.3.5.A
10CFR73.26(b)(1)	3.2.3.2.3.H
10CFR73.40(a)	3.2.4.3.3.A, 3.2.4.3.3.B, 3.2.4.3.14
10CFR73.50(b)(1)	3.2.4.3.4.A
10CFR73.50(b)(2)	3.2.4.3.4.B
10CFR73.50(b)(3)	3.2.4.3.4.C
(10CFR73.50(b)(3)(4))	3.7.1.1.2.1
10CFR73.50(b)(4)	3.2.4.3.4.D, 3.2.4.3.4.E, 3.2.4.3.4.F
10CFR73.50(b)(5)	3.7.1.1.2.1
10CFR73.50(c)	3.2.4.3.5.A, 3.2.4.3.5.B, 3.2.4.3.5.J
10CFR73.50(c)(1)	3.2.4.3.5.C, 3.7.1.3.2.3.A, 3.7.1.3.2.3.B
10CFR73.50(c)(2)	3.2.4.3.5.D
10CFR73.50(c)(3)(4)	3.2.4.3.5.E
10CFR73.50(c)(4)	3.2.4.3.5.F
10CFR73.50(c)(5)	3.2.4.3.5.G
10CFR73.50(c)(7)	3.2.4.3.5.I

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
10CFR73.50(d)(1)	3.2.4.3.7.A, 3.2.4.3.7.B
10CFR73.50(d)(2)	3.2.4.3.7.C
10CFR73.50(e)(1)	3.2.4.3.8.A
10CFR73.50(e)(2)	3.2.4.3.8.B
10CFR73.50(e)(3)	3.2.4.3.8.C
10CFR73.50(e)(4)	3.2.4.3.8.D
10CFR73.50(f)(1)	3.2.4.3.13.A
10CFR73.50(f)(2)	3.2.4.3.13.B
10CFR73.50(f)(3)	3.2.4.3.13.C
10CFR73.55(a)	3.2.4.3.14
10CFR75.1	3.2.3.3.3.G, 3.3.8.2.2
10CFR75.42(a)	3.7.1.5.2.9, 3.7.2.1.2.15
10CFR75.42(d)(1)	3.7.1.7.2.11
(10CFR100 Appendix A)	3.2.6.1.2.A, 3.2.6.1.2.B
(10CFR961.11 Appendix E)	3.2.3.2.2.A
10CFR961.11 Article IV.B.2	3.2.3.2.3.F
10CFR961.11 Article VI.A.1	3.2.3.2.2.A
10CFR961.11 Article VI.B.3.(b)	3.2.3.2.2.C
10CFR1022.3(a)	3.7.1.1.2.3.A
10CFR1022.3(b)	3.7.1.1.2.3.B
10CFR1022.3(d)	3.7.1.1.2.3.C
10CFR1022.5(b)	3.7.1.1.2.4
10CFR1022.15(a)	3.7.1.1.2.5
(29CFR1910 Subpart D, F)	3.3.6.6
(29CFR1910 Subpart E, L)	3.3.6.3
(29CFR1910 Subpart H)	3.3.6.7.C
(29CFR1910 Subpart I)	3.2.4.6.4
(29CFR1910 Subpart J)	3.3.6.1
(29CFR1910 Subpart Q)	3.3.6.13
(29CFR1910 Subpart N, O, P)	3.3.6.5
(29CFR1910 Subpart O)	3.3.6.7.B
(29CFR1910 Subpart S)	3.3.6.7.A

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
(29CFR1910.94)	3.3.6.12
(29CFR1910.95)	3.2.4.2.4
29CFR1910.120(q)(6)	3.6.2.5.3
(29CFR1910.141)	3.2.4.2.1
(29CFR1910.147)	3.3.6.7.E
29CFR1910.151(c)	3.3.6.7.D
29CFR1910.156(c)(1)	3.6.2.5.4
(29CFR1926 Subpart E)	3.2.4.6.4
(29CFR1926 Subpart F)	3.3.6.3
(29CFR1926 Subpart G)	3.3.6.1
(29CFR1926 Subpart H, I, O)	3.3.6.5
(29CFR1926 Subpart K)	3.3.6.7.A
(29CFR1926 Subpart L, M)	3.3.6.6
(29CFR1926 Subpart O)	3.3.6.7.B
(29CFR1960)	3.6.2.5.2
33CFR323.3	3.3.11.3
(33CFR323.4)	3.3.11.3
40CFR50.2(d)	3.3.11.6
40CFR60.1	3.3.11.1.A, 3.3.11.1.B
40CFR60.10	3.3.11.6
40CFR61.01	3.3.11.1.A, 3.3.11.1.B
40CFR61.92	3.2.2.12
40CFR122.41(a)(1)	3.7.1.2.2.5
40CFR122.41(j)(1)	3.7.1.2.2.8.A
40CFR122.41(j)(2)	3.7.1.7.2.12.A, 3.7.1.7.2.12.B
40CFR122.41(j)(3)	3.7.1.7.2.12.C
40CFR122.41(j)(4)	3.7.1.2.2.8.B
(40CFR136)	3.7.1.2.2.8.B
40CFR141.3	3.7.1.2.2.9
40CFR142.4	3.3.11.6
40CFR144.11	3.3.11.2
40CFR165.2	3.3.11.5

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
40CFR191.03(a)	3.2.2.2
(40CFR260.21)	3.7.1.2.2.7
(40CFR261.2, 261.4, 261 Subpart D, C)	3.7.1.2.2.7
40CFR262.11	3.7.1.2.2.7
(40CFR264)	3.7.1.2.2.7
(40CFR265)	3.7.1.2.2.7
(40CFR268)	3.7.1.2.2.7
(40CFR280)	3.7.1.2.2.6
40CFR280.10(a)	3.7.1.2.2.6, 3.7.1.7.2.8
(40CFR280(b)(c)(d)	3.7.1.2.2.6
(40CFR280.11, 280.12)	3.7.1.2.2.6, 3.7.1.7.2.8
(40CFR503)	3.7.1.2.2.8.B, 3.7.1.7.2.12.A
49CFR172.702(b)	3.6.2.5.3
49CFR174.700(d)	3.2.3.2.3.E
49CFR177.842(f)	3.2.3.2.3.E
(5USC500 et seq., Sec. 522(a))	3.7.1.7.2.17.D
15USC2601 et seq.	3.3.11.4
(29USC651 et seq.)	3.2.4.4.1, 3.6.2.5.2
29USC651 et seq., Sec. 654(a)(b)	3.2.4.4.1, 3.3.6.11.A, 3.3.6.11.B, 3.3.6.11.C
29USC651 et seq., Sec. 657 (c)(1)	3.7.1.7.2.9.A, 3.7.1.7.2.9.B, 3.7.1.7.2.9.C
(33USC1251 et seq. Sec. 1311, 1312, 1316, 1317, 1328, 1342, 1344)	3.7.1.2.2.4
33USC1251 et seq., Sec. 1311(a)	3.7.1.2.2.4
(33USC1251 et seq., Sec. 307(a), 405(d))	3.7.1.2.2.5
42USC300f et seq., Sec. 300g-6(a)(d)	3.7.1.2.2.3.A
42USC300f et seq., Sec. 300g-6(a)	3.7.1.2.2.3.B
(42USC4001 et seq.)	3.7.1.1.2.3.B
(DOE Order 1324.2A)	3.7.1.7.2.10.B
DOE Order 3790.1A (5)(b)(2)(g)(3)	3.7.1.7.2.10.B
DOE Order 3790.1A, p. V-1, (2)(b)	3.6.2.5.2
DOE Order 3790.1A, p. VIII-3(5)	3.2.4.4.2

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
DOE Order 3790.1A, p. I-2,(3)(a)(5)	3.2.4.4.5
(DOE Order 4330.4A)	3.6.2.2.2
(DOE Order 4330.4A Sec. I, 3.5)	3.5.1.5.B
(DOE Order 4700.1)	5.1.A, 5.1.B
DOE Order 4700.1 Ch III.B.2.c(2)(c)	3.2.3.2.4, 3.2.3.3.3.A, 3.2.3.3.3.B, 3.2.3.3.5.A, 3.2.3.3.5.B
DOE Order 4700.1, p. V-17, q	3.2.5.2.9.A
DOE Order 4700.1, p. V-33, part C, Sec. 2(a)	3.3.1.2.A
(DOE Order 6430.1A)	3.3.1.1.B
DOE Order 6430.1A	3.7.1.2.2.11
DOE Order 6430.1A Sec. 0101-1	3.3.1.1.C
(DOE Order 6430.1A Sec. 0101-2)	3.3.1.1.D
DOE Order 6430.1A Sec. 0109	3.3.4.2
(DOE Order 6430.1A Sec. 0110-6, 1052, 1161-3, 1670-2, 1671-2)	3.7.1.2.2.11
DOE Order 6430.1A Sec. 0110-99.0.4	3.2.5.2.2.A
DOE Order 6430.1A Sec. 0110-99.0.6	3.2.6.2.2.A, 3.2.6.2.2.B, 3.2.6.2.2.C
DOE Order 6430.1A Sec. 0110-99.8.4	3.3.2.1
DOE Order 6430.1A Sec. 0111-2.3.2	3.2.6.1.7
DOE Order 6430.1A Sec. 0111-2.4.2	3.2.6.1.3.D
DOE Order 6430.1A, Sec. 0111-2.7.1	3.2.6.1.2.C
DOE Order 6430.1A Sec. 0111-2.8.1	3.2.6.2.3
DOE Order 6430.1A Sec. 0111-2.8.2	3.2.6.1.5.A, 3.2.6.1.5.B
DOE Order 6430.1A Sec. 0111-2.8.4	3.2.6.1.6
DOE Order 6430.1A Sec. 0111-2.8.5	3.2.6.2.4
DOE Order 6430.1A Sec. 0111-99.0	3.2.4.7.1, 3.2.4.7.2
DOE Order 6430.1A Sec. 0111-99.0.2	3.2.6.1.3.C
DOE Order 6430.1A Sec. 0111-99.0.3	3.2.6.1.4
DOE Order 6430.1A Sec. 0111-99.0.7	3.2.4.7.3
DOE Order 6430.1A, Sec. 0245	3.7.1.1.2.6
DOE Order 6430.1A, Sec. 0250	3.7.1.1.2.7.A, 3.7.1.1.2.7.B

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
DOE Order 6430.1A Sec. 0710-1.2	3.2.4.1.2.A, 3.2.4.1.2.B, 3.2.4.1.2.C, 3.2.4.1.2.D
DOE Order 6430.1A Sec. 0900-99.0	3.2.4.1.1.A, 3.2.4.1.1.B
(DOE Order 6430.1A Sec. 0950)	3.2.4.1.1.A
DOE Order 6430.1A Sec. 1300-3.5	3.2.5.2.2.B
DOE Order 6430.1A Sec. 1300-6.2	3.2.4.6.1.A, 3.2.4.6.1.B, 3.2.4.6.1.C, 3.2.4.6.1.D
DOE Order 6430.1A Sec. 1300-6.3	3.2.4.6.2
DOE Order 6430.1A Sec. 1300-6.8	3.2.4.6.3.A, 3.2.4.6.3.B, 3.2.4.6.3.C
DOE Order 6430.1A Sec. 1300-10.2.4	3.2.4.3.6
DOE Order 6430.1A, Sec. 1300-11.2	3.2.1.5.5
(DOE Order 6430.1A Sec. 1300-12.4.5)	3.2.4.6.4
DOE Order 6430.1A Sec. 1300-12.4.11	3.3.3.A, 3.3.3.B, 3.3.3.C, 3.3.3.D, 3.3.3.E
(DOE Order 6430.1A Sec. 1300-13)	3.3.7.13
DOE Order 6430.1A, Sec. 1460	3.7.1.6.2.3
DOE Order 6430.1A Sec. 1630-2.2.1	3.3.2.2
DOE Order 6430.1A Sec. 1630-2.2.2	3.3.2.3
DOE Order 6430.1A Sec. 1655-99.8	3.3.2.4
DOE/RW-0239	3.2.3.2.3.I, 3.7.1.5.2.5.B
DOE/RW-0316P	3.2.8.1.A, 3.2.8.1.B, 3.2.8.2
DOE/RW-0412	3.2.1.1.2, 3.2.1.2, 3.2.1.7, 3.2.1.8.1, 3.2.1.8.2
Executive Order 11988	3.7.1.1.2.5
Executive Order 11988, Sec. 2(b)	3.2.6.1.8.A, 3.2.6.1.8.B
(Executive Order 12196)	3.6.2.5.2
QARD(DOE/RW-0333P), Section ii	3.9.1
(QARD(DOE/RW-0333P))	3.4.5.2.D, 3.4.7
NWPA Sec. 114(d)	3.2.3.2.1.B
(NWPA Sec. 115(d))	3.2.3.2.1.D
NWPA Sec. 141(b)(1)	3.1
NWPA Sec. 141(g)	3.2.3.2.1.A
NWPA Sec. 148(d)(3)	3.7.1.5.2.1.A

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
NWPA Sec. 148(d)(4)	3.7.1.5.2.1.B
NWPA Sec. 302(a)(5)	3.2.1.7
NWPAA Sec. 142(b)	3.1
NWPAA Sec. 145(g)	3.2.3.2.1.C
NWPAA Sec. 148(d)(1)	3.2.3.2.1.D
NWPAA Sec. 148(d)(2)	3.2.3.2.1.E
NWPAA Sec. 148(d)(3)(4)	3.2.3.2.1.F
MOA NS/RW, 4/16/92	3.8.B
(AASHTO-GDHS-84)	3.7.1.1.2.7.B
(ACI 318)	3.2.4.6.1.C
(ACI 349)	3.2.4.6.1.C
(ACI 515.1R-79(85))	3.2.4.1.2.A
(ANSI/ASA 38)	3.2.4.2.5
(ANSI/ANS 6.4)	3.2.4.6.1.C
(ANSI/ANS 6.4.2)	3.2.4.6.1.C
(ANSI C2)	3.3.2.2, 3.3.6.7.A
(ANSI/ASCE 7-88)	3.2.6.1.3.D, 3.2.6.1.7
(ANSI/HFS Std. No. 100-1988)	3.3.7.9
(ANSI/NFPA 70)	3.3.6.7.A
(AREA)	3.7.1.1.2.6
(ASTM D4256)	3.2.4.1.1.B
(ASTM D5144-91)	3.2.4.1.1.B
(BIA 7-F)	3.2.4.1.2.C
(CMAA-70)	3.7.1.6.2.3
(DOD-HDBK-743A)	3.3.7.10
(Fed-Std-795)	3.7.1.1.2.7.A
(GSA-FSS-W-A-450/1-17)	3.2.4.3.7.B
(MIL-STD-882B)	3.2.5.1.2
(MIL-STD-1472D Sec. 5.3.10)	3.3.7.2
(MIL-STD-1472D Sec. 5.6.3)	3.3.7.10
(MIL-STD-1472D Sec. 5.8.1)	3.2.4.2.2
(MIL-STD-1472D Sec. 5.8.2)	3.2.4.2.3

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
(MIL-STD-1472D Sec. 5.8.3)	3.2.4.2.4
(MIL-STD-1472D Sec. 5.8.4)	3.2.4.2.5
(MIL-STD-1472D Sec. 5.10)	3.3.7.11
(MIL-STD-1472D Sec. 5.12, 5.14.1)	3.3.7.12
(MIL-STD-1472D Sec. 5.13.2)	3.3.6.1
(MIL-STD-1472D Sec. 5.13.4)	3.3.6.3
(MIL-STD-1472D Sec. 5.13.5)	3.3.6.5
(MIL-STD-1472D Sec. 5.13.6)	3.3.6.6
(MIL-STD-1472D Sec. 5.13.7.1)	3.3.6.7.A
(MIL-STD-1472D Sec. 5.13.7.2)	3.3.6.7.B
(MIL-STD-1472D Sec. 5.13.7.3, 5.13.7.4)	3.3.6.7.C
(MTR 10090 (ESD-TR-86-278))	3.3.7.14
(NCMA TEK-55)	3.2.4.1.2.B
(NCMA TEK-121)	3.2.4.1.2.B
(NRC Regulatory Guide 1.76)	3.2.6.1.3.A
(NRC Regulatory Guide 8.8)	3.6.2.3.C
(NRC Regulatory Guide 8.10)	3.6.2.3.C
(NUREG-0700 Sec. 6.1)	3.3.7.1
(NUREG-0700 Sec. 6.1.4)	3.2.4.6.4
(NUREG-0700 Sec. 6.1.5)	3.2.4.2.1, 3.2.4.2.2, 3.2.4.2.3, 3.2.4.2.4
(NUREG-0700 Sec. 6.1.5.4.a)	3.3.6.4.A
(NUREG-0700 Sec. 6.1.5.4.b)	3.3.6.4.B
(NUREG-0700 Sec. 6.1.5.4.c)	3.3.6.4.C
(NUREG-0700 Sec. 6.2.1)	3.3.7.2
(NUREG-0700 Sec. 6.2.2, 6.3)	3.3.7.3
(NUREG-0700 Sec. 6.4)	3.3.7.4
(NUREG-0700 Sec. 6.5)	3.3.7.5
(NUREG-0700 Sec. 6.6)	3.3.7.8
(NUREG-0700 Sec. 6.8)	3.3.7.6
(NUREG-0700 Sec. 6.9)	3.3.7.7
(NUREG-0800 Sec. 3.5.1.4)	3.2.6.1.3.B
(UBC)	3.2.6.1.2.C

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
(UCRL 15673 Sec. 1)	3.2.5.2.9.B
(UCRL 15673 Sec. 2)	3.2.5.2.9.C
(UCRL 15763 Sec. 3)	3.2.5.2.9.D
(UCRL 15910)	3.2.6.1.2.C, 3.2.6.1.3.D, 3.2.6.1.4
(UCRL 53526)	3.2.6.1.3.B
A00000000-01717-6700-00001	3.2.1.1.1, 3.2.1.1.2, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.8.2, 3.2.3.2.3.I
A00000000-01717-2200-00001	3.2.1.1.2, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.8.2, 3.2.3.2.3.D
CRD	3.2.1.1.1
CRD	3.2.1.1.2
CRD	3.2.1.5.1.A
CRD	3.2.1.5.6
CRD	3.2.1.7
CRD	3.2.1.8.1
CRD	3.2.1.8.2
CRD	3.2.1.9.2
CRD	3.2.1.9.5
CRD	3.2.1.10.2
CRD	3.2.2.13.A
CRD	3.2.3.2.3.C
CRD	3.2.3.2.3.G
CRD	3.2.3.2.3.L
CRD	3.2.3.3.3.A
CRD	3.2.3.3.3.E
CRD	3.2.3.3.3.G
CRD	3.2.4.2.1
CRD	3.2.4.2.4
CRD	3.2.4.2.5
CRD	3.2.4.3.5.H
CRD	3.2.4.5.1.C
CRD	3.2.4.6.4

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
CRD	3.2.5.2.3
CRD	3.2.5.2.4.A
CRD	3.2.5.2.4.B
CRD	3.2.5.2.4.C
CRD	3.2.5.2.5
CRD	3.2.5.2.7
CRD	3.2.5.2.8
CRD	3.2.5.2.9.C
CRD	3.2.5.2.9.D
CRD	3.2.6.1.3.A
CRD	3.2.6.1.3.B
CRD	3.3.1.1.A
CRD	3.3.1.1.B
CRD	3.3.1.1.D
CRD	3.3.2.5
CRD	3.3.6.1
CRD	3.3.6.3
CRD	3.3.6.4.C
CRD	3.3.6.6
CRD	3.3.6.7.A
CRD	3.3.6.7.B
CRD	3.3.6.7.C
CRD	3.3.6.7.E
CRD	3.3.6.12
CRD	3.3.6.13
CRD	3.4.5.2.D
CRD	3.4.7
CRD	3.5.1.1.B
CRD	3.5.1.1.C
CRD	3.5.2.1
CRD	3.5.2.2.A, 3.5.2.2.B
CRD	3.5.3.1.A

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
CRD	3.5.3.2.C
CRD	3.5.3.3.C
CRD	3.6.2.2.2
Derived by CRD	3.2.3.1
Derived by CRD	3.2.3.2.2.B
Derived by CRD	3.2.3.2.2.D
Derived by CRD	3.2.3.2.3.A
Derived by CRD	3.2.3.2.3.B
Derived by CRD	3.2.3.2.3.J
Derived by CRD	3.2.3.2.3.K
Derived by CRD	3.2.3.2.3.O
Derived by CRD	3.2.4
Derived by CRD	3.2.4.2.2
Derived by CRD	3.2.4.2.3
Derived by CRD	3.2.5.1
Derived by CRD	3.2.5.1.1
Derived by CRD	3.2.5.1.2
Derived by CRD	3.2.5.1.6.A, 3.2.5.1.6.B
Derived by CRD	3.2.5.2.9.B
Derived by CRD	3.2.5.3.1
Derived by CRD	3.2.5.3.1.1
Derived by CRD	3.2.5.3.1.2
Derived by CRD	3.2.5.3.2
Derived by CRD	3.2.5.5.A
Derived by CRD	3.2.5.5.B
Derived by CRD	3.2.7.A, 3.2.7.B
Derived by CRD	3.2.8.3.A
Derived by CRD	3.2.8.3.B
Derived by CRD	3.2.8.4
Derived by CRD	3.2.9
Derived by CRD	3.3.5
Derived by CRD	3.3.6

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
Derived by CRD	3.3.6.2
Derived by CRD	3.3.6.4.A
Derived by CRD	3.3.6.4.B
Derived by CRD	3.3.6.5
Derived by CRD	3.3.7.1
Derived by CRD	3.3.7.2
Derived by CRD	3.3.7.3
Derived by CRD	3.3.7.4
Derived by CRD	3.3.7.5
Derived by CRD	3.3.7.6
Derived by CRD	3.3.7.7
Derived by CRD	3.3.7.8
Derived by CRD	3.3.7.9
Derived by CRD	3.3.7.10
Derived by CRD	3.3.7.11
Derived by CRD	3.3.7.12
Derived by CRD	3.3.7.13
Derived by CRD	3.3.7.14
Derived by CRD	3.3.9.A
Derived by CRD	3.3.9.B
Derived by CRD	3.3.10
Derived by CRD	3.4.6
Derived by CRD	3.5.1.5.A
Derived by CRD	3.5.1.5.B
Derived by CRD	3.5.1.5.C
Derived by CRD	3.6.2.1.A
Derived by CRD	3.6.2.1.B
Derived by CRD	3.6.2.1.C
Derived by CRD	3.6.2.1.D
Derived by CRD	3.6.2.1.E
Derived by CRD	3.7.1.1.1.1
Derived by CRD	3.7.1.2.1.1

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
Derived by CRD	3.7.1.3.1.1
Derived by CRD	3.7.1.4.1.1
Derived by CRD	3.7.1.4.2.11.C
Derived by CRD	3.7.1.5.1.1
Derived by CRD	3.7.1.6.1.1
Derived by CRD	3.7.1.7.1.1
Derived by CRD	3.7.1.8.1.1
Derived by CRD	3.7.1.8.2.9.E
Derived by CRD	3.7.2.1.1.1
Derived by CRD	3.7.2.1.2.4.C
Derived by CRD	3.7.2.2.1.1
Derived by CRD	3.7.2.2.2.4.C
Derived by CRD	3.7.2.3.1.1
Derived by CRD	3.7.2.3.2.4.C
Derived by CRD	3.8.A
Derived by CRD	5.1.A
Derived by CRD	5.1.B
Derived by CRD	5.2.A
Derived by CRD	5.2.B
Derived	3.3.8.2.1.B
Derived	3.5.1.1.A
Derived	3.5.1.2
Derived	3.5.1.3.A
Derived	3.5.1.3.B
Derived	3.5.1.4
Derived	3.5.3.1.B
Derived	3.5.3.1.C
Derived	3.5.3.1.D
Derived	3.5.3.1.E
Derived	3.5.3.2.A
Derived	3.5.3.2.B
Derived	3.5.3.3.A

Table 6-3. Requirements Cross Referenced by Source Document (Continued)

Source Document	MRS-SRD Paragraph
Derived	3.5.3.3.B
Derived	3.6.1.2
Derived	3.6.2.3.C
Derived	3.6.2.5.1
Derived	3.7.1.4.2.10
Derived	3.7.1.6.2.1
Derived	3.7.1.6.2.2
Derived	3.7.1.8.2.1
Derived	3.7.1.8.2.3.A
Derived	3.7.1.8.2.3.C
Derived	3.7.1.8.2.4.A
Derived	3.7.1.8.2.4.B
Derived	3.7.1.8.2.5
Derived	3.7.1.8.2.6
Derived	3.7.1.8.2.7
Derived	3.7.1.8.2.8.A
Derived	3.7.1.8.2.8.C
Derived	3.7.1.8.2.9.A
Derived	3.7.1.8.2.9.B
Derived	3.7.1.8.2.9.C
Derived	3.7.1.8.2.9.D
Derived	3.7.1.8.2.10.A
Derived	3.7.1.8.2.10.B
Derived	3.7.1.8.2.10.C
Derived	3.7.1.8.2.11.A
Derived	3.7.1.8.2.11.B
Derived	3.7.1.8.2.12

6.4 IDENTIFICATION OF REGULATORY GUIDES

The NRC, in Regulatory Guide 3.53, identifies the following Regulatory Guides as having potential applicability to the Independent Spent Fuel Storage Installations. Because they are licensed under the 10CFR72 as are Monitored Retrievable Storage Installations (MRS) and OSTS Subelements, those Regulatory Guides have potential applicability to the MRS and OSTS Subelements as well. The MRS and OSTS Subelements design organization is urged to review, as a minimum, the following documents and determine to what degree the recommendations of those documents will be adopted for the design of the MRS and OSTS Subelements.

Table 6-4. Potentially Applicable Regulatory Guides

Regulatory Guide 1.21
Regulatory Guide 1.22
Regulatory Guide 1.25
Regulatory Guide 1.28
Regulatory Guide 1.29
Regulatory Guide 1.59
Regulatory Guide 1.60
Regulatory Guide 1.61
Regulatory Guide 1.69
Regulatory Guide 1.74
Regulatory Guide 1.76
Regulatory Guide 1.78
Regulatory Guide 1.91
Regulatory Guide 1.92
Regulatory Guide 1.102
Regulatory Guide 1.108
Regulatory Guide 1.109
Regulatory Guide 1.111
Regulatory Guide 1.113
Regulatory Guide 1.122
Regulatory Guide 1.125
Regulatory Guide 1.132
Regulatory Guide 1.138
Regulatory Guide 1.143
Regulatory Guide 3.41
Regulatory Guide 3.44
Regulatory Guide 3.48
Regulatory Guide 3.49
Regulatory Guide 3.50
Regulatory Guide 4.1
Regulatory Guide 4.13
Regulatory Guide 4.15
Regulatory Guide 4.16

Table 6-4. Potentially Applicable Regulatory Guides (Continued)

Regulatory Guide 5.7
Regulatory Guide 5.12
Regulatory Guide 5.14
Regulatory Guide 5.20
Regulatory Guide 5.43
Regulatory Guide 5.44
Regulatory Guide 5.55
Regulatory Guide 5.57
Regulatory Guide 8.1
Regulatory Guide 8.4
Regulatory Guide 8.5
Regulatory Guide 8.8
Regulatory Guide 8.9
Regulatory Guide 8.10
Regulatory Guide 8.13
Regulatory Guide 8.15
Regulatory Guide 8.25
Regulatory Guide 8.26

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APPENDIX A. MRS Function Descriptions

1.3 Store Waste

An installation is to be provided to store civilian SNF, in a manner that protects the health and safety of the public and maintains the quality of the environment, with the intent to retrieve the SNF for disposal.

In addition, the CRWMS will provide for the safe transfer of SNF from the spent fuel pool at the Purchaser site into an MPC for either immediate shipment to a CRWMS facility or for storage on-site.

The MRS facility or the Purchaser using the OSTS will perform the functions necessary to:

A. Accommodate SNF resulting from civilian activities

B. Permit continuous monitoring, management, and maintenance of such SNF for the foreseeable future

C. Provide for the ready retrieval of such SNF for disposal

D. Safely store such SNF as long as may be necessary by maintaining such facility through appropriate means, including any required replacement of such facility.

Inputs:	**From:**
• Reports, documentation, procedures, and data	1.1, 1.2, 1.4
• Loaded Cask Subsystems, with SNF or MPC	1.2.2
• Unloaded Cask Subsystems	1.2.2

Outputs:	**To:**
• Loaded Cask Subsystems	1.2.2
• Unloaded Cask Subsystems	1.2.2
• Reports and data	Outside CRWMS, 1.1, 1.2, 1.4

1.3.1 Store at the MRS

This function specifically addresses the storage of SNF, in MPCs, at the CRWMS MRS.

An installation is to be provided to store civilian SNF in a manner that protects the health and safety of the public and maintains the quality of the environment, with the intent to retrieve the SNF for disposal.

The MRS will perform the functions necessary to:

A. Accommodate SNF resulting from civilian activities

B. Permit continuous monitoring, management, and maintenance of such SNF for the foreseeable future

C. Provide for the ready retrieval of such SNF for disposal

D. Safely store such SNF as long as may be necessary by maintaining such facility through appropriate means, including any required replacement of such facility.

Inputs:	**From:**
• Reports, documentation, procedures, and data	1.1, 1.2, 1.4
• Loaded Cask Subsystems, with SNF or MPC	1.2.2.4
• Unloaded Cask Subsystems	1.2.2.4

Outputs:	**To:**
• Loaded Cask Subsystems	1.2.2.2
• Unloaded Cask Subsystems	1.2.2.2
• Reports and data	Outside CRWMS, 1.1, 1.2, 1.4

1.3.1.1 Handle SNF or Loaded MPC

The installation will be capable of handling both truck and rail shipments of spent nuclear fuel. The SNF will arrive at the MRS in SNF transportation casks or as loaded MPCs in MPC transportation casks. Provisions will be included to detach incoming vehicles and substitute with site handling vehicles and to wash and inspect the external surfaces of the casks and associated vehicles. Provisions will also be included for on-site lag storage. This function also includes preparing the SNF for storage, transferring the SNF to its interim storage location, retrieving the SNF from interim storage, and preparing the SNF for transport for permanent disposal. SNF, not delivered in MPCs, will be placed in MPCs prior to storage. Provisions for handling abnormal conditions, if encountered, during these processes will also be included in this function. This function also includes the staging of loaded from-reactor rail casks for flow-through to the MGDS.

Inputs:	
• Loaded SNF transportation cask subsystem	1.2.2.4
• Loaded MPC transportation cask subsystem	1.2.2.4
• Prime Mover	1.2
• Unloaded transportation cask subsystem	1.2, 1.3.1.4
• Unloaded storage mode and transporter	1.3.1.4

*[1]	Maintenance, tools, and supplies	1.3.1.4	I
•	On-site vehicles	1.3.1.4	I
*	Utilities	1.3.1.4	I
*	Radiation protection	1.3.1.4	I
*	Technical services	1.3.1.4	I
*	Emergency response	1.3.1.4	I
•	Loaded storage mode and transporter	1.3.1.2	I
*	Operational procedures and guidelines	1.3.1.4	I
*	Security	1.3.1.4	I

Outputs:

•	Loaded MPC transportation cask subsystem	1.2.2.2	I
•	Prime movers	1.2	
•	Unloaded transportation cask subsystem	1.2, 1.3.1.4	I
*	Heat	Outside CRWMS	
*	Radiation	Outside CRWMS	
•	Radionuclides	Outside CRWMS	
*	Used parts and equipment	1.3.1.4	I
•	Low-level radwaste	1.3.1.4	I
•	Solid waste	1.3.1.4	I
•	Liquid effluent	1.3.1.4	I
•	Hazardous waste	1.3.1.4	I
*	Information, reports, and data	1.3.1.4	I
•	Loaded storage mode and transporter	1.3.1.2	I
•	Unloaded storage mode and transporter	1.3.1.4	I

1.3.1.1.1 Receive Loaded/Unloaded Transportation Cask I

Upon arrival of a loaded SNF transportation cask/transporter or unloaded cask/transporter in the shipping/receiving area at the boundary of the MRS, the cask is accepted by the MRS and the accompanying shipping records (including the records relating to the cask contents for the loaded casks) are transferred to MRS personnel.

Inputs:

•	Loaded transportation cask and transporter	1.2
•	Unloaded transportation cask and transporter	1.2
•	Prime mover	1.2
•	Shipping manifest	1.2

[1] The asterisks indicate the input or output is common to all subfunctions and therefore will not be identified on the lower functions.

Outputs:

• Loaded transportation cask and transporter	1.3.1.1.2
• Unloaded transportation cask and transporter	1.3.1.1.2
• Shipping manifest	1.3.1.4.6
• Prime mover	1.2

1.3.1.1.1.1 Accept Transportation Cask/Transporter

Upon satisfactory verification of records, custody of the SNF is transferred to the MRS facility.

Inputs:

• Loaded transportation cask and transporter	1.2
• Unloaded transportation cask and transporter	1.2
• Prime mover	1.2
• Shipping manifest	1.2

Outputs:

• Loaded transportation cask and transporter	1.3.1.1.1.2
• Unloaded transportation cask and transporter	1.3.1.1.1.2
• Shipping manifest	1.3.1.4.6
• Prime mover	1.3.1.1.1.2

1.3.1.1.1.2 Detach Prime Mover (Release Road Tractor/Rail Engine)

The prime mover is detached from the transportation cask/transporter and removed from the site.

Inputs:

• Loaded transportation cask and transporter	1.3.1.1.1.1
• Unloaded transportation cask and transporter	1.3.1.1.1.1
• Prime mover	1.3.1.1.1.1
• On-site mover	1.3.1.4.2.4

Outputs:

• Prime mover	1.2
• On-site mover, transportation cask, and transporter	1.3.1.1.1.5

1.3.1.1.1.3 Inspect Transportation Cask/Transporter

Arriving shipments are inspected for the presence of explosives or other unauthorized material. The cask and transporter are also inspected to see if they are mechanically intact, that no damage exists, and that there is nothing out of order regarding the appearance of the incoming shipment. This activity takes place within the controlled area, but outside the protected area.

Inputs:

• On-site mover, transportation cask, and transporter	1.3.1.1.1.5

Outputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.4, or .6, or .7
- Off-normal report 1.3.1.1.1.6
- Problem report 1.3.1.1.1.7

1.3.1.1.1.4 Move Transportation Cask/Transporter to Parking Area

Loaded and Unloaded Transportation Cask/Transporters are moved by an on-site vehicle from the Shipping/Receiving Area to a Parking Area inside the Protected Area.

Inputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.3, or .8, or .9

Outputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.2

1.3.1.1.1.5 Move Cask/Transporter Inside Controlled Area

Upon acceptance of the shipment, the transportation cask/transporter is moved inside the controlled area.

Inputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.2

Outputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.3
- Off-normal problem report (if applicable) 1.3.1.1.1.3, 1.3.1.1.1.6

1.3.1.1.1.6 Move Off-Normal Transportation Cask/Transporter to Holding

Any arriving shipment which has any abnormality not involving suspicion of tampering or sabotage is taken to a holding area for problem resolution.

Inputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.3
- Off-normal report 1.3.1.1.1.3, and .5

Outputs:

- On-site mover, transportation cask, and transporter 1.3.1.1.1.8
- Off-normal report 1.3.1.1.1.8

1.3.1.1.1.7 Move Suspect Transportation Cask/Transporter to Holding

If an arriving shipment exceeds specified levels of radioactivity or is suspected of tampering or sabotage, it is taken to a holding area for problem resolution.

Inputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.3
•	Problem report	1.3.1.1.1.3

Outputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.9
•	Problem report	1.3.1.1.1.9

1.3.1.1.1.8 Process Off-Normal Transportation Cask/Transporter

All steps necessary to resolve problems associated with off-normal shipments are taken, including completion of additional inspections or cleaning, and clarification of documentation.

Inputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.6
•	Off-normal report	1.3.1.1.1.6
•	Technical services	1.1, 1.3.1.4.2

Outputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.4
•	Off-normal report	1.3.1.4.6

1.3.1.1.1.9 Process Suspect Transportation Cask/Transporter

All suspect shipments are properly investigated, disarmed, stabilized, or decontaminated as required.

Inputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.7
•	Problem report	1.3.1.1.1.7
•	Emergency response	1.3.1.4.4

Outputs:

•	On-site mover, transportation cask, and transporter	1.3.1.1.1.4
•	Problem report	1.3.1.4.6

1.3.1.1.2 Park Transportation Cask/Transporter

A parking area is provided inside the protected area for storage of unloaded and loaded transportation casks and transporters.

Inputs:

•	On-site movers	1.3.1.1.1, 1.3.1.4.2, 1.3.1.4.9
•	Loaded transportation casks and transporters	1.3.1.1.1
•	Unloaded transportation casks and transporters	1.3.1.1.1, 1.3.1.4.9

Outputs:

• On-site movers	1.3.1.1.3, 1.3.1.1.6, 1.3.1.4.2, 1.3.1.4.9
• Loaded transportation casks and transporters	1.3.1.1.3
• Unloaded transportation casks and transporters	1.3.1.1.6, 1.3.1.4.9

1.3.1.1.3 Prepare SNF or Loaded MPC for Storage

SNF is unloaded from the SNF transportation cask, or the MPC is unloaded from the MPC transportation cask, and prepared for transfer to the MRS storage location.

Inputs:	**From:**
• SNF	1.2.2
• Loaded MPC	1.2.2
• Loaded SNF transportation cask subsystem	1.3.1.1.2
• Loaded MPC transportation cask subsystem	1.3.1.1.2
• On-site movers	1.3.1.1.2
• On-site vehicles	1.3.1.4.2
• SNF descriptions and documentation	1.3.1.1.2

Outputs:	**To:**
• Unloaded transportation cask subsystem	1.2.2.2, 1.3.1.4.9
• SNF	1.3.1.1.4, 1.3.1.1.6
• Loaded MPC	1.3.1.1.4, 1.3.1.1.6
• Radionuclides	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Solid waste	1.3.1.4.8
• Liquid effluent	1.3.1.4.8
• Hazardous waste	1.3.1.4.8
• Identification of SNF or Loaded MPC	1.3.1.1.4, 1.3.1.4.4

1.3.1.1.3.1 Remove Loaded Transportation Cask from Transporter

The transportation cask subsystem is cleaned, surveyed, removed from the transporter, and placed on the cask mover.

Inputs:	**From:**
• Loaded SNF transportation cask subsystem	1.3.1.1.2
• Loaded MPC transportation cask subsystem	1.3.1.1.2
• On-site movers	1.3.1.1.2
• On-site vehicles	1.3.1.4.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• Loaded SNF transportation cask	1.3.1.1.3.2
• Loaded MPC transportation cask	1.3.1.1.3.2
• Transporter and on-site mover	1.3.1.1.3.5
• Liquid effluent	1.3.1.4.8
• Low-level radwaste	1.3.1.4.7

1.3.1.1.3.2 Prepare Loaded Transportation Cask for Transfer

The loaded transportation cask subsystem is moved to the transfer station. There, any gas is vented and monitored, the cask lid is loosened, and the cask is mated to the unloading port.

Inputs:	**From:**
• Loaded SNF transportation cask	1.3.1.1.3.1
• Loaded MPC transportation cask	1.3.1.1.3.1
• Security	1.3.1.4
• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• Open, loaded SNF transportation cask	1.3.1.1.3.3
• Open, loaded MPC transportation cask	1.3.1.1.3.3
• Radionuclides	Environment
• Low-level radwaste	1.3.1.4.7
• Records	1.3.1.4

1.3.1.1.3.3 Remove SNF or Loaded MPC from Loaded Transportation Cask

The transportation cask lid and unloading port plug are removed, the SNF is removed from the SNF transportation cask subsystem, or the MPC is removed from the MPC transportation cask, its identity is verified with SNF or SNF from damaged MPCs being placed in an MPC, and the MPC is placed into a storage mode. This function includes collecting and accounting for any loose fuel pellets from assemblies damaged during shipment. This material along with the failed fuel assembly will be placed into a canister for storage and final disposal at the MGDS.

Inputs:	**From:**
• Open, loaded SNF transportation cask	1.3.1.1.3.2
• Open, loaded MPC transportation cask	1.3.1.1.3.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• SNF	1.3.1.1.3.4
• Loaded MPC	1.3.1.1.3.4
• Open, unloaded transportation cask	1.3.1.1.3.5
• Radionuclides	Environment
• Low-level radwaste	1.3.1.4.7
• Identification of SNF/MPC	1.3.1.4.4.1

1.3.1.1.3.4 Verify SNF and Loaded MPC Identity and Condition

The SNF or loaded MPC is inspected to verify its integrity and its identity; and any defective SNF is placed in canisters prior to off-site shipment.

Inputs:	**From:**
• SNF	1.3.1.1.3.3
• Loaded MPC	1.3.1.1.3.3
• Security	1.3.1.4
• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• SNF	1.3.1.1.4.2, 1.3.1.1.6.3
• Loaded MPC	1.3.1.1.4.2, 1.3.1.1.6.3
• Radionuclides	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Identification of retrieved SNF	1.3.1.4.4.1
• Off-Normal MPC	1.3.1.1.5.7

1.3.1.1.3.5 Prepare Unloaded Transportation Cask for Return to Service

The transportation cask is made ready for additional shipments through cleaning, external decontamination (if necessary), routine maintenance, replacing of the lid, and returning to the transporter for removal to an outside parking area.

Inputs:	**From:**
• Open, unloaded transportation cask	1.3.1.1.3.3
• On-site mover and transporter	1.3.1.1.3.1
• Security	1.3.1.4
• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• Unloaded transportation cask subsystem	1.3.1.1.3.8, 1.3.1.4.9
• On-Site Mover	1.3.1.1.3.8, 1.3.1.4.9
• Low-level radwaste	1.3.1.4.7
• Records	1.3.1.1.3.8, 1.3.1.4.9

1.3.1.1.3.6 Move TSC to Storage Area

The loaded TSC is transported directly to the storage area.

Inputs:

• On-site mover and TSC	1.3.1.1.2

Outputs:

• On-site mover and TSC	1.3.1.1.3.6

1.3.1.1.3.7 Place TSC into Storage Fixture

The loaded TSC is placed on its storage fixture.

Inputs:

• On-site mover and TSC	1.3.1.1.3.5

Outputs:

• On-site mover	1.3.1.1.3.7

1.3.1.1.3.8 Return Transporter to Debarkation

The unloaded transporter is removed from the protected area.

Inputs:

• On-site mover, unloaded cask, and transporter	1.3.1.1.3.4
• On-site mover and transporter	1.3.1.1.3.6
• Prime mover	1.2

Outputs:

• Prime mover, cask (if not TSC), and transporter	1.2
• On-site mover	1.3.1.4.2
• Location of storage mode	1.3.1.4.4.1

1.3.1.1.4 Transfer SNF or Loaded MPC into Storage

The SNF and loaded MPC is transferred into the MPC storage mode on the transporter, and transported to the storage location in its storage mode, and emplaced there.

Inputs:	**From:**
• SNF	1.3.1.1.3.3
• Loaded MPC	1.3.1.1.3.3
• Unloaded/Partially Loaded Storage Mode	1.3.1.4.2
• Storage mode transporter	1.3.1.4.2
• Records	1.3.1.1.3
• Security	1.3.1.4

• Radiation Protection	1.3.1.4
• Utilities	1.3.1.4

Outputs:	**To:**
• Loaded storage mode on transporter	1.3.1.2
• Radionuclides	Outside CRWMS
• Radiation	Outside CRWMS
• Heat	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Solid waste	1.3.1.4.8
• Liquid effluent	1.3.1.4.8
• Hazardous waste	1.3.1.4.8

1.3.1.1.4.1 Configure Storage Mode

The storage mode to be used is prepared to accept the placement of the SNF or loaded MPC in its proper location and orientation.

Inputs:	**From:**
• Unloaded Storage Mode	1.3.1.4.2
• Storage Mode Transporter	1.3.1.4.2
• Empty MPC	1.3.1.4
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Prepared unloaded storage mode	1.3.1.1.4.2
• Storage mode transporter	1.3.1.1.4.4
• Records	1.3.1.4

1.3.1.1.4.2 Place SNF or Loaded MPC into Storage Mode

The SNF or loaded MPC is placed into the MRS storage mode.

Inputs:	**From:**
• SNF	1.3.1.1.3.1.3, 1.3.1.1.5.7
• Loaded MPC	1.3.1.1.3.1.3
• Prepared unloaded storage mode	1.3.1.1.4.1
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Radionuclides	Outside CRWMS
• Open, loaded storage mode	1.3.1.1.4.3
• Low-level radwaste	1.3.1.4.7

1.3.1.1.4.3 Close MPC and/or Storage Mode

The MPC, if loaded at the MRS facility, is welded closed and the storage mode is closed securely and readied for transport to the storage location. This includes welding the storage mode closed or installing a tamper indicating seal for safeguards accountability.

Inputs:	**From:**
• Open, loaded storage mode	1.3.1.1.4.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Closed, loaded storage mode	1.3.1.1.4.4
• Low-level radwaste	1.3.1.4.7

1.3.1.1.4.4 Move Loaded Storage Mode to Storage Location

If required, the storage mode containing the loaded MPC is moved from the transfer station to the MRS storage location.

Inputs:	**From:**
• Closed, Loaded storage mode	1.3.1.1.4.3
• Storage mode transporter	1.3.1.1.4.1
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded storage mode	1.3.1.1.4.5
• Storage mode transporter	1.3.1.1.4.5

1.3.1.1.4.5 Emplace Loaded Storage Mode into Storage

If required, the storage mode containing the MPC is placed in the MRS storage location.

Inputs:	**From:**
• Loaded storage mode and transporter	1.3.1.1.4.4
• Storage mode transporter	1.3.1.1.4.4, 1.3.1.1.5
• Unloaded/partially loaded storage mode and transporter	1.3.1.1.5
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded storage mode	1.3.1.2
• Storage mode transporter	
• Location of storage mode	1.3.1.4.4.1

1.3.1.1.5 Retrieve MPC from Storage

Stored MPC is retrieved from the MRS storage location, and prepared for transportation cask loading.

Inputs:	**From:**
• Loaded storage mode and transporter	1.3.1.2
• Storage mode transporter	1.3.1.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Unloaded/Partially loaded storage mode and transporter	1.3.1.1.4
• Loaded MPC	1.3.1.1.6
• Radionuclides	Outside CRWMS
• Radiation	Outside CRWMS
• Heat	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Identification of retrieved MPC/SNF and storage mode	1.3.1.4.4.1

1.3.1.1.5.1 Retrieve Loaded Storage Mode from Storage

The storage mode containing SNF is retrieved from the storage location.

Inputs:	**From:**
• Loaded storage mode	1.3.1.2
• Storage mode transporter	1.3.1.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded storage mode	1.3.1.1.5.2
• Storage mode transporter	1.3.1.1.5.2
• Identification of retrieved storage mode	1.3.1.4.4.1

1.3.1.1.5.2 Move Loaded Storage Mode into Transfer Area

The loaded storage mode is moved to the transfer station for further handling.

Inputs:	**From:**
• Loaded storage mode	1.3.1.1.5.1
• Storage mode transporter	1.3.1.1.5.1
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded storage mode and transporter	1.3.1.1.5.3
• Storage mode transporter	1.3.1.1.5.3

1.3.1.1.5.3 Open Storage Mode

The storage mode is opened.

Inputs:	**From:**
• Loaded storage mode and transporter	1.3.1.1.5.2
• Storage mode transporter	1.3.1.1.5.2
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Opened, loaded storage mode	1.3.1.1.5.4
• Storage mode transporter	1.3.1.1.5.4
• Radionuclides	Outside CRWMS
• Low-level radwaste	1.3.1.4.7

1.3.1.1.5.4 Remove MPC from Storage Mode

The MPC is removed from the storage mode.

Inputs:	**From:**
• Opened, loaded storage mode	1.3.1.1.5.3
• Storage mode transporter	
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded MPC	1.3.1.1.5.5
• Radionuclides	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Unloaded storage mode	1.3.1.1.5.6
• Storage mode transporter	1.3.1.1.5.6

1.3.1.1.5.5 Verify MPC Identity and Condition

The loaded MPC is inspected to verify its integrity and its identity, and a defective MPC is replaced prior to off-site shipment.

Inputs:	**From:**
• Loaded MPC	1.3.1.1.5.4
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded MPC	1.3.1.1.6
• Radionuclides	Outside CRWMS
• Low-level radwaste	1.3.1.4.7
• Identification of retrieved MPC	1.3.1.4.4.1
• Loaded Off-Normal MPC	1.3.1.1.5.7

1.3.1.1.5.6 Handle Unloaded Storage Mode

This function provides for the return to storage of unloaded storage modes for storage and potential reuse prior to the MRS being decommissioned.

Inputs:	**From:**
• Unloaded storage mode	1.3.1.1.5.4
• Storage mode transporter	1.3.1.1.5.4
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Unloaded storage mode and transporter	1.3.1.1.4.5
• Storage mode transporter	1.3.1.1.4.5

1.3.1.1.5.7 Recover SNF from Off-Normal MPC

MPCs that arrive in transportation casks or are retrieved from storage, and are in an off-normal condition will be opened in the transfer cell and the SNF will be removed.

Inputs:	
• Loaded Off-Normal MPC	1.3.1.1.3.4, 1.3.1.1.5.5

Outputs:	
• Unloaded Off-Normal MPC	1.3.1.4.7.2
• SNF	1.3.1.1.4.2

1.3.1.1.6 Prepare MPC for Transport

The MPC is prepared for transport off-site to the repository.

Inputs:	**From:**
• SNF	1.3.1.1.3
• Loaded MPC	1.3.1.1.3, 1.3.1.1.5
• Unloaded transportation cask and transporter	1.3.1.1.2
• On-Site Mover	1.3.1.1.2
• Prime mover	1.2
• Empty MPC	1.3.1.4
• Security	1.3.1.4

•	Radiation Protection	1.3.1.4

Outputs:		**To:**
•	On-site mover	1.3.1.4.2
•	Loaded MPC	1.2.2
•	Loaded transportation cask, transporter, and prime mover	1.2.2
•	Radionuclides	Outside CRWMS
•	Radiation	Outside CRWMS
•	Heat	Outside CRWMS
•	Low-level radwaste	1.3.1.4.7

1.3.1.1.6.1 Retrieve Unloaded MPC Transportation Cask

The unloaded transportation cask/transporter (rail) is moved from the storage/parking area, washed, and the cask placed on the cask mover.

Inputs:		**From:**
•	Unloaded MPC transportation cask subsystem	1.3.1.1.2
•	On-Site Mover	1.3.1.1.2
•	Security	1.3.1.4
•	Radiation Protection	1.3.1.4

Outputs:		**To:**
•	Unloaded MPC transportation cask	1.3.1.1.6.2
•	Transporter and on-site mover	1.3.1.1.6.5

1.3.1.1.6.2 Prepare Unloaded MPC Transportation Cask for Loading

The appropriate transportation cask is prepared, prior to being loaded with the loaded MPC, for shipment to the geologic repository by moving it to the cask preparation area, loosening its lid, and mating it to the unloading port.

Inputs:		**From:**
•	Unloaded MPC transportation cask	1.3.1.1.6.1
•	Empty MPC	1.3.1.4
•	Security	1.3.1.4
•	Radiation Protection	1.3.1.4

Outputs:		**To:**
•	Opened, prepared, unloaded MPC transportation cask	1.3.1.1.6.3

1.3.1.1.6.3 Place SNF or Loaded MPC into MPC Transportation Cask

The port plug and transportation cask lid are removed, the SNF is retrieved from lag storage or the loaded MPC, verified, and loaded into the transportation cask, and the port plug and transportation cask lid are replaced.

Inputs:	**From:**
• Opened, prepared, unloaded MPC transportation cask	1.3.1.1.6.2
• Loaded MPC	1.3.1.1.3.4, 1.3.1.1.5.5
• SNF	1.3.1.1.3.4
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Loaded MPC transportation cask	1.3.1.1.6.4
• Low-level radwaste	1.3.1.4.7
• Radionuclides	Outside CRWMS
• SNF/MPC descriptions and documentation	Outside 1.3.1

1.3.1.1.6.4 Prepare Loaded MPC Transportation Cask Subsystem for Transport

The loaded MPC transportation cask is unmated from the loading port, the transportation cask lid is tightened, the transportation cask is inerted, decontaminated, and placed on the transporter in preparation for release from the site.

Inputs:	**From:**
• Loaded MPC transportation cask	1.3.1.1.6.3
• Security	1.3.1.4
• Radiation Protection	1.3.1.4

Outputs:	**To:**
• Closed loaded MPC transportation cask	1.3.1.1.6.5
• Low-level radwaste	1.3.1.4.7
• Radionuclides	Outside CRWMS

1.3.1.1.6.5 Prepare Cask/Transporter for Release from Site

The cask/transporter has a final survey and inspection performed, then is moved to the protected area boundary where shipping papers are prepared and the off-site prime mover removes the cask/transporter from the site.

Inputs:	
• Loaded transportation cask	1.3.1.1.6.4
• On-site mover and transporter	1.3.1.1.6.1
• Prime mover	1.2

Outputs:	
• Loaded transportation cask, transporter, and prime mover	1.2
• On-site mover	1.3.1.4.2

1.3.1.2 Store SNF

The SNF is stored in an environment designed to prevent its degradation.

Inputs:

•	Loaded/unloaded storage mode	1.3.1.1
•	Storage mode transporter	1.3.1.1, 1.3.1.4
*	Maintenance, tools, and supplies	1.3.1.4
*	Vehicles (on-site use)	1.3.1.4
*	Utilities	1.3.1.4
*	Radiation protection	1.3.1.4
*	Technical services	1.3.1.4
*	Emergency response	1.3.1.4
*	Reports, data, and information	1.3.1.4
*	Procedures and guidelines	1.3.1.4

Outputs:

*	Heat	Outside CRWMS
*	Radiation	Outside CRWMS
•	Loaded storage mode	1.3.1.1
•	Storage mode transporter	1.3.1.1, 1.3.1.4
*	Salvage parts and equipment	1.3.1.4
*	Low-level radwaste	1.3.1.4
*	Solid waste	1.3.1.4
*	Liquid effluent	1.3.1.4
*	Hazardous waste	1.3.1.4
*	Information	1.3.1.4
*	Reports and data	1.3.1.4
*	Emissions (from site vehicles etc.)	Outside CRWMS

1.3.1.2.1 Maintain SNF Integrity

The SNF integrity is maintained by preventing oxidation, corrosion and removing decay heat.

Inputs:

•	Loaded storage mode	1.3.1.2.2

Outputs:

•	Heat	Outside CRWMS
•	Radiation	Outside CRWMS

1.3.1.2.2 Maintain Storage System Containment

SNF containment within the storage system is maintained under all credible accidents and natural phenomena.

Inputs:

- Loaded storage mode 1.3.1.1.4

Outputs:

- Loaded storage mode 1.3.1.1.5

1.3.1.2.3 Monitor SNF Storage System

The SNF storage system is monitored to detect any abnormal SNF storage conditions.

Inputs:

- Loaded storage mode 1.3.1.2.2

Outputs:

- Heat Outside CRWMS
- Radiation Outside CRWMS

1.3.1.2.3.1 Monitor Radiological/Thermal Condition

The radiological and thermal conditions of the storage system are monitored and maintained to assure that safe storage conditions are maintained.

Inputs:

- Loaded storage mode 1.3.1.1

Outputs:

- Heat Outside CRWMS
- Radiation Outside CRWMS

1.3.1.2.3.2 Account for SNF

The condition and location of all SNF received at, stored in, and shipped from the MRS is recorded and maintained.

Inputs:

- Loaded storage mode 1.3.1.1

Outputs:

- Heat Outside CRWMS
- Radiation Outside CRWMS

1.3.1.3 Reserved

1.3.1.4 Support SNF Storage Operations

All goods and services necessary to support the operation and maintenance of the MRS facility are provided.

Inputs:

• Prime movers	1.2
• Unloaded transportation casks on transporters	1.2, 1.3.1.1
• Legal, regulatory, and licensing constraints	Outside CRWMS
• Equipment, parts, tools, and supplies	Outside CRWMS
• Vehicles (on-site use)	Outside CRWMS
• Utilities	Outside CRWMS
• Services	Outside CRWMS
• Emergency response	Outside CRWMS
• Low-level radwaste	1.3.1.1, 1.3.1.2
• Storage mode transporter	1.3.1.1, 1.3.1.2
• Salvage parts and equipment	1.3.1.1, 1.3.1.2
• Solid waste	1.3.1.1, 1.3.1.2
• Liquid effluent	1.3.1.1, 1.3.1.2
• Hazardous waste	1.3.1.1, 1.3.1.2
• Information	1.3.1.1, 1.3.1.2
• Reports and data	1.3.1.1, 1.3.1.2

Outputs:

• Prime movers	1.2
• Unloaded transportation casks on transporters	1.2
• Heat	Outside CRWMS
• Radiation	Outside CRWMS
• Salvage parts and equipment	Outside CRWMS
• Packaged low-level radwaste	Outside CRWMS
• Solid waste	Outside CRWMS
• Liquid effluent	Outside CRWMS
• Packaged hazardous waste	Outside CRWMS
• Public information	Outside CRWMS
• Reports and data	Outside CRWMS, 1.1, 1.2, 1.4
• Emissions (from site vehicles etc.)	Outside CRWMS
• Storage mode transporter	1.3.1.1, 1.3.1.2
• Maintenance, tools, and supplies	1.3.1.1, 1.3.1.2
• Vehicles (on-site use)	1.3.1.1, 1.3.1.2
• Utilities	1.3.1.1, 1.3.1.2
• Radiation protection	1.3.1.1, 1.3.1.2
• Technical services	1.3.1.1, 1.3.1.2
• Emergency response	1.3.1.1, 1.3.1.2
• Reports, data, and information	1.3.1.1, 1.3.1.2

•	Procedures and guidelines	1.3.1.1, 1.3.1.2

1.3.1.4.2 Provide Operations Support

All services needed to support operations are provided.

Inputs:

•	Equipment, parts, tools, and supplies	Outside CRWMS
•	Vehicles (on-site use)	Outside CRWMS
•	Utilities	Outside CRWMS
•	Services	Outside CRWMS
•	Storage mode transporter	1.3.1.1, 1.3.1.2
•	Unloaded storage mode	1.3.1.1.4

Outputs:

•	Heat	Outside CRWMS
•	Solid waste	1.3.1.4.8
•	Emissions (from site vehicles etc.)	Outside CRWMS
•	Storage mode transporter	1.3.1.1, 1.3.1.2
•	Tools and supplies	1.3.1.1, 1.3.1.2
•	Vehicles (on-site use)	1.3.1.1, 1.3.1.2
•	Utilities	1.3.1.1, 1.3.1.2, 1.3.1.4
•	Technical services	1.3.1.1, 1.3.1.2
•	Unloaded storage mode	1.3.1.1.5

1.3.1.4.2.1 Provide Utilities

Utilities (e.g., electricity, water, sewer, communications, fuel, gas) are provided by both on-site and off-site means, with backup sources for utilities serving systems important to safety.

Inputs:

•	Utilities	Outside CRWMS

Output:

•	Utilities	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.2.2 Provide HVAC

Heating, ventilation, and air conditioning (HVAC) are provided in those areas that require it to protect the health and safety of the public, MRS personnel, and to maintain the integrity of the SNF.

No additional inputs or outputs specified at this level.

1.3.1.4.2.3 Provide Central Stores

Central storage facilities are provided for warehousing and inventory management of materials needed to operate and maintain SNF transfer and storage facilities and operations.

Inputs:

• Equipment, parts, tools, and supplies	Outside CRWMS

Outputs:

• Equipment, parts, tools, and supplies	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.2.4 Provide On-site Transportation

On-site transportation (e.g., maintenance, security vehicles) is provided to move personnel and material around the site.

Inputs:

• Site vehicles	Outside CRWMS

Outputs:

• Site vehicles	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.2.5 Provide Technical Services

Technical services, including data analysis, inspections, tests and evaluations, are provided to support SNF storage operations.

Inputs:

• Technical staff and services	1.3.1.4.2.6, 1.3.1.4.6

Outputs:

• Technical services	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.2.6 Acquire Off-Site Services

Additional off-site services are acquired, as necessary, to support operations.

Inputs:

• Services	Outside CRWMS

Outputs:

• Services	1.3.1.4.2.5

1.3.1.4.3 Maintain Operating Facilities

The operating facilities are maintained in good operating condition so that the MRS throughput schedule is achieved, and the SNF is safely stored.

Inputs:

• Equipment, parts, tools, and supplies	1.3.1.4.2.3
• Vehicles (on-site use)	1.3.1.4.2.4
• Utilities	1.3.1.4.2.1
• Services	1.3.1.4.2.5
• Salvage parts and equipment	1.3.1.1, 1.3.1.2, 1.3.1.4

Outputs:

• Salvage parts and equipment	Outside CRWMS
• Solid waste	1.3.1.4.8
• Maintenance, tools, and supplies	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.3.1 Maintain Equipment

All on-site equipment and shops are maintained to support the desired level of operations.

No additional inputs or outputs specified at this level.

1.3.1.4.3.2 Maintain Buildings

All on-site buildings and operational areas are maintained so that the desired level of operations is achieved.

No additional inputs or outputs specified at this level.

1.3.1.4.3.3 Maintain Site

All on-site property is maintained, including roads, railyards, sidewalks, and ground cover.

No additional inputs or outputs specified at this level.

1.3.1.4.4 Provide Protective Services

Protective services are provided to protect the health and safety of the public and on-site MRS personnel, national security and IAEA objectives, and the environment.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Vehicles (on-site use)	1.3.1.4.2.4
• Utilities	1.3.1.4.2.1
• Services	1.3.1.4.2.5

• Emergency response	Outside CRWMS
• Identification of stored SNF	1.3.1.1.3
• Identification of retrieved SNF	1.3.1.1.5
• Location of loaded/unloaded storage mode	1.3.1.1.4

Outputs:

• Radiation protection	1.3.1.1, 1.3.1.2
• Security	1.3.1.1, 1.3.1.2
• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.1 Safeguard SNF

Material control and accountability of SNF are maintained during all phases of operation.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Identification of stored SNF	1.3.1.1.3.3
• Identification of retrieved SNF	1.3.1.1.5.3
• Location of loaded/unloaded storage mode	1.3.1.1.4.4

Outputs:

• Inventory of SNF	Outside CRWMS

1.3.1.4.4.2 Maintain Physical Security

Physical security is maintained to protect the SNF from sabotage, diversion, incidental damage, or tampering.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Emergency response	Outside CRWMS

Outputs:

• Security	1.3.1.1, 1.3.1.2
• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.3 Maintain Emergency Plan

An emergency plan is maintained to protect the health and safety of both the public and MRS personnel and to mitigate the consequences of an inadvertent release of radionuclides.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Emergency response	Outside CRWMS

Outputs:

• Security	1.3.1.1, 1.3.1.2
• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.4 Provide Emergency Medical Treatment

On-site emergency medical treatment is available to mitigate health hazards due to any on-site emergency situations.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Emergency response	Outside CRWMS

Outputs:

• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.5 Provide Fire Protection

On-site fire protection is available to mitigate the consequences of any on-site fires or explosions.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Emergency response	Outside CRWMS

Outputs:

• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.6 Provide Radiological Protection

Radiological protection is provided to maintain the health and safety of both the public and MRS personnel. It includes providing radiation protection technicians, area monitoring, protective clothing, radiation warning signals, radiological lab and laundry facilities, and recording individual radiation exposures.

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6
• Emergency response	Outside CRWMS

Outputs:

• Radiation protection	1.3.1.1, 1.3.1.2, 1.3.1.4.7, 1.3.1.4.9
• Emergency response	1.3.1.1, 1.3.1.2

1.3.1.4.4.7 Provide Environmental Monitoring

A system is maintained to monitor the environment in and around the MRS installation by measuring the radioactivity of releases from the installation (e.g., air, water, ground, flora, fauna).

Inputs:

• Legal, regulatory, and licensing constraints	1.3.1.4.6

Outputs:

• Monitoring	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.5 Provide QA/QC Services

A quality assurance/quality control program is certified and implemented to ensure the quality of on-site operations important to safety.

Inputs:

• Legal, regulatory, and licensing constraints	Outside CRWMS
• Utilities	1.3.1.4.2.1
• Services	1.3.1.4.2.5
• Information	1.3.1.1, 1.3.1.2
• Reports and data	1.3.1.1, 1.3.1.2

Outputs:

• Public information	Outside CRWMS
• Reports and data	Outside CRWMS, 1.1, 1.2, 1.4
• QA technical services	1.3.1.1, 1.3.1.2
• Procedures and guidelines	1.3.1.1, 1.3.1.2

1.3.1.4.6 Provide Administrative Support

Administrative support is provided to control the overall operation of the MRS and to interact with external organizations.

Inputs:

• Legal, regulatory, and licensing constraints	Outside CRWMS
• Vehicles (on-site use)	1.3.1.4.2.4
• Utilities	1.3.1.4.2.1
• Services	1.3.1.4.2.5
• Information	1.3.1.1, 1.3.1.2, 1.3.1.4
• Reports and data	1.3.1.1, 1.3.1.2, 1.3.1.4

Outputs:

• Public information	Outside CRWMS
• Reports and data	Outside CRWMS, 1.1, 1.2, 1.4
• Reports, data, and information	1.3.1.1, 1.3.1.2
• Procedures and guidelines	1.3.1.1, 1.3.1.2
• Personnel	1.3.1.1, 1.3.1.2, 1.3.1.4
• Training	1.3.1.1, 1.3.1.2, 1.3.1.4

1.3.1.4.6.1 Provide for Human Resources

Human resource services are provided to support and train employees at the MRS during all phases of operation.

No additional inputs or outputs specified at this level.

1.3.1.4.6.2 Maintain Records

All records pertaining to the operating MRS installation are maintained, protected and archived.

No additional inputs or outputs specified at this level.

1.3.1.4.6.3 Maintain Institutional and External Relations

Public relations and educational interaction with elements of the surrounding communities are maintained.

No additional inputs or outputs specified at this level.

1.3.1.4.6.4 Maintain Financial Accounting

Financial accounting is maintained to ensure a sound and responsible fiscal base for the operation of the MRS.

No additional inputs or outputs specified at this level.

1.3.1.4.6.5 Provide Office Space for Regulatory Inspectors

On-site office space is provided for the exclusive use of NRC inspector(s).

No additional inputs or outputs specified at this level.

1.3.1.4.7 Process Site-Generated Radwaste

All site-generated radioactive waste is collected and processed in preparation for disposal.

Inputs:

• Low-level radioactive waste	1.3.1.1, 1.3.1.2, 1.3.1.4.9
• Maintenance	1.3.1.4.3
• Supplies and packaging material	1.3.1.4.2
• Personnel training	1.3.1.4.5, 1.3.1.4.6
• Records	1.3.1.1, 1.3.1.1, 1.3.1.4.6, 1.3.1.4.9
• Procedures and guidelines	1.3.1.4.6
• Radiation protection services	1.3.1.4.4
• Procedures and guidelines	1.3.1.4.6, 1.3.1.4.5

•	Utilities	1.3.1.4.2

Outputs:

•	Records	1.3.1.1, 1.3.1.2, 1.3.1.4.5, 1.3.1.4.6, 1.3.1.4.9
•	Radiation	Outside SW
•	Packaged radwaste	Outside SW

1.3.1.4.7.1 Collect Liquid Radwaste

Site-generated liquid and gaseous radwaste is collected from the various operations at the MRS in preparation for disposal.

No additional inputs or outputs specified at this level.

1.3.1.4.7.2 Collect Solid Radwaste

Site generated solid radwaste is collected from the various operations at the MRS in preparation for disposal.

Inputs:

•	Unloaded Off-Normal MPC	1.3.1.1.5.7

No additional inputs or outputs specified at this level.

1.3.1.4.7.3 Treat/Package/Monitor/Ship Radwaste for Off-Site Disposal

Site generated solid radwaste is treated, packaged, monitored, and shipped off-site for disposal. Liquid and gaseous radwastes are treated, monitored and released when the concentration levels are within the legal limits.

No additional inputs or outputs specified at this level.

1.3.1.4.7.4 Store Packaged Radwaste for Off-Site Disposal

If required, the site-generated radwaste is stored and monitored in preparation for disposal.

No additional inputs or outputs specified at this level.

1.3.1.4.8 Control Site-Generated Wastes Other than Radwaste

Site generated waste other than radioactive waste is collected, monitored and segregated prior to disposal or off-site release.

Inputs:

•	Hazardous wastes	1.3.1.1.3, 1.3.1.4.2, 1.3.1.4.3, 1.3.1.4.9
•	Liquid and solid wastes	1.3.1.1, 1.3.1.2, 1.3.1.4.2, 1.3.1.4.3, 1.3.1.4.9
•	Maintenance	1.3.1.4.3
•	Supplies and packaging material	1.3.1.4.2
•	Personnel training	1.3.1.4.5, 1.3.1.4.6
•	Records	1.3.1.1, 1.3.1.2, 1.3.1.4.3, 1.3.1.4.9
•	Procedures and guidelines	1.3.1.4.6, 1.3.1.4.5
•	Utilities	1.3.1.4.2
•	RCRA guidelines	1.3.1.4.6

Outputs:

•	Records	1.3.1.4.6
•	Implementing procedures for RCRA materials	1.3.1.4.6
•	Effluent	Outside SW
•	Solid waste	Outside SW
•	Packaged hazardous waste	Outside SW

1.3.1.4.8.1 Monitor All Off-Site Releases

A system is maintained to monitor all off-site releases to the environment (e.g., air, water, site-generated waste).

No additional inputs or outputs specified at this level.

1.3.1.4.8.2 Avoid Use of RCRA Listed Materials

The use of RCRA listed materials is to be precluded to the extent practical. A system is maintained to minimize the use of those materials that fall within the scope of RCRA.

No additional inputs or outputs specified at this level.

1.3.1.4.8.3 Segregate Hazardous Waste Streams

A system is maintained to segregate, monitor and collect hazardous waste prior to disposal or off-site release.

No additional inputs or outputs specified at this level.

1.3.1.4.9 Maintain and Repair Transportation Casks Subsystems

Maintain transportation cask subsystems, including ancillary and related equipment and vehicles, in accordance with regulatory and design requirements by providing routine inspections and maintenance. Conduct annual/periodic tests, inspections, and required maintenance and repair or replace components as required. These activities may be conducted at the CMF or other allocated site as appropriate.

Inputs:

•	Unloaded transportation casks with transporters	1.2, 1.3.1.1.2
•	Equipment, parts, and supplies	Outside SW or 1.3.1.4.2
•	Records	1.2, 1.3.1.1.3, 1.3.1.4.6, 1.3.1.4.7
•	Procedures and guidelines	1.2, 1.3.1.4.6, 1.3.1.4.8
•	Utilities	1.3.1.4.2
•	Radiation protection services	1.3.1.4.4
•	Personnel training	1.2, 1.3.1.4.5, 1.3.1.4.6
•	Surveillance	1.2, 1.3.1.4.5, 1.3.1.4.6

Outputs:

•	Unloaded transportation casks and transporters	1.2, 1.3.1.1.2
•	Records	1.2, 1.3.1.4.5, .6, .7, .8
•	Low-level radwaste	1.3.1.4.7
•	Radiation	Outside SW
•	Other wastes	1.3.1.4.8

1.3.1.4.9.1 Maintain and Repair Transportation Casks

Repair, modify, and maintain transportation casks as documented in a work order or a maintenance schedule. The repair, modification, and maintenance is to be performed in accordance with QA requirements.

No additional inputs or outputs specified at this level.

1.3.1.4.9.2 Maintain and Repair Ancillary Equipment and Special Tools and Fixtures

Repair, modify, and maintain ancillary equipment in accordance with QA requirements.

No additional inputs or outputs specified at this level.

1.3.1.4.9.3 Perform Cask Reconfigurations

Reconfiguration of casks may be required in order to accept the next scheduled waste type. Reconfiguration can vary from changing inserts in spent fuel baskets to allowing for shipment of different lengths of fuel to a complete basket changeout to permit the movement of a different type of waste. SNF baskets for BWR or PWR are changed out between shipping campaigns when necessitated by a change in the SNF type (BWR vs. PWR) being received.

No additional inputs or outputs specified at this level.

1.3.1.4.9.4 Manage Transportation Cask Subsystem Inventory

Manage the inventory of spare parts and consumable supplies to provide assurance that the necessary items are available in a suitable condition to support planned operations and provide accountability for property.

No additional inputs or outputs specified at this level.

1.3.1.4.9.5 Manage Unloaded Cask Inventory

Provide for temporary storage of unloaded casks and maintenance of records for inventory and accountability purposes. Unloaded casks may be received, inspected, and stored until needed for another shipping campaign.

No additional inputs or outputs specified at this level.

1.3.1.4.9.6 Manage Transporter Inventory

Provide for temporary storage of transporters and maintenance of records for accountability purposes. Transporters with unloaded casks may be received inspected and stored until needed for another shipping campaign.

No additional inputs or outputs specified at this level.

1.3.1.4.9.7 Manage Ancillary Equipment and Special Tools and Fixtures Inventory

Store clean equipment and contaminated equipment. Separate storage areas shall be provided in accordance with regulatory requirements. Provisions are made to maintain sufficient inventories to support operations.

No additional inputs or outputs specified at this level.

1.3.1.4.9.8 Manage Spare Parts and Consumables Inventory

Store clean and contaminated spare parts and maintain inventory of consumables. Separate storage areas shall be provided in accordance with regulatory requirements. Provisions are made to maintain sufficient inventories to support operations.

No additional inputs or outputs specified at this level.

1.3.1.4.9.9 Create and Maintain Records

Records are created and maintained for inspections, maintenance, repairs, and modifications of transportation casks and cask subsystems, in accordance with QA procedures. Records are also maintained for the spare parts, equipment, ancillary equipment, special tools, and consumables.

No additional inputs or outputs specified at this level.

1.3.1.4.9.10 Manage Transporter Repair and Maintenance

The repair and maintenance for transporters will be contracted with an existing facility. These maintenance and repairs will be managed through the CMF with complete records being maintained by the CMF.

No additional inputs or outputs specified at this level.

1.3.2 Perform Transfer and Storage Operations

The SNF is placed in or stored at the Purchaser site in the MPC prior to being shipped to a CRWMS facility.

Inputs:	**From:**
• SNF	Purchaser
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask	Purchaser
• Unloaded SNF Transportation Cask Subsystem	Purchaser
• Unloaded MPC Transfer Cask	Purchaser
• Unloaded SNF Transfer Device	Purchaser
• Prepared Storage Mode	Purchaser

Outputs:	**To:**
• Loaded SNF Transportation Cask Subsystem	Purchaser
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded SNF Transfer Device	Purchaser
• Unloaded MPC Transfer Cask	Purchaser
• Unloaded Storage Mode	Purchaser

1.3.2.1 Transfer SNF into an MPC in Fuel Pool

SNF is loaded into the MPC that is within an MPC transportation cask and prepared for shipment to a CRWMS facility. This function includes the option of loading an MPC in an MPC transfer cask in the fuel pool, and providing for a dry on-site transfer to the transportation cask.

Inputs:	**From:**
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded MPC Transfer Cask	Purchaser
• SNF	Purchaser

Outputs:	**To:**
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Loaded MPC Transfer Cask	1.3.2.3.1

1.3.2.1.1 Transfer SNF into an MPC in Transfer Cask in Fuel Pool

SNF is loaded into an MPC contained within an MPC transfer cask. The MPC is loaded in the fuel pool. The loaded MPC/transfer cask is prepared for the dry on-site transfer of the MPC to the MPC transportation cask.

Inputs:	**From:**
• Empty MPC	Purchaser
• Unloaded MPC Transfer Cask	Purchaser
• SNF	Purchaser

Outputs:	**To:**
• Loaded MPC in MPC Transfer Cask	1.3.2.1.2, 1.3.2.3.1

1.3.2.1.2 Transfer Loaded MPC from MPC Transfer Cask into MPC TransportationCask Outside of the Fuel Pool

The loaded MPC and MPC transfer cask combination is moved to the transfer area, where the dry on-site transfer to the MPC transportation cask is performed. This function includes the preparation of the unloaded transportation cask for the transfer and the preparation of the loaded MPC/transportation cask for shipment to a CRWMS facility.

Inputs:	**From:**
• Unloaded MPC Transportation Cask Subsystem	Purchaser
• Loaded MPC in MPC Transfer Cask	1.3.2.1.1

Outputs:	**To:**
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded MPC Transfer Cask	Purchaser

1.3.2.2 Transfer SNF into an MPC Outside of Fuel Pool

The SNF is loaded into an SNF transfer device in the fuel pool for dry transfer to an MPC. The MPC is contained within an MPC transportation cask and prepared for shipment to a CRWMS facility.

Inputs:	**From:**
• SNF	Purchaser
• Unloaded SNF Transfer Device	Purchaser
• Unloaded MPC Transfer Cask	Purchaser
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser

Outputs:	**To:**
• Loaded MPC Transfer Cask	1.3.2.3.1
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded SNF Transfer Device	Purchaser

1.3.2.2.1 Transfer SNF in Fuel Pool into SNF Transfer Device

SNF is loaded into an SNF transfer device in the fuel pool. The SNF transfer cask is then prepared for dry cask-to-cask transfer of the SNF to an MPC.

Inputs:	**From:**
• SNF	Purchaser
• Unloaded SNF Transfer Device	Purchaser

Outputs:	**To:**
• Loaded SNF Transfer Device	1.3.2.2.2, 1.3.2.2.3

1.3.2.2.2 Transfer SNF from SNF Transfer Device into an MPC in an MPC Transportation Cask Outside of Fuel Pool

The MPC and MPC transportation cask combination is loaded with SNF by dry cask-to-cask transfer from the SNF transfer device. The loaded MPC transportation cask is then prepared for shipment to a CRWMS facility.

Inputs:	**From:**
• Loaded SNF Transfer Device	1.3.2.2.1
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser

Outputs:	**To:**
• Unloaded SNF Transfer Device	Purchaser
• Loaded MPC Transportation Cask Subsystem	Purchaser

1.3.2.2.3 Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool

SNF is loaded into the MPC using dry cask-to-cask transfer methods from the SNF transfer device to the MPC and MPC transfer cask combination.

Inputs:	**From:**
• Loaded SNF Transfer Device	1.3.2.2.1
• Empty MPC	Purchaser
• Unloaded MPC Transfer Cask	Purchaser

Outputs:	**To:**
• Unloaded SNF Transfer Device	Purchaser
• Loaded MPC Transfer Cask	1.3.2.3.1

1.3.2.3 Store MPC On-Site

The MPC is placed in a storage mode for a period of time prior to transportation to a CRWMS facility. An MPC transfer cask may be requirement to move the loaded MPC from the storage mode to an area for transfer to the MPC transportation cask.

Inputs:	**From:**
• Unloaded Storage Mode	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser
• Loaded MPC Transfer Cask	1.3.2.1.1, 1.3.2.2.3

Outputs:	**To:**
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded Storage Mode	Purchaser
• Unloaded MPC Transfer Cask	Purchaser

1.3.2.3.1 Transfer MPC from MPC Transfer Cask to Storage Mode

The loaded MPC is moved in an MPC transfer cask to the storage mode. The MPC is then transferred from the MPC transfer cask to the prepared storage mode.

Inputs:	**From:**
• Unloaded Storage Mode	Purchaser
• Loaded MPC Transfer Cask	1.3.2.1.1, 1.3.2.2.3

Outputs:	**To:**
• Loaded Storage Mode	1.3.2.3.2
• Unloaded MPC Transfer Cask	Purchaser

1.3.2.3.2 Conduct Storage Mode Operations

The loaded MPC is contained within the ISFSI storage mode and is monitored and maintained.

Inputs:	**From:**
• Loaded Storage Mode	1.3.2.3.1

Outputs:	**To:**
• Loaded Storage Mode	1.3.2.3.3

1.3.2.3.3 Transfer MPC From Storage to MPC Transportation Cask

The loaded MPC is removed from the storage mode and transferred dry into an MPC transportation cask for shipment. This function may require the transfer of the MPC into an MPC transfer cask for movement to an area for transfer to the MPC transportation cask.

Inputs:	**From:**
• Loaded Storage Mode	1.3.2.3.2
• Unloaded MPC Transportation Cask Subsystem	Purchaser

Outputs:	**To:**
• Unloaded Storage Mode	Purchaser
• Loaded MPC Transportation Cask Subsystem	Purchaser

1.3.2.4 Transfer SNF into a Transportation Cask in Fuel Pool

SNF is loaded directly into a transportation cask for shipment. The SNF may be loaded into an MPC transportation cask or a SNF transportation cask. This function does not include the use or operation of any OSTS equipment.

Inputs:	**From:**
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser
• Unloaded SNF Transportation Cask Subsystem	Purchaser
• SNF	Purchaser

Outputs:	**To:**
• Loaded MPC Transportation Cask Subsystem	Purchaser
• Loaded SNF Transportation Cask Subsystem	Purchaser

1.3.2.4.1 Transfer SNF into an MPC in an MPC Transportation Cask in Fuel Pool

SNF is loaded into the MPC that is contained within the MPC transportation cask. The MPC loading is performed in the fuel pool.

Inputs:	**From:**
• Empty MPC	Purchaser
• Unloaded MPC Transportation Cask Subsystem	Purchaser
• SNF	Purchaser

Outputs:	**To:**
• Loaded MPC Transportation Cask Subsystem	

1.3.2.4.2 Transfer SNF into SNF Transportation Cask in Fuel Pool

SNF is loaded directly into an SNF transportation cask in the fuel pool. The bare SNF would be placed in an MPC at the MRS or Repository.

Inputs:	**From:**
• Unloaded SNF Transportation Cask Subsystem	Purchaser
• SNF	Purchaser

Outputs:	**To:**
• Loaded SNF Transportation Cask Subsystem	Purchaser

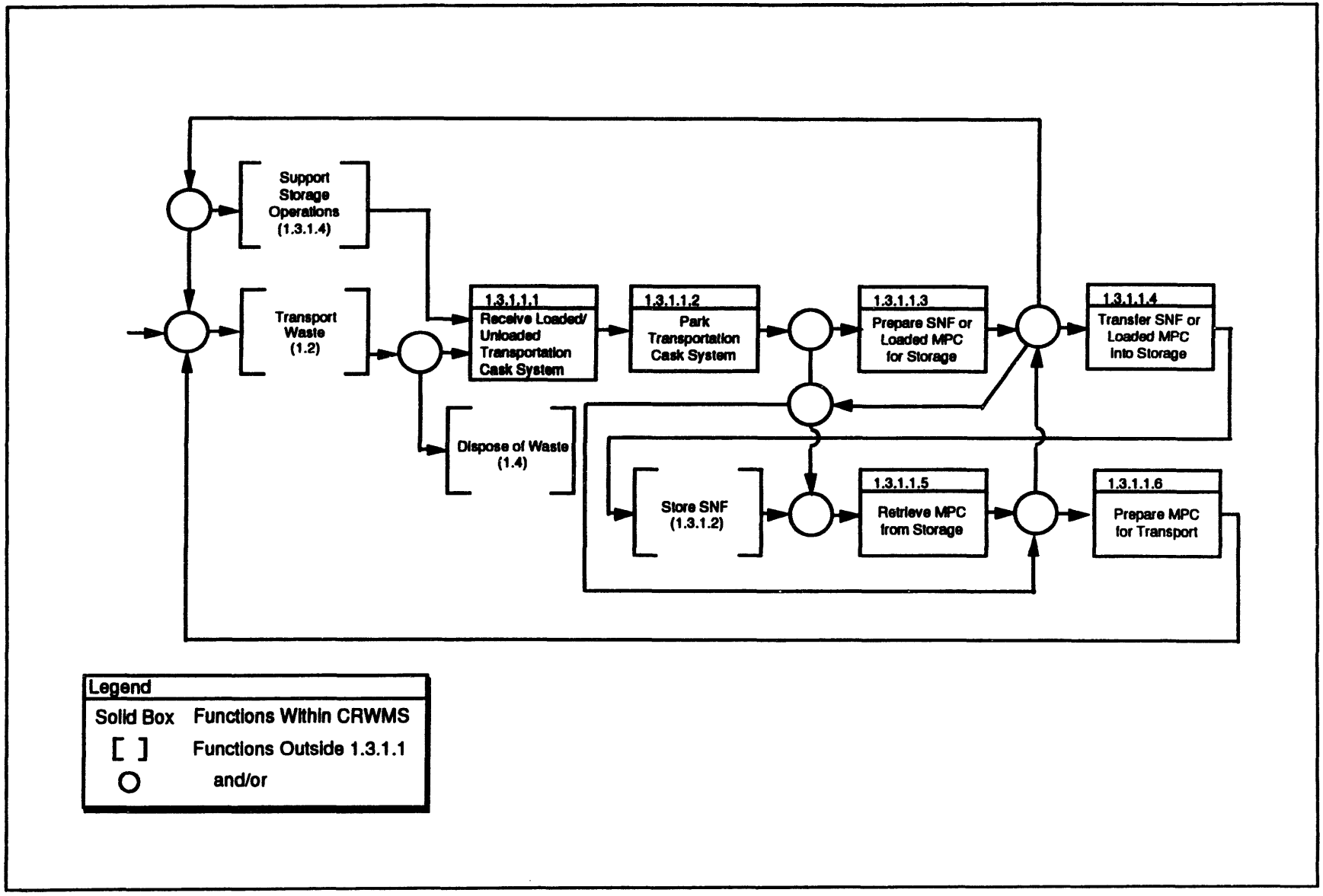

Figure A-1. 1.3.1.1 Handle SNF or Loaded MPC Function Flow Diagram

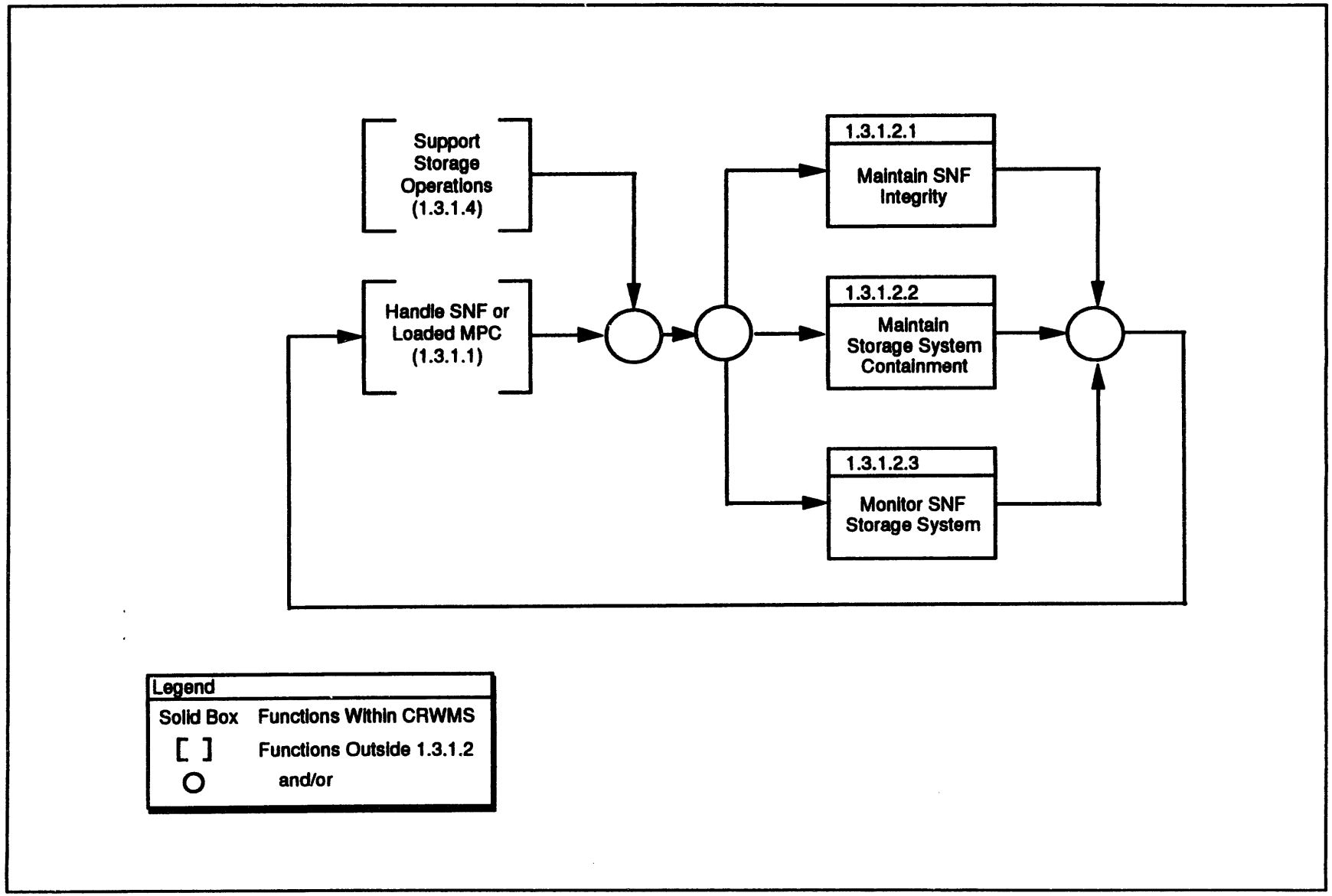

Figure A-2. 1.3.1.2 Store SNF Function Flow Diagram

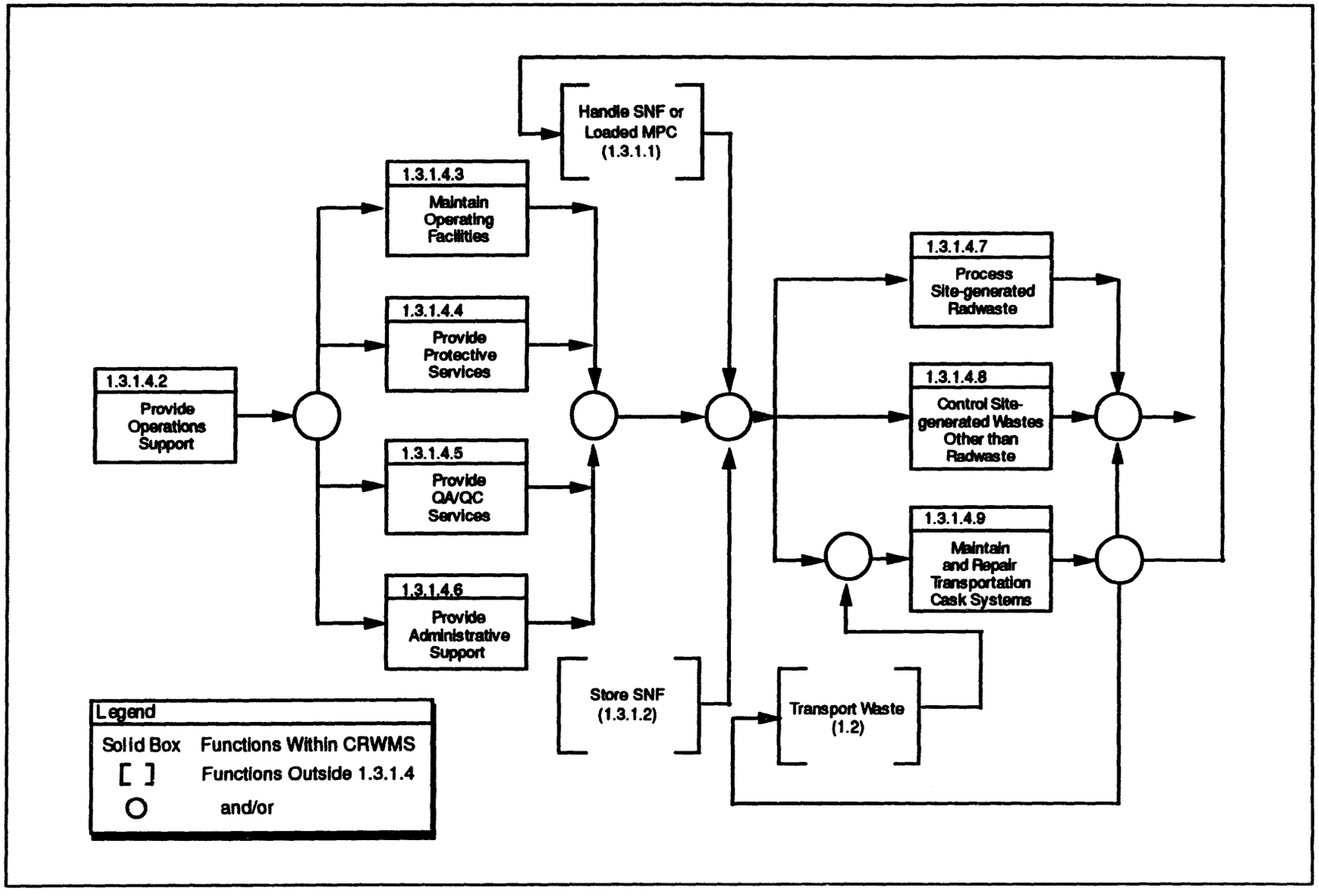

Figure A-3. 1.3.1.4 Support Storage Operations Function Flow Diagram

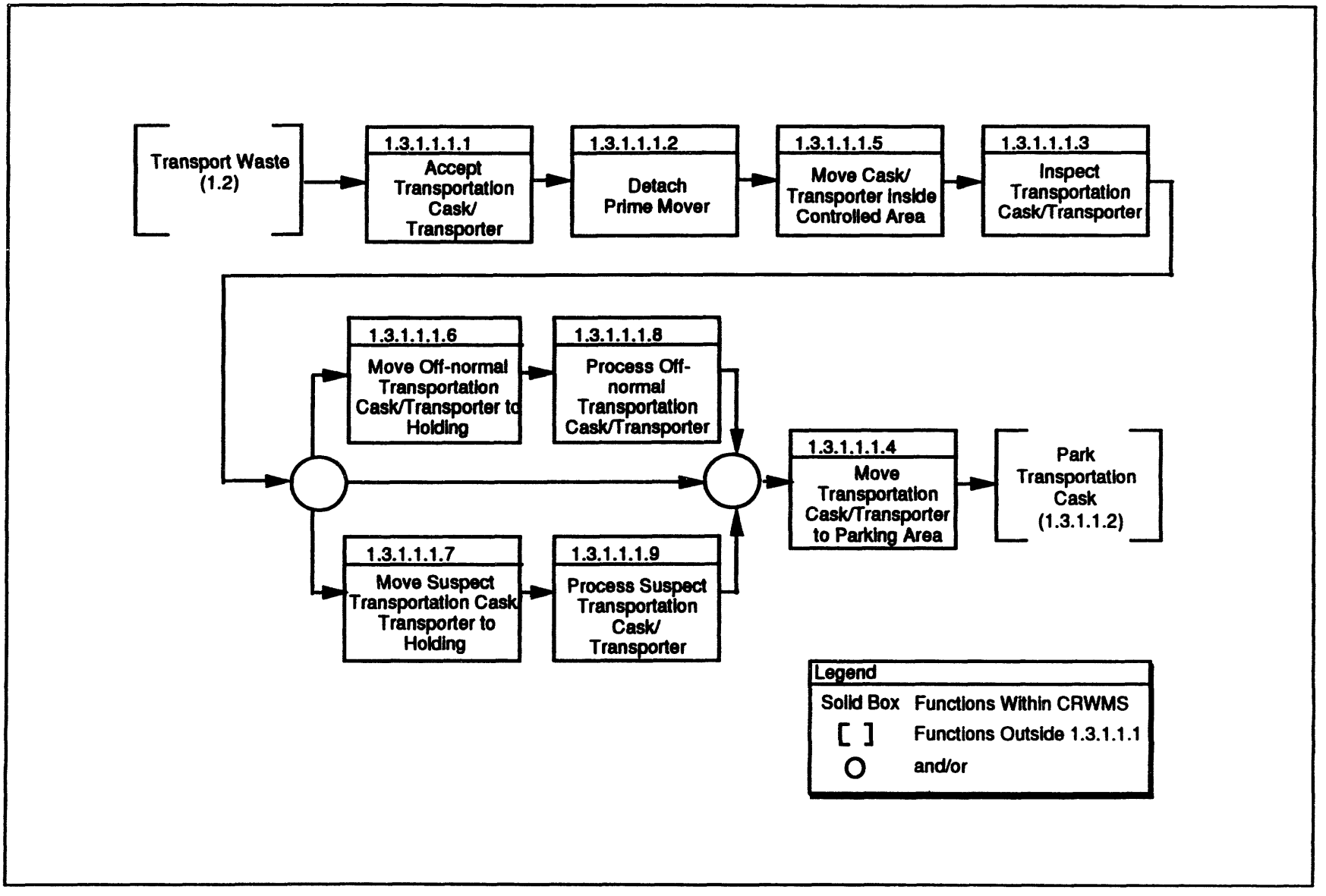

Figure A-4. 1.3.1.1.1 Receive Loaded/Unloaded Transportation Cask System Function Flow Diagram

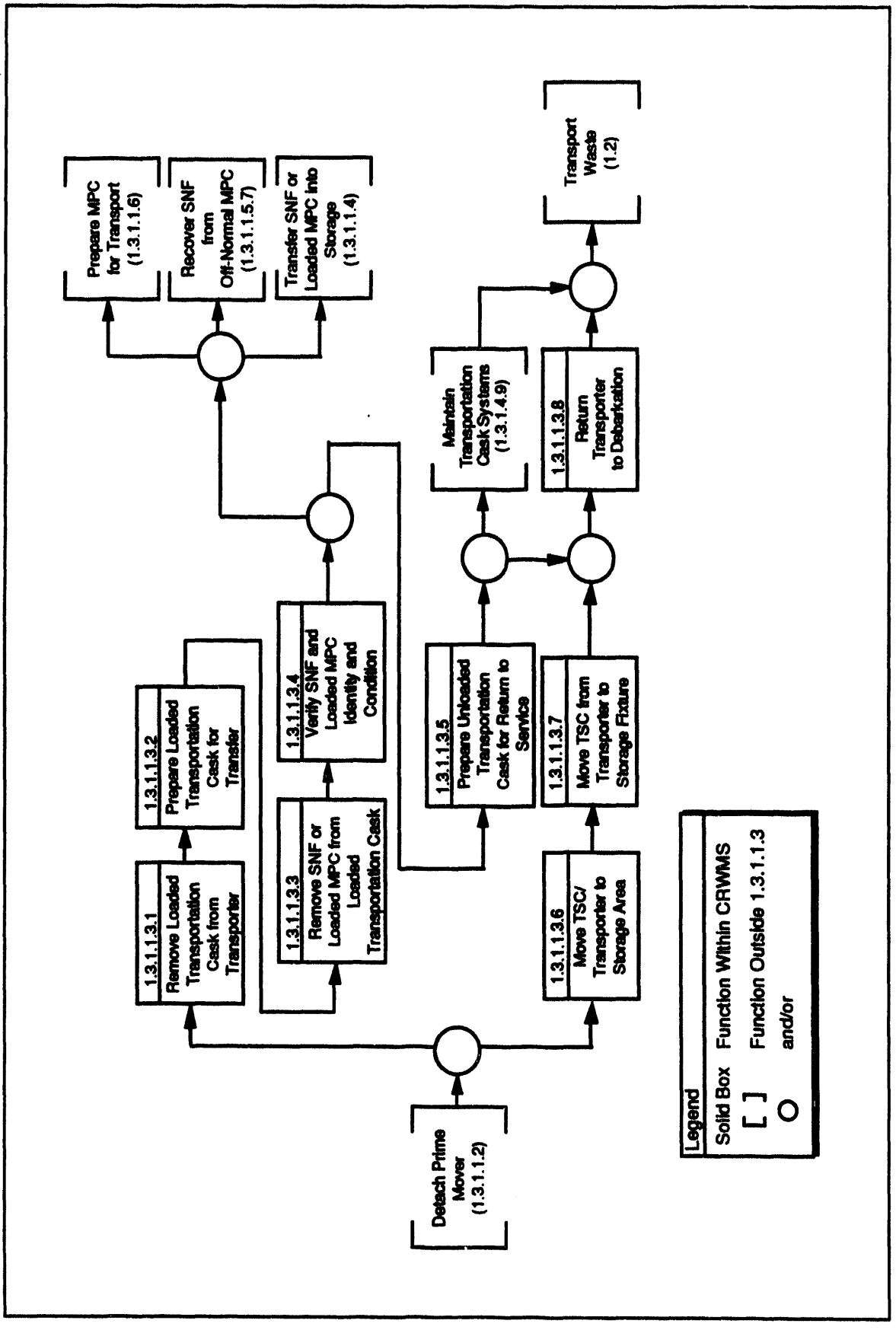

Figure A-5. 1.3.1.1.3 Prepare SNF or Loaded MPC for Storage Function Flow Diagram

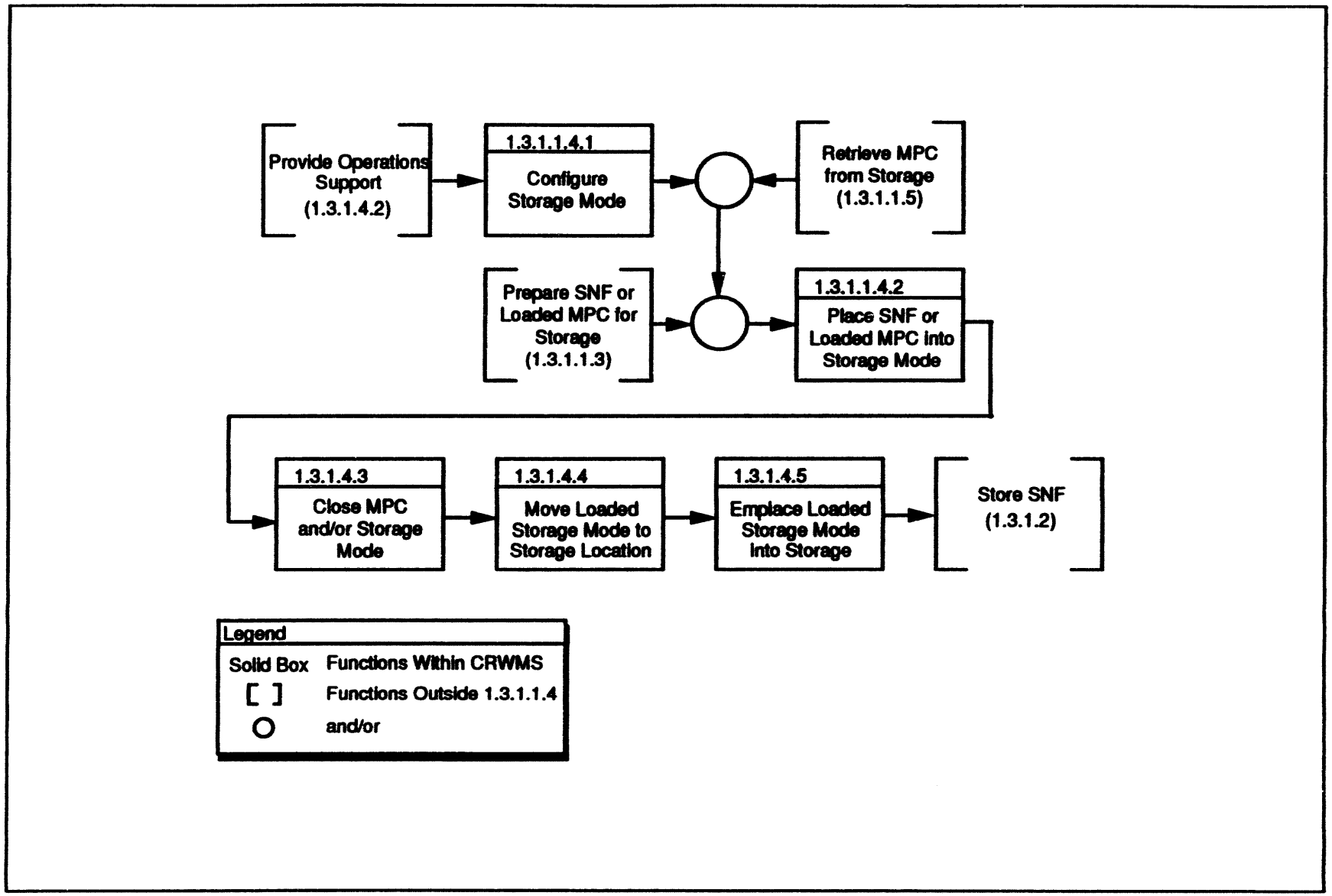

Figure A-6. 1.3.1.1.4 Transfer SNF or Loaded MPC into Storage Function Flow Diagram

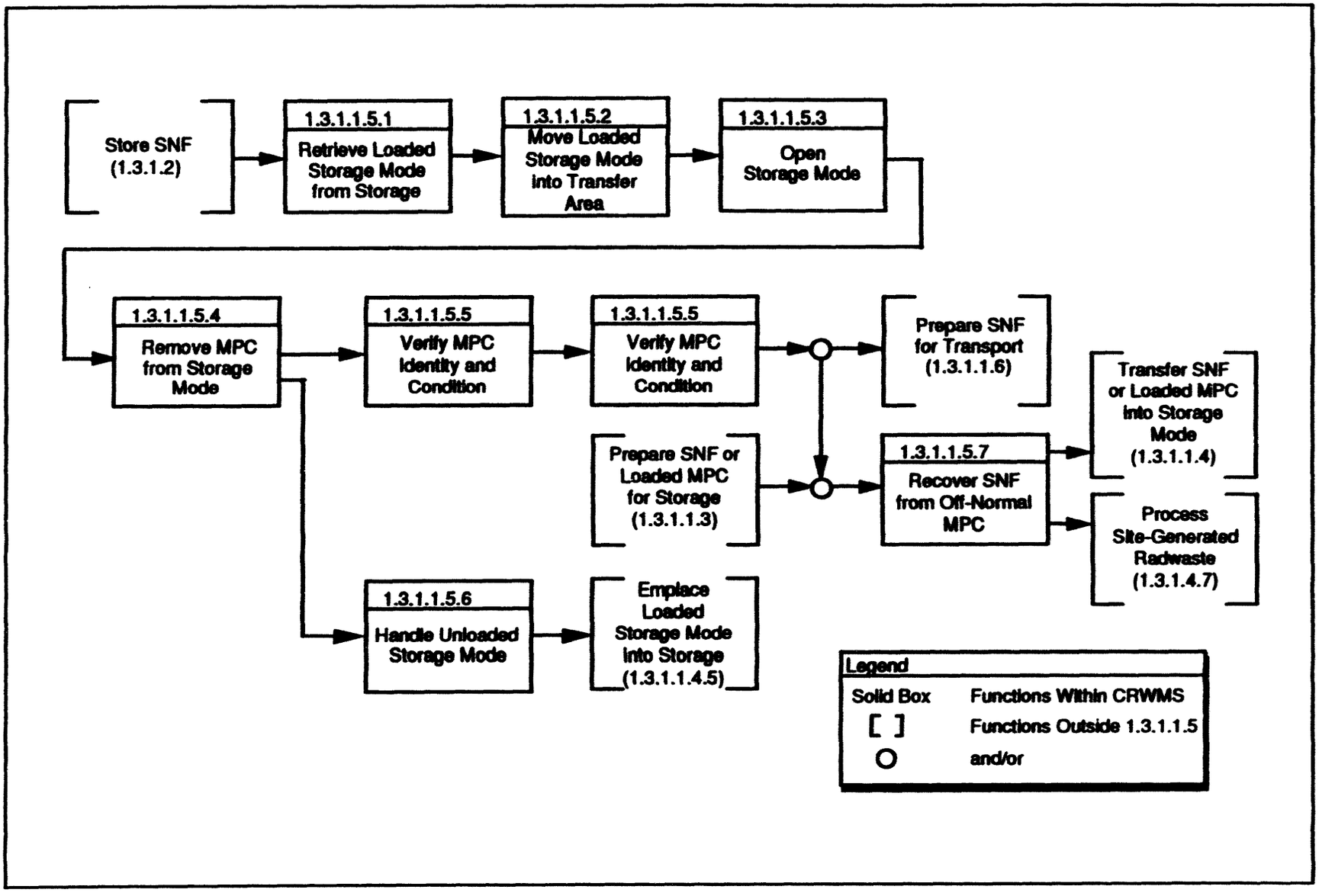

Figure A-7. 1.3.1.1.5 Retrieve MPC from Storage Function Flow Diagram

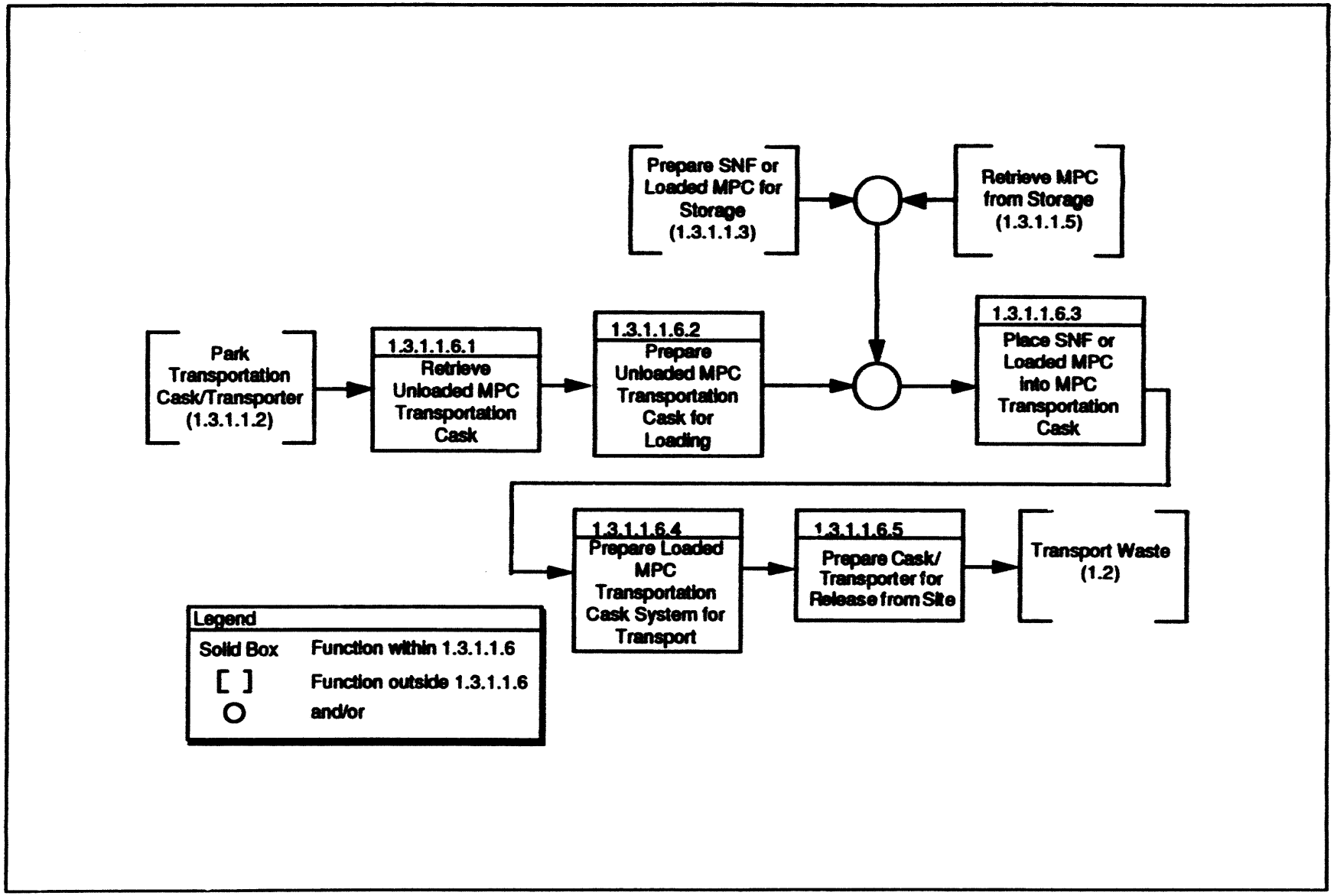

Figure A-8. 1.3.1.1.6 Prepare MPC for Transport Function Flow Diagram

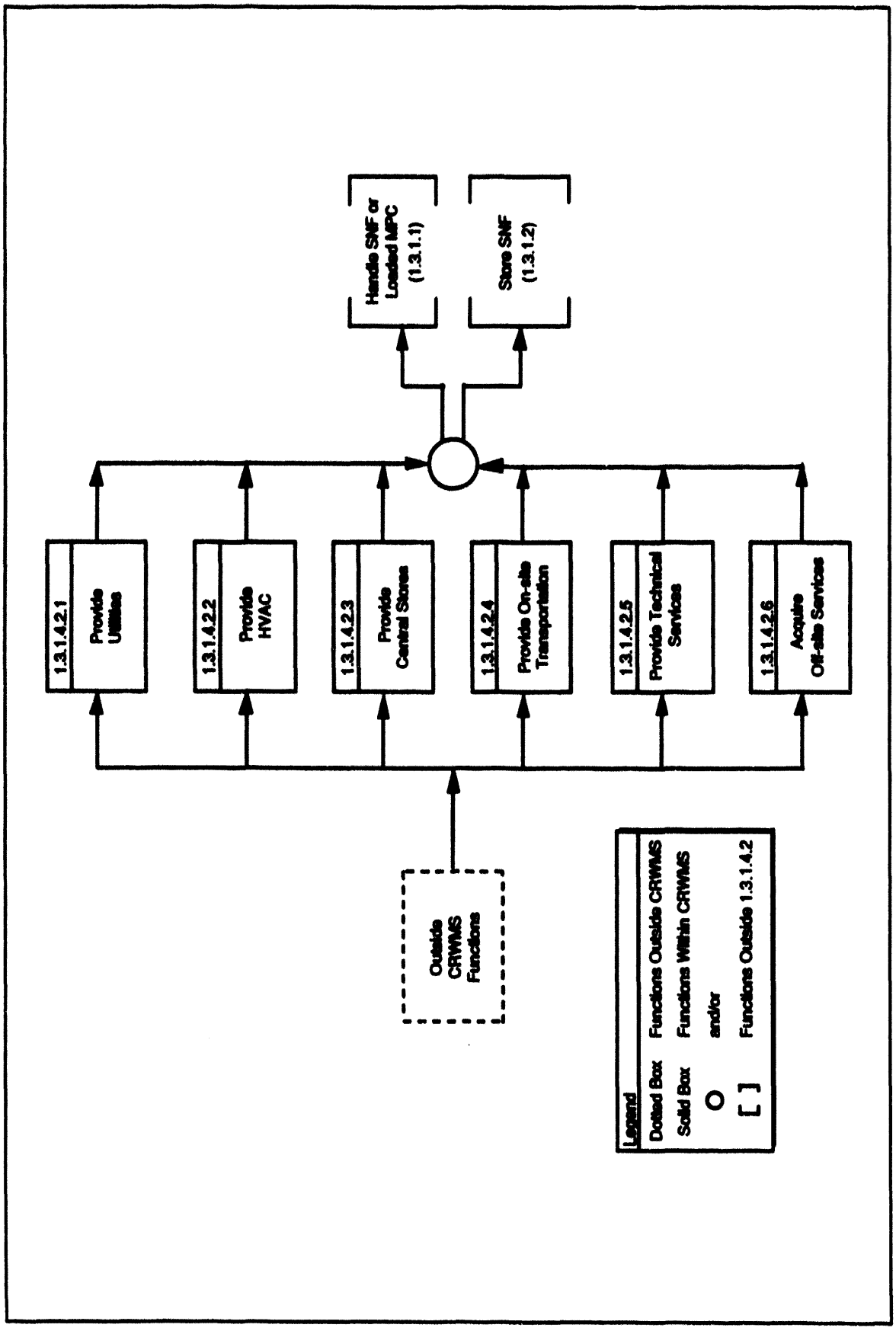

Figure A-9. 1.3.1.4.2 Provide Operations Support Function Flow Diagram

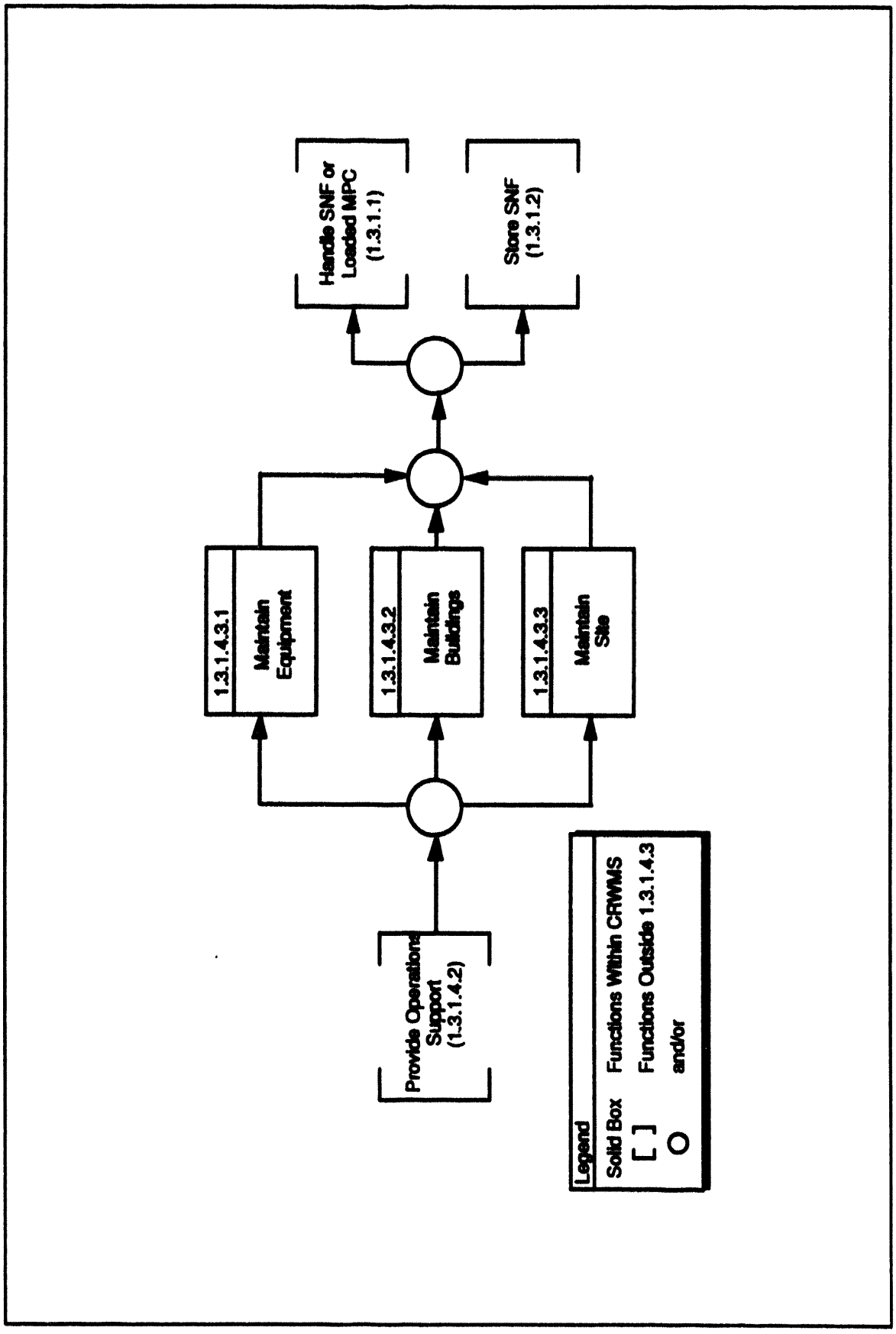

Figure A-10. 1.3.1.4.3 Maintain Operating Facilities Function Flow Diagram

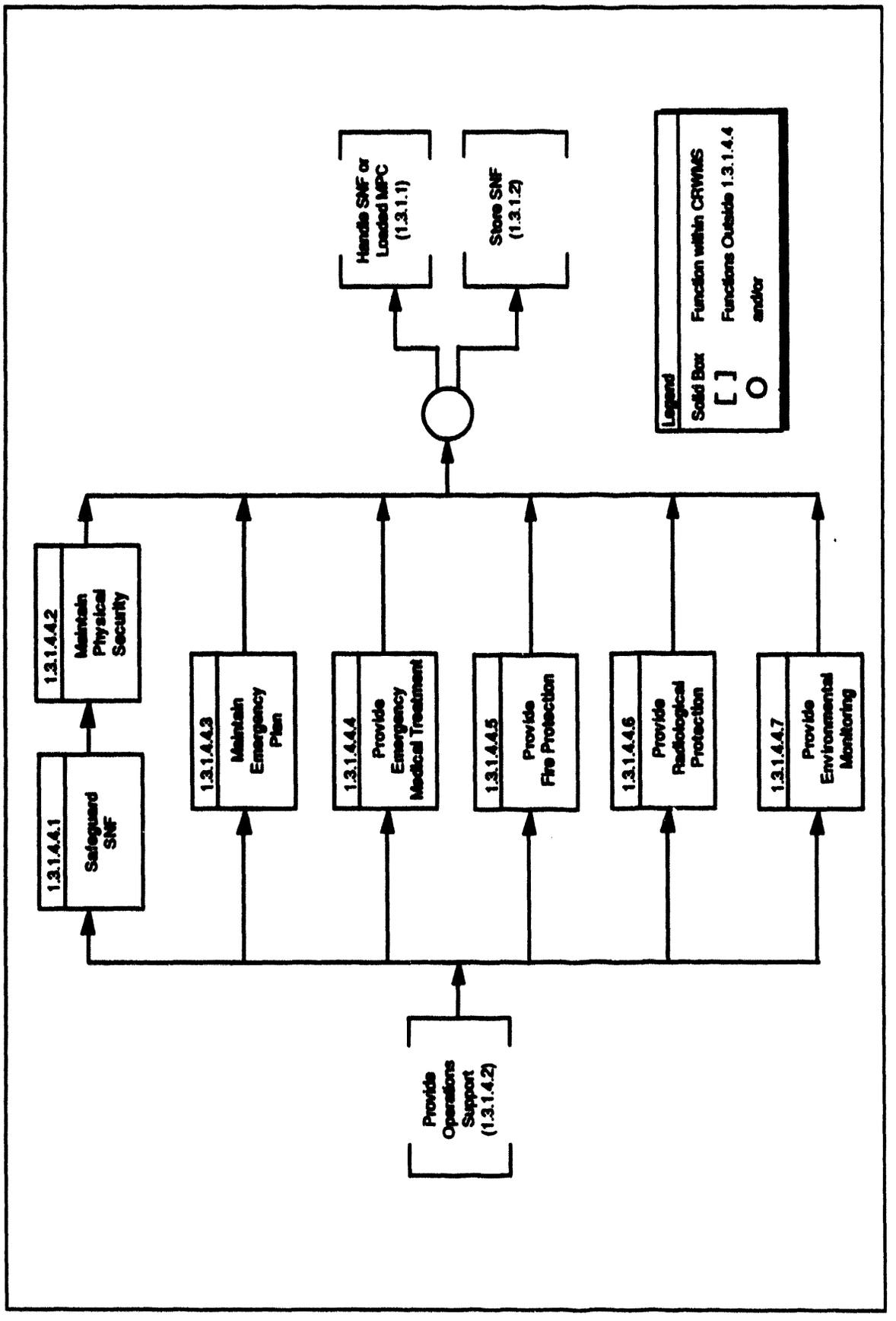

Figure A-11. 1.3.1.4.4 Provide Protection Services Function Flow Diagram

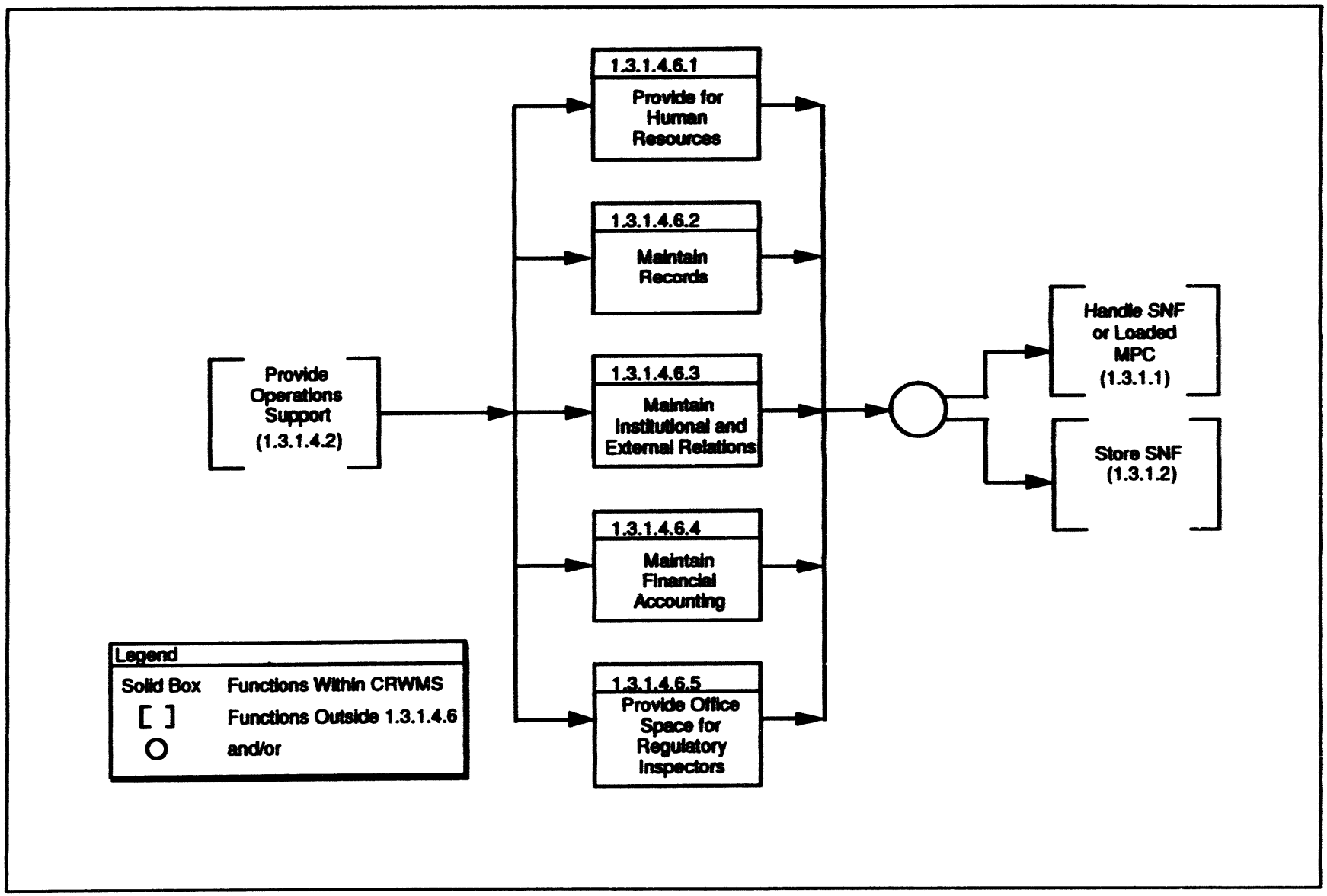

Figure A-12. 1.3.1.4.6 Provide Administrative Support Function Flow Diagram

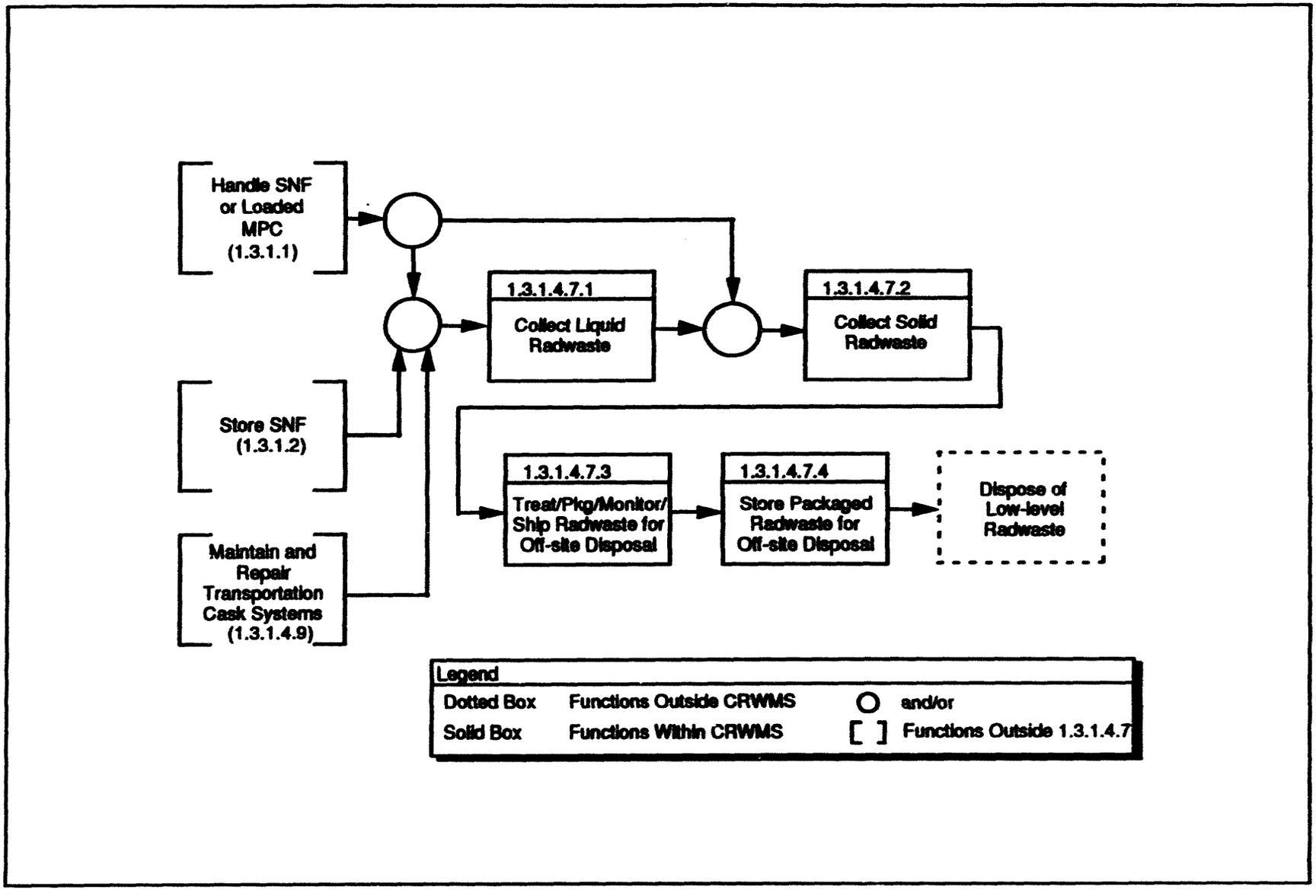

Figure A-13. 1.3.1.4.7 Process Site-Generated Radwaste Function Flow Diagram

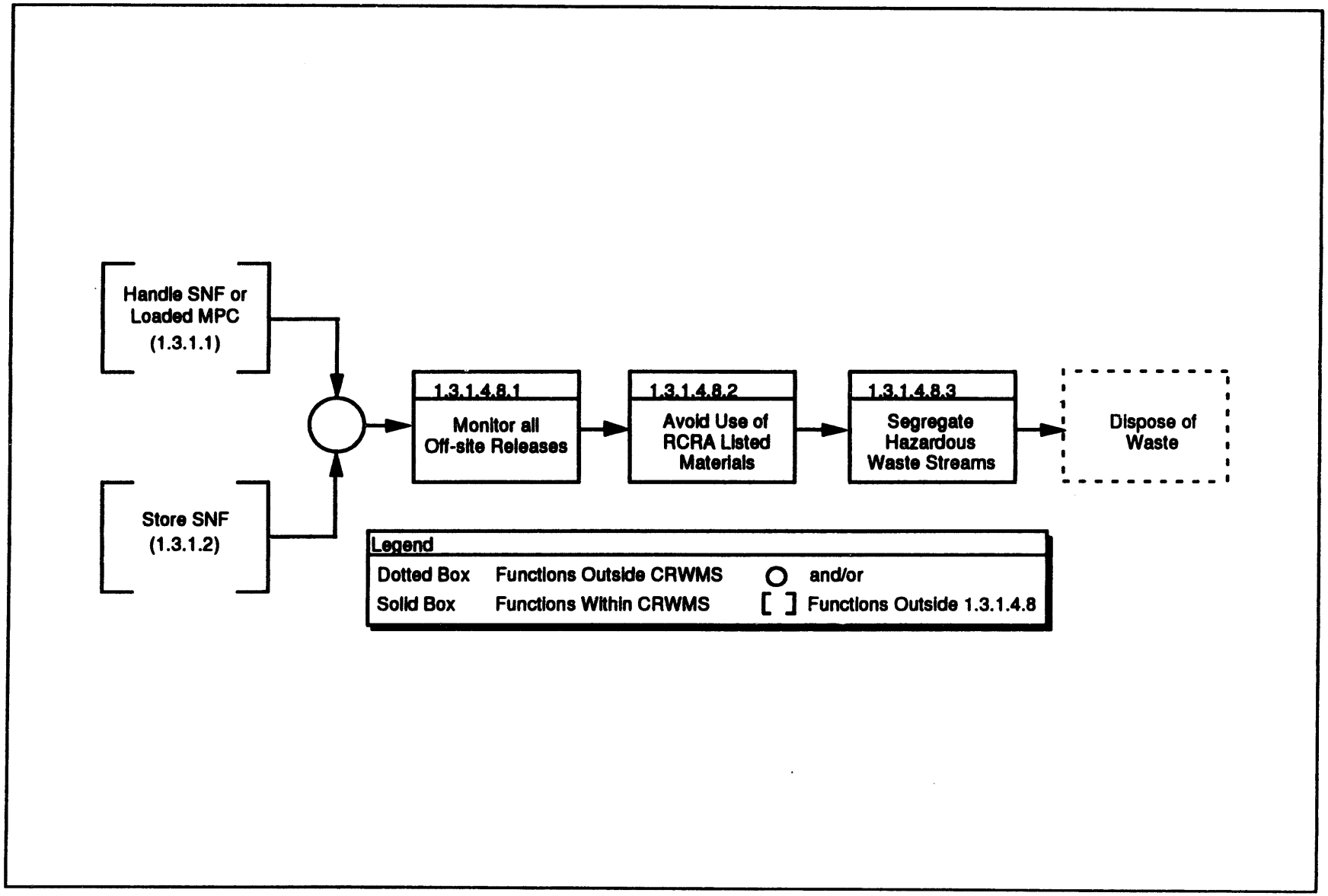

Figure A-14. 1.3.1.4.8 Control Site-Generated Wastes Other than Radwaste Function Flow Diagram

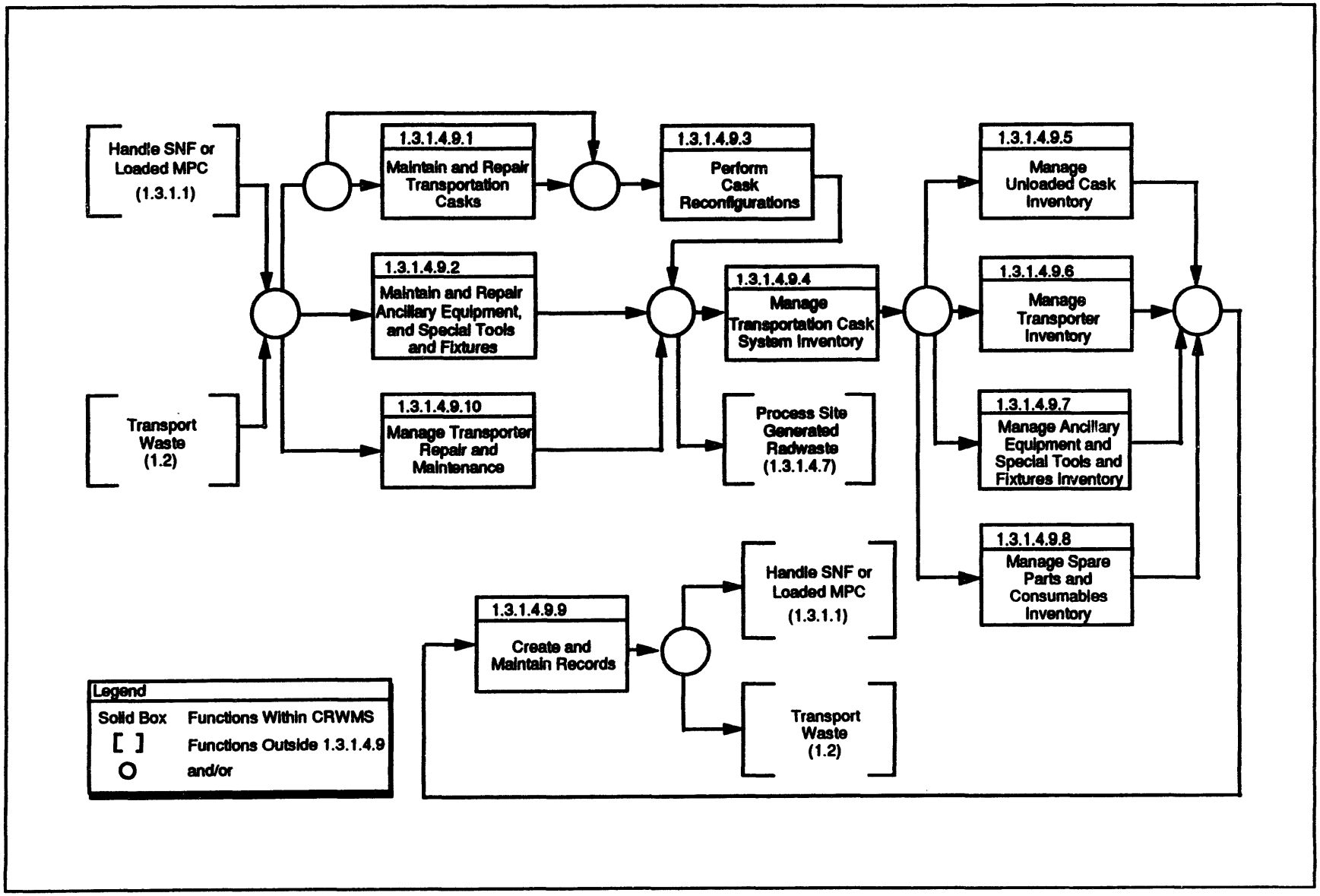

Figure A-15. 1.3.1.4.9 Maintain and Repair Transportation Cask Systems Function Flow Diagram

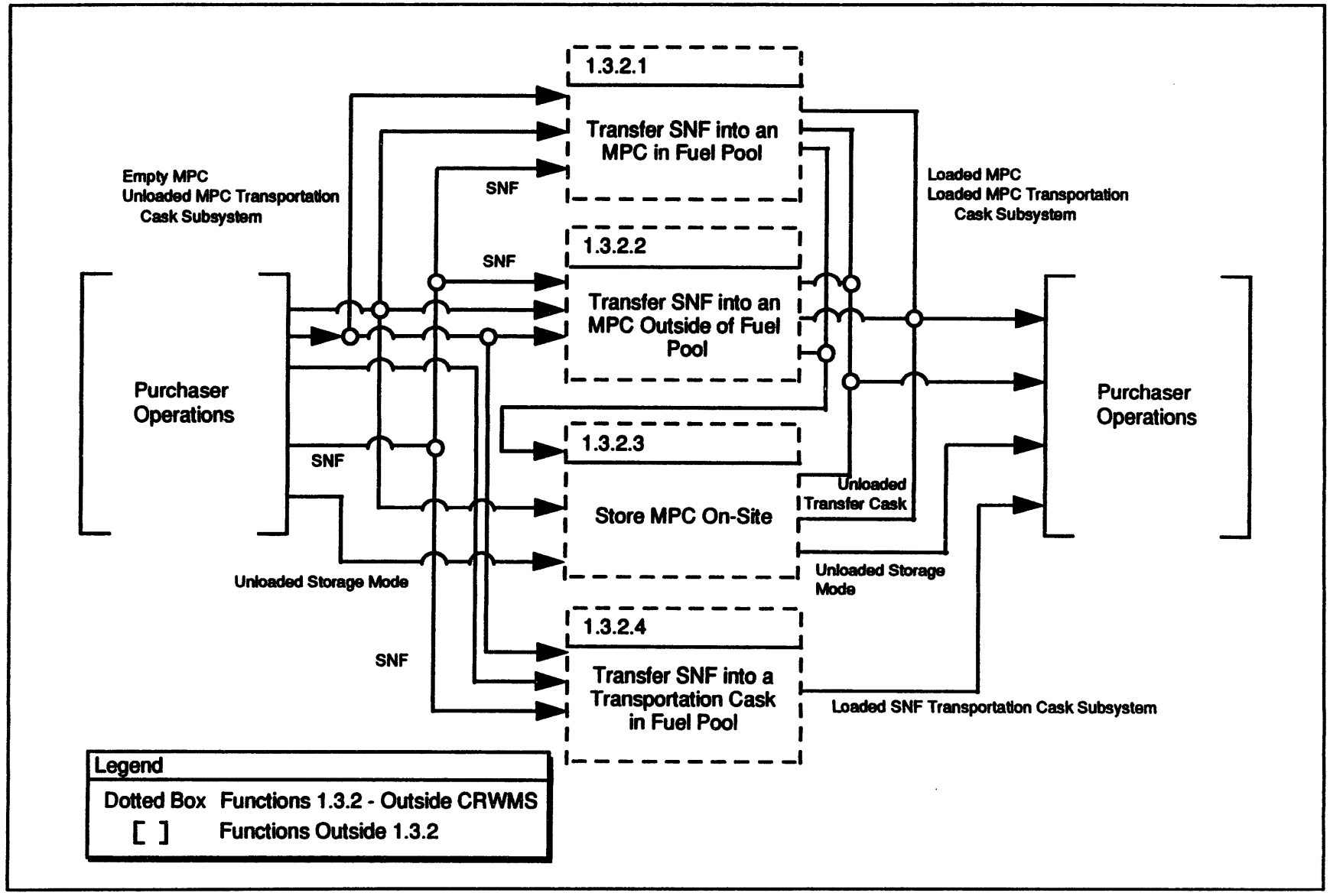

Figure A-16. 1.3.2 Perform Transfer and Storage Operations Function Flow Diagram

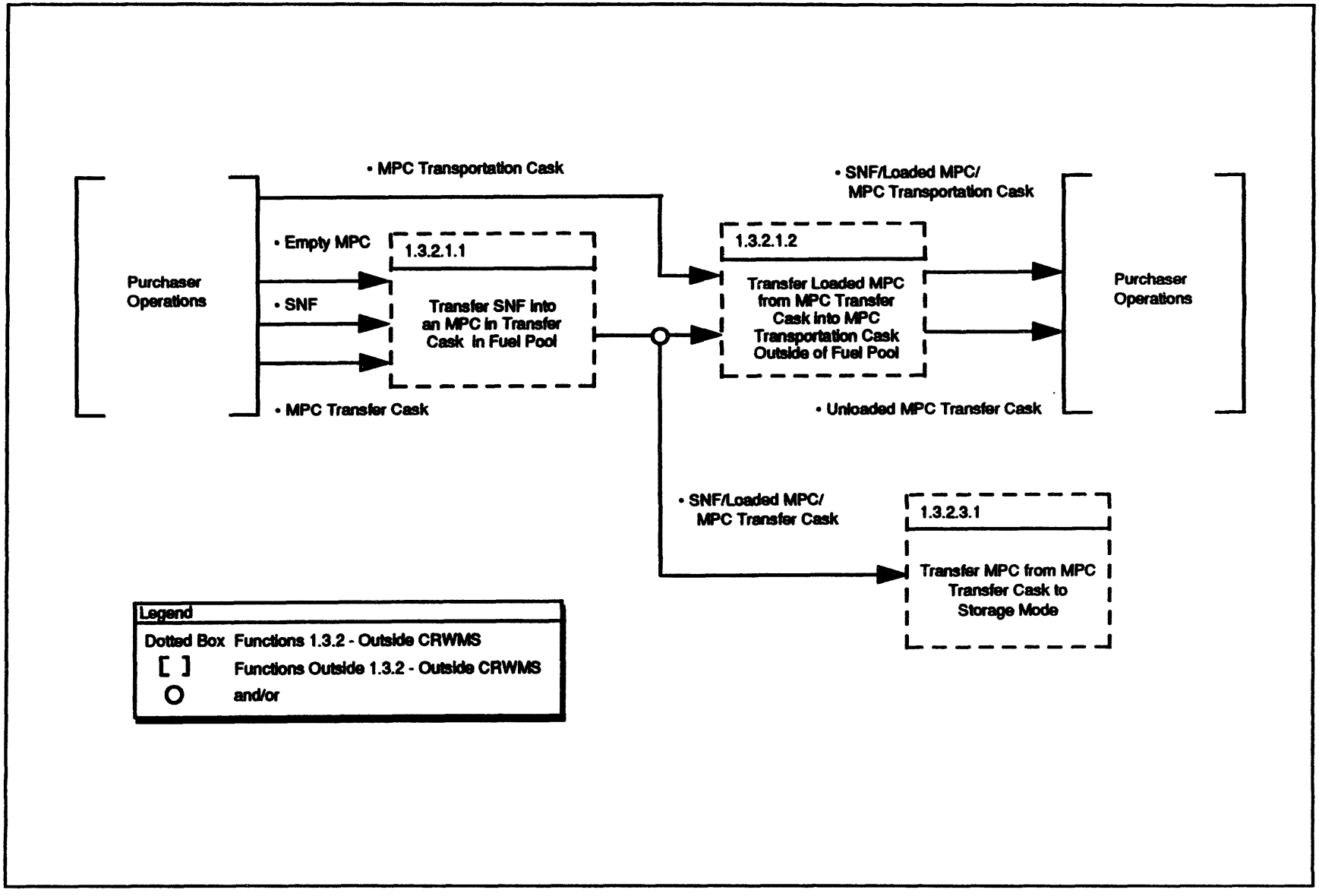

Figure A-17. 1.3.2.1 Transfer SNF into MPC in Fuel Pool Function Flow Diagram

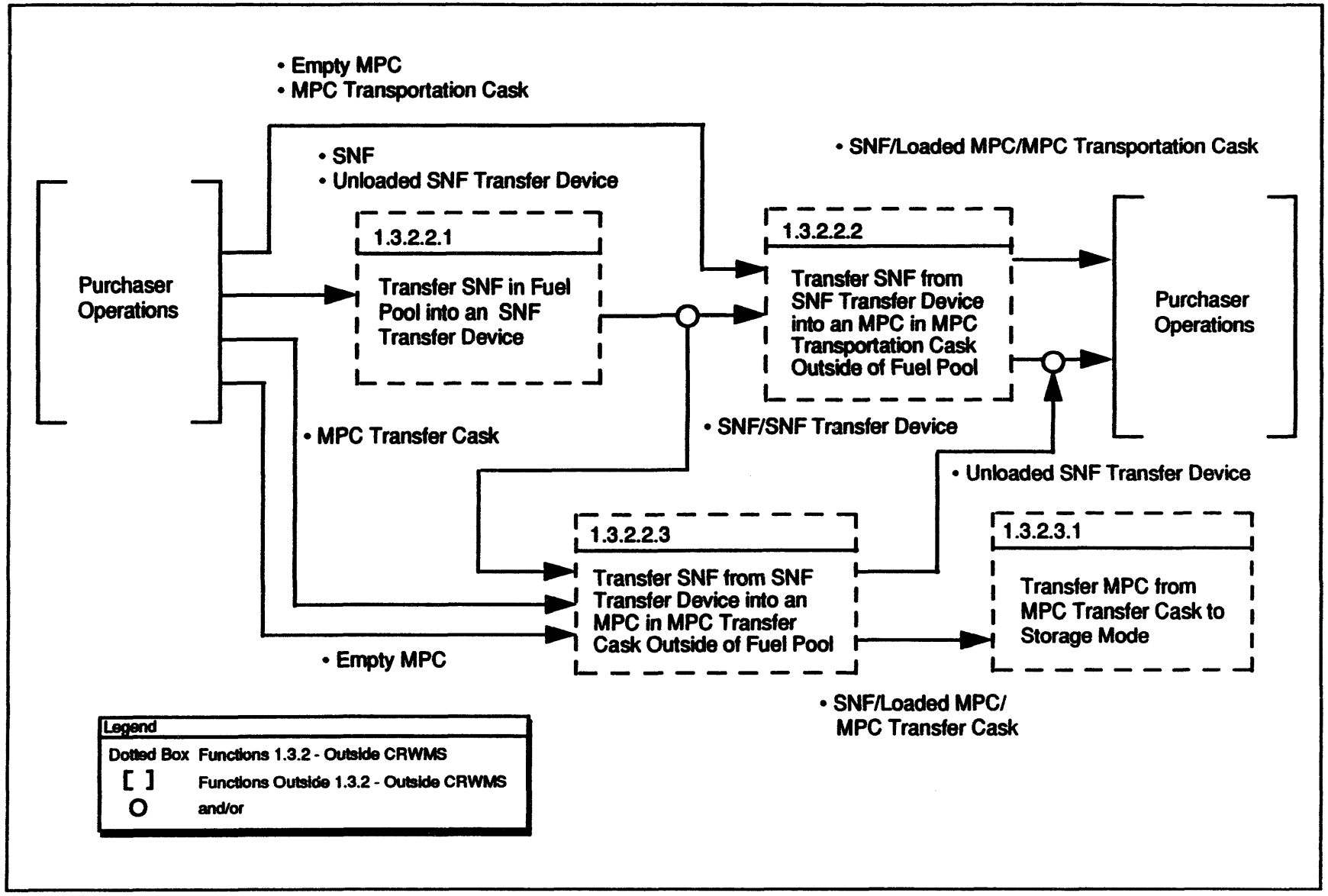

Figure A-18. 1.3.2.2 Transfer SNF into an MPC Outside of Fuel Pool Function Flow Diagram

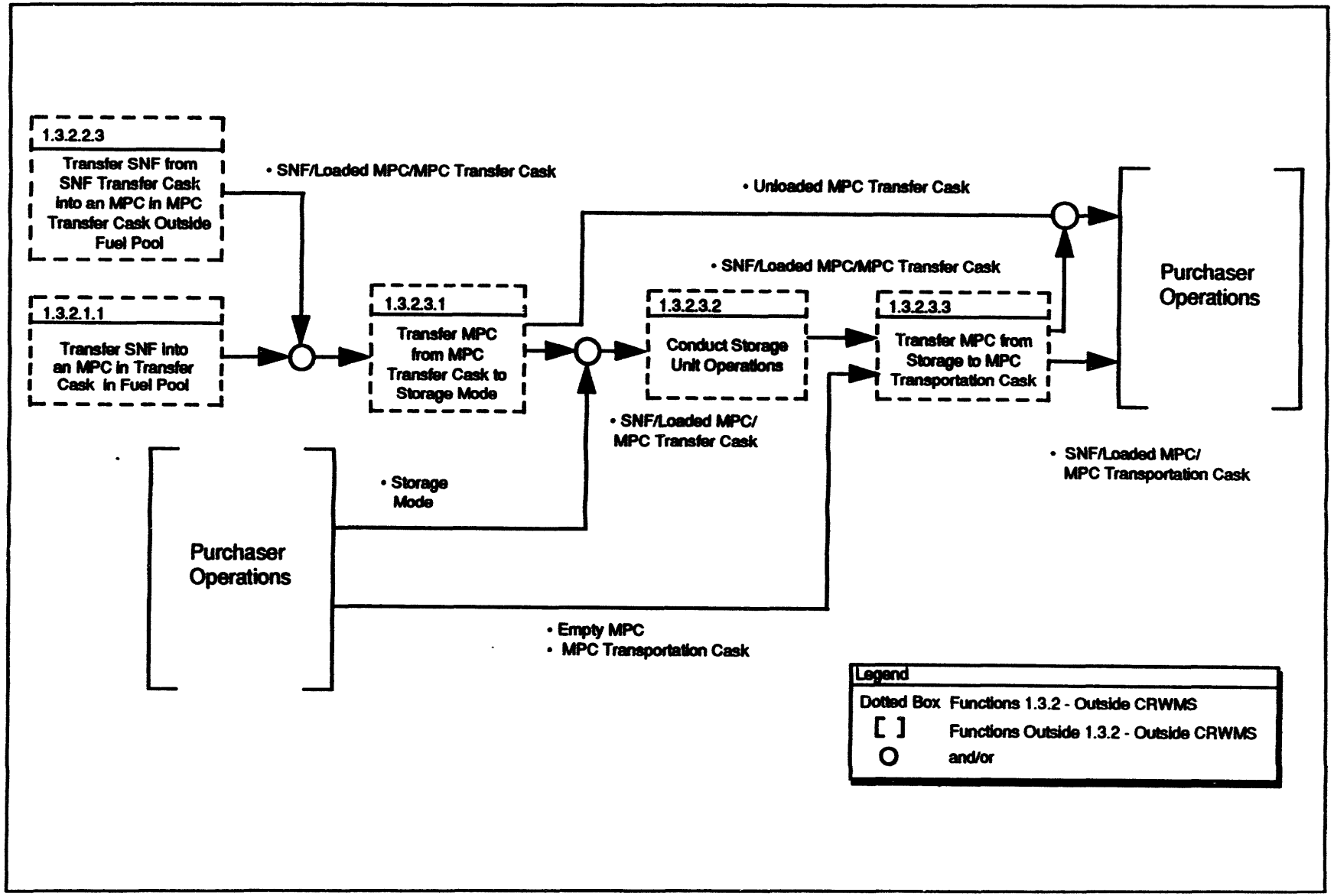

Figure A-19. 1.3.2.3 Store MPC On-Site Function Flow Diagram

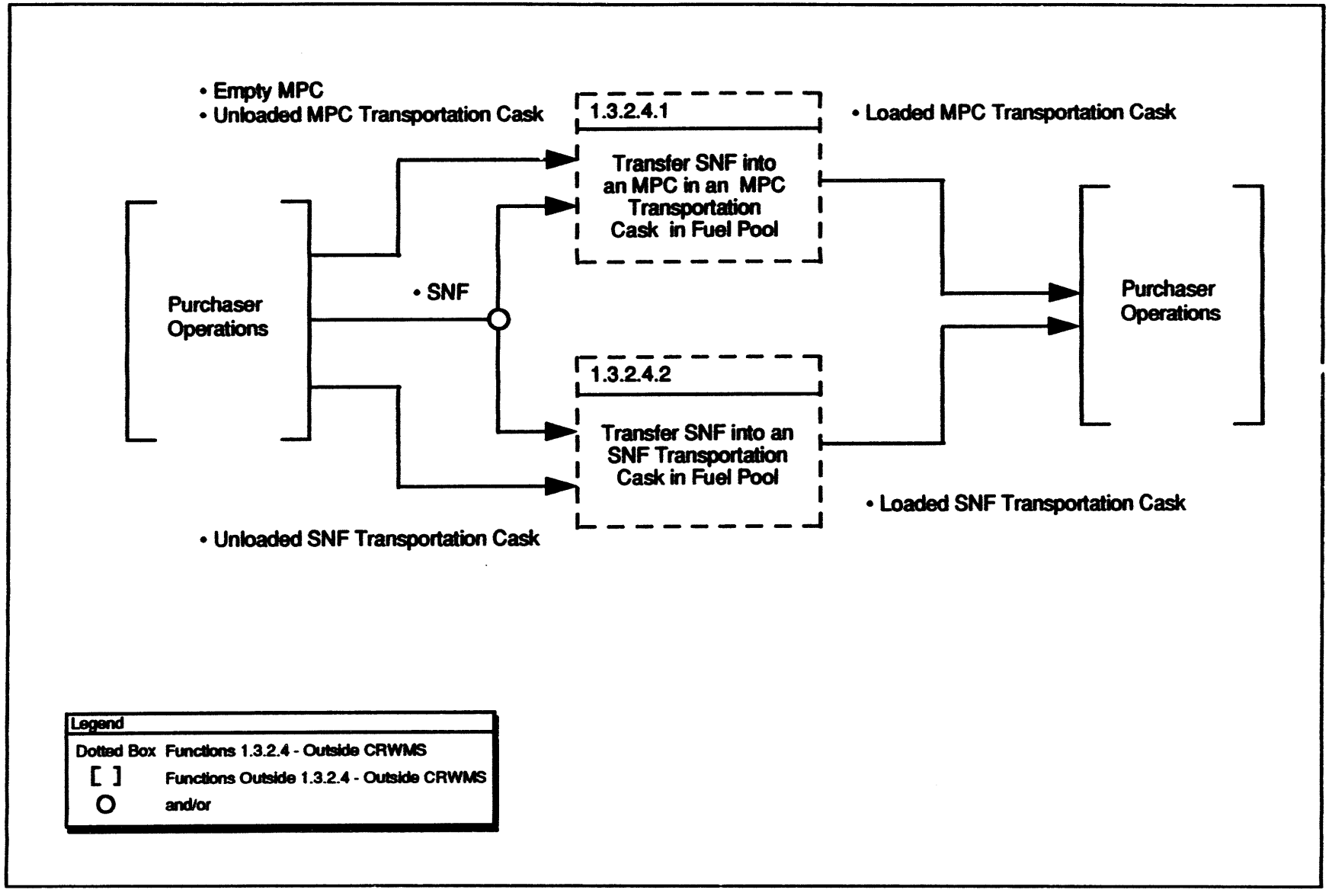

Figure A-20. 1.3.2.4 Transfer SNF into a Transportation Cask Function Flow Diagram

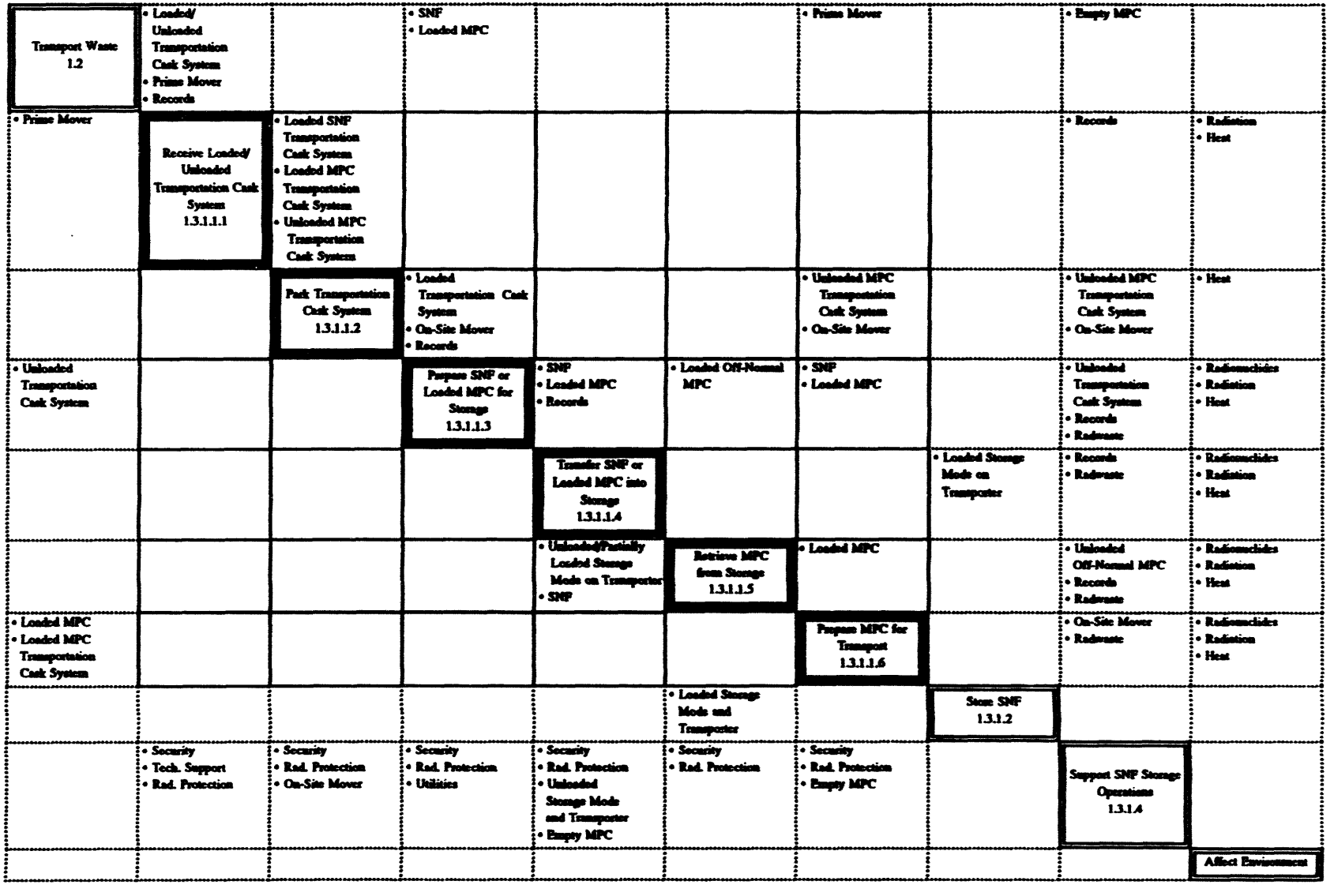

Figure A-21. N-Square Chart for 1.3.1.1 Handle SNF or Loaded MPC

Outside Store Waste		Prime Mover, Cask & Trans., Manifest								
Prime Mover	Outside 1.3.1.1.1	Security, R.P.	On-site Mover, Security, R.P.	Security, R.P.	Security, R.P.	Security, R.P.	Security, R.P.	Security, R.P.	Security, R.P.	Security, R.P., Technical Support
Radiation, Heat	Manifest	Accept Transportation Cask/Transp. 1.3.1.1.1.1	Prime Mover, Cask & Trans., Records							
Radiation, Heat	Prime Mover, Report		Dutch Prime Mover 1.3.1.1.1.2			On-site Mover Cask & Trans., Records				
Radiation Heat	Report of Cask Status			Inspect Transportation Cask/Transp. 1.3.1.1.1.3	On-site Mover, Cask, Trans., Records		Off-Normal Problem Report, On-site Mover, Problem Cask & Trans., Records	Suspect Problem Report, On-site Mover, Problem Cask & Trans. Records		
Radiation, Heat	Report of Cask Location, On-Site Mover, Cask & Trans.				Move Transportation Cask/Transp. to Parking 1.3.1.1.1.4					
Radiation, Heat	Report of Cask Location			On-site Mover Cask & Trans., Records, Problem Report		Move Cask/Transp. In Controlled Area 1.3.1.1.1.5	Off-Normal Problem Report (If applicable)			
Radiation, Heat	Report of Incorrect Manifest						Move Off-Normal Cask /Transp. to Holding 1.3.1.1.1.6		On-site Mover Problem Cask & Trans., Records	
Radiation Heat	Initial Suspect Cask Report							Move Suspect Cask / Transp. to Holding 1.3.1.1.1.7		On-site Mover Problem Cask & Trans., Records
Radiation, Heat	Corrected Manifest, Completed Problem Report				On-site Mover Cask & Trans., Records				Process Off-Normal Cask/Transp. 1.3.1.1.1.8	
Radiation, Heat	Completed Suspect Cask Report				On-site Mover Cask & Trans., Records					Process Suspect Ship. Cask/Transp. 1.3.1.1.1.9

Figure A-22. N-Square Chart for 1.3.1.1.1 Receive Loaded/Unloaded Transportation Cask

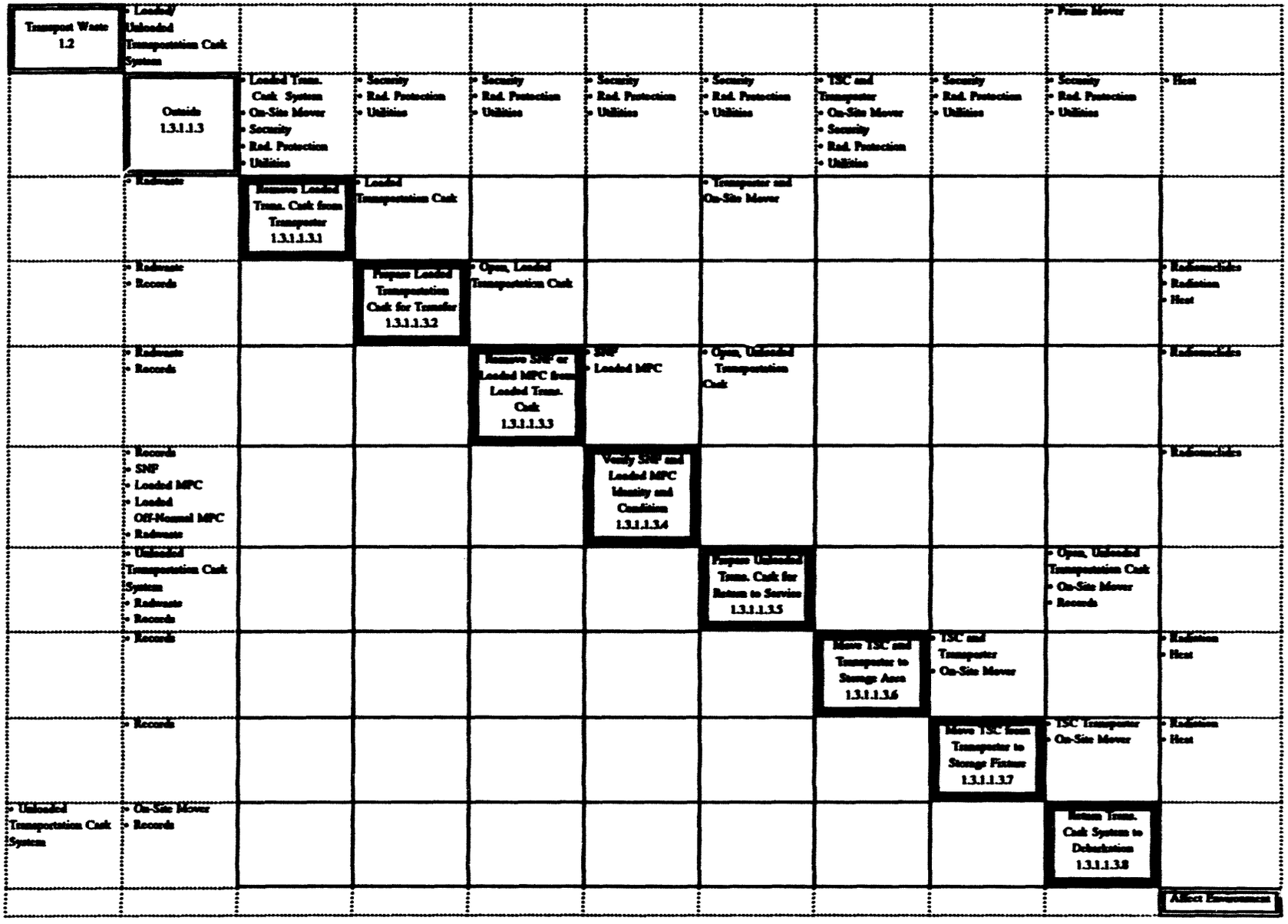

Figure A-23. N-Square Chart for 1.3.1.1.3 Prepare SNF or Loaded MPC for Storage

Figure A-24. N-Square Chart for 1.3.1.1.4 Transfer SNF or Loaded MPC into Storage

Figure A-25. N-Square Chart for 1.3.1.1.5 Retrieve MPC from Storage

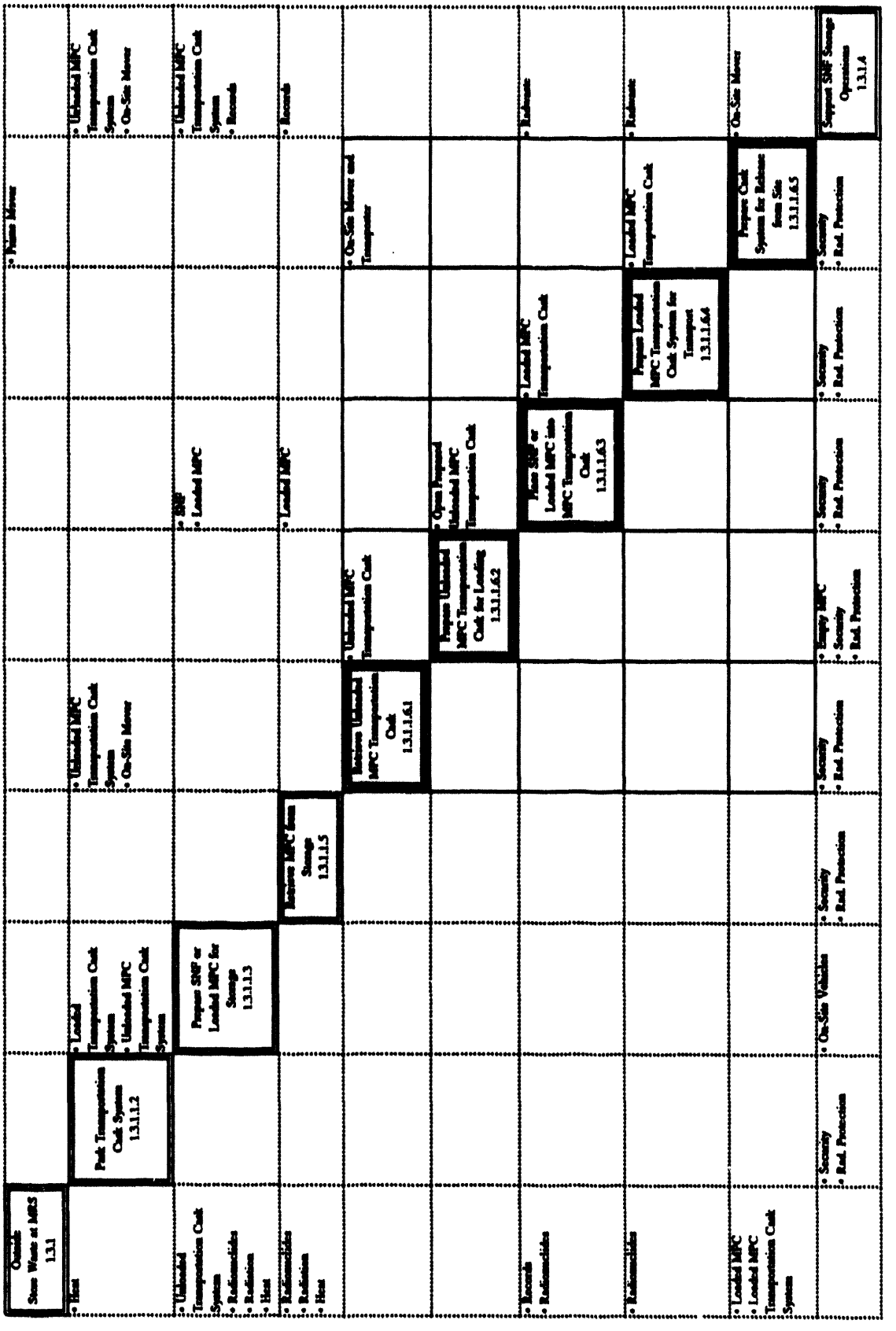

Figure A-26. N-Square Chart for 1.3.1.1.6 Prepare MPC for Transport

Outside Store Waste		Heat Sink		
	Outside 1.3.1.2	Security R.P.	Storage mode transp. Loaded storage mode Security R.P.	Security R.P.
Radiation Heat	Records	**Maintain SNF Integrity 1.3.1.2.1**		
Radiation Heat	Records Loaded storage mode Storage mode transp.	Access to loaded storage mode	**Maintain Storage System Containment 1.3.1.2.2**	Access to loaded Storage Mode
Radiation Heat	Records Safeguards Information			**Monitor SNF Storage System 1.3.1.2.3**

Figure A-27. N-Square Chart for 1.3.1.2 Store SNF

Outside Store Waste			
	Outside 1.3.1.2.3	R.P Security Access to loaded storage mode	R.P Security Access to loaded storage mode
Radiation Heat	Records	**Monitor Radiological / Thermal Condition 1.3.1.2.3.1**	
Radiation Heat	Records		**Account for SNF 1.3.1.2.3.2**

Figure A-28. N-Square Charts for 1.3.1.2.3 Monitor SNF Storage System

Outside Store Waste			Utilities, Site Vehicles, Supplies, Tools, Parts, Equipment, Services				Laws, Regulations, Licenses			
	Outside 1.3.1.4		On-site Movers, Storage Mode Movers, Data			QA Records	Records	Radwaste, Records Unloaded Off-Normal MPC	Waste, Records	Casks, Transp., Records
		Function 1.3.1.4.1 not used								
Effluent, Heat, Solid Waste, Emissions	Utilities, Supplies, Site Vehicles, Services		Provide Operations Support 1.3.1.4.2	Utilities, Supplies, Tools, Parts, Equip., Services	Utilities, Dosimetry, Protective Clothing, Services	Utilities	Utilities, Records	Packages		Equipment, Tools, Supplies
Salvage Parts, Solid Waste	Maintenance Services		Maintenance services	Maintain Operating Facilities 1.3.1.4.3	Maintenance services	Maintenance services	Maintenance services	Maintenance services	Maintenance services	Maintenance services
	Security, Safeguards, Medical Care, Fire Protection, R.P., Monitors		Security, Medical Care, Fire Protection, R.P., Monitors	Security, Medical Care, Fire Protection, R.P., Monitors	Provide Protective Services 1.3.1.4.4	Security, Medical Care, Fire Protection, R.P., Monitors	Security, Medical Care, Fire Protection, R.P., Monitors	Security, Medical Care, Fire Protection, R.P., Monitors	Security, Medical Care, Fire Protection, R.P., Monitors	Security, Medical Care, Fire Protection, R.P., Monitors
Information	QA Records, Surveillance		QA Records, Surveillance	QA Records, Surveillance	QA Records, Surveillance	Provide QA/QC Services 1.3.1.4.5	QA Records, Surveillance	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance
Information	Training, Personnel, Records, Surveillance		Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance	Provide Admin. Support 1.3.1.4.6	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance	Training, Personnel, Records, Surveillance
Radiation, Low-level Radwaste	Records						Records	Process Site-Generated Radwaste 1.3.1.4.7		Records
Effluent	Records						Records		Control Site-generated Wastes Other than Radwaste 1.3.1.4.8	
Casks & Transp.	Records, Casks and Transp.					QA Records	Records	Radwaste, Records	Wastes, Records	Maintain Transportation Casks 1.3.1.4.9

Figure A-29. 1.3.1.4 Support SNF Storage Operations N-Square Chart

Outside Store Waste		Electricity Water Sewerage	Air	Supplies Equipment	Trucks Switchyard Engine		Services
	Outside 1.3.1.4.2				On-site Movers, Storage Mode Transp.	Data	
Effluent	Utilities	**Provide Utilities 1.3.1.4.2.1**	Utilities	Utilities	Utilities	Utilities	Utilities
Heat	HVAC		**Provide HVAC 1.3.1.4.2.2**				
Solid Waste	Supplies, Equipment			**Provide Central Stores 1.3.1.4.2.3**			
Emissions	On-site Mover, Storage Mode Transp., Other Site Vehicles				**Provide On-Site Transportation 1.3.1.4.2.4**		
	Technical Services					**Provide Technical Services 1.3.1.4.2.5**	
	Services						**Acquire Off-Site Services 1.3.1.4.2.6**

Figure A-30. N-Square Chart for 1.3.1.4.2 Provide Operations Support

Outside Store Waste	Equipment Parts Supplies			
	Outside 1.3.1.4.3	Parts Tools Technical Services	Supplies Equipment Tools Technical Services	Supplies Equipment Tools Technical Services
Salvage Parts Solid Waste	Maintenance	**Maintain Equipment 1.3.1.4.3.1**		
Solid Waste	Maintenance		**Maintain Buildings 1.3.1.4.3.2**	
Solid Waste	Maintenance			**Maintain Site 1.3.1.4.3.3**

Figure A-31. N-Square Chart for 1.3.1.4.3 Maintain Operating Facilities

Outside Store Waste	Utilities	Guidelines	Guidelines	Guidelines, Emergency Assistance	Emergency Assistance	Emergency Assistance		
	Outside 1.3.1.4.4	Technical Services		Technical Services	Technical Services		Protective Clothing, Dosimetry	Technical Services
	Records, Guidelines	**Safeguard SNF 1.3.1.4.4.1**						
	Security		**Maintain Physical Security 1.3.1.4.4.2**					
	Guidelines			**Maintain Emergency Plan 1.3.1.4.4.3**	Plans	Plans	Plans	
	Medical Care				**Provide Emergency Medical Treatment 1.3.1.4.4.4**			
	Fire Protection					**Provide Fire Protection 1.3.1.4.4.5**		
	R.P.						**Provide Radiological Protection 1.3.1.4.4.6**	
	Monitors							**Provide Environmental Monitoring 1.3.1.4.4.7**

Figure A-32. N-Square Chart for 1.3.1.4.4 Provide Protective Services

Outside Store Waste				Requests for Information		Regulatory Inspectors
	Outside 1.3.1.4.6	Personnel Requirements, Utilities	Records, Utilities	Utilities	Invoices, Utilities	Utilities
	Training, Personnel	**Provide for Human Resources 1.3.1.4.6.1**	Records			
	Records		**Maintain Records 1.3.1.4.6.2**			
Information				**Maintain Institutional and External Relations 1.3.1.4.6.3**		
			Records		**Maintain Financial Accounting 1.3.1.4.6.4**	
Operational Information	Surveillance		Audits	Information		**Provide Office Space for Regulatory Inspectors 1.3.1.4.6.5**

Figure A-33. N-Square Chart for 1.3.1.4.6 Provide Administrative Support

Outside Store Waste					
Radiation Radionuclides	Outside 1.3.1.4.7	Liquid Radwaste R.P.	Unloaded Off-Normal MPC Solid Radwaste R.P.	Shipping Packages R. P.	R.P.
		Collect Liquid Radwaste 1.3.1.4.7.1		Liquid Radwaste	Liquid Radwaste
			Collect Solid Radwaste 1.3.1.4.7.2	Solid Radwaste	Solid Radwaste
Packaged low-level radwaste				**Treat, Package, Monitor, Ship Radwaste for Off-Site Disposal 1.3.1.4.7.3**	Solid and Liquid Radwaste
				Solid and Liquid Radwaste	**Store Packaged Radwaste for Off-Site Disposal 1.3.1.4.7.4**

Figure A-34. N-Square Chart for 1.3.1.4.7 Process Site-Generated Radwaste

Outside Store Waste			RCRA Regulations	
	Outside 1.3.1.4.8	Records Effluent Solid waste		Effluent
Effluent Solid waste Waste Packages	Records	**Monitor all Off-Site Releases 1.3.1.4.8.1**		
	RCRA guidelines		**Avoid Use of RCRA Listed Materials 1.3.1.4.8.2**	RCRA guidelines
		Effluent Hazardous waste packages		**Segregate Hazardous Waste Streams 1.3.1.4.8.3**

Figure A-35. N-Square Chart for 1.3.1.4.8 Control Site-Generated Wastes Other than Radwaste

Purchaser	• SNF • Unloaded MPC Transfer Casks • Empty MPC • Unloaded MPC Transportation Cask Subsystems	• SNF • Unloaded SNF Transfer Devices • Empty MPCs • Unloaded MPC Transportation Cask Subsystems	• Unloaded Storage Mode • Unloaded MPC Transportation Cask Subsystems	• SNF • Unloaded SNF Transportation Cask Systems • Empty MPC • Unloaded MPC Cask Transportation Subsystems
• Unloaded MPC Transfer Casks • Loaded MPCs • Loaded MPC Transportation Cask Subsystems	**Transfer SNF into an MPC in Fuel Pool 1.3.2.1**		• Loaded MPC Transfer Cask • Loaded MPC	
• Unloaded SNF Transfer Devices • Loaded MPCs • Loaded MPC Transportation Cask Systems		**Transfer SNF into an MPC Outside of Fuel Pool 1.3.2.2**	• Loaded MPC Transfer Cask • Loaded MPC	
• Unloaded MPC Transfer Casks • Unloaded Storage Mode • Loaded MPCs • Loaded MPC Transportation Cask Subsystems			**Store MPC On-Site 1.3.2.3**	
• SNF • Loaded SNF Transportation Cask Subsystems • Loaded MPC • Loaded MPC Transportation Cask Subsystems				**Transfer SNF into a Transportation Cask 1.3.2.4**

Figure A-36. N-Square Chart for 1.3.2 Perform Transfer and Storage Operations

Purchaser	• SNF • Unloaded MPC Transfer Cask • Empty MPC	• Unloaded MPC Transportation Cask Subsystem	• Unloaded Storage Mode
	Transfer SNF into an MPC in Transfer Cask in Fuel Pool 1.3.2.1.1	• Loaded MPC in MPC Transfer Cask	• Loaded MPC in MPC Transfer Cask
• Unloaded MPC Transfer Cask • Loaded MPC • Loaded MPC Transportation Cask System		**Transfer Loaded MPC from MPC Transfer Cask into MPC Transportation Cask Outside of Fuel Pool 1.3.2.1.2**	
• Loaded MPC Transfer Cask			Transfer MPC from MPC Transfer Cask to Storage Mode 1.3.2.3.1

Figure A-37. N-Square Chart for 1.3.2.1 Transfer SNF into an MPC in Fuel Pool

Purchaser	• SNF • Unloaded SNF Transfer Cask	• Empty MPC • Unloaded MPC Transportation Cask Subsystem	• Unloaded MPC Transfer Cask • Empty MPC	• Unloaded Storage Mode
	Transfer SNF in Fuel Pool into SNF Transfer Device 1.3.2.2.1	• Loaded SNF Transfer Device	• Loaded SNF Transfer Device	
• Unloaded SNF Transfer Device • Loaded MPC • Loaded MPC Transportation Cask System		**Transfer SNF from SNF Transfer Device into an MPC in an MPC Transportation Cask Outside of Fuel Pool 1.3.2.2.2**		
• Unloaded SNF Transfer Device			**Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool 1.3.2.2.3**	• Loaded MPC Transfer Cask
• Loaded MPC Transfer Cask				Transfer MPC from MPC Transfer Cask to Storage Mode 1.3.2.3.1

Figure A-38. N-Square Chart for 1.3.2.2 Transfer SNF into an MPC Outside of Fuel Pool

Purchaser	• SNF • Unloaded MPC Transfer Cask • Empty MPC	• Unloaded MPC Transfer Cask • Empty MPC	• Unloaded Storage Mode		• Unloaded MPC Transportation Cask Subsystem
	Transfer SNF from Fuel Pool into an MPC in MPC Transfer Cask 1.3.2.1.1		• Loaded MPC Transfer Cask		
• Unloaded SNF Transfer Cask		Transfer SNF from SNF Transfer Cask into an MPC in MPC Transfer Cask Outside of Fuel Pool 1.3.2.2.3	• Loaded MPC Transfer Cask		
• Unloaded MPC Transfer Cask			Transfer MPC from MPC Transfer Cask to Storage Mode 1.3.2.3.1	• Loaded Storage Mode	
				Conduct Storage Mode Operations 1.3.2.3.2	• Loaded Storage Mode
• Unloaded Storage Mode • Loaded MPC • Loaded MPC Transportation Cask Subsystem					Transfer MPC From Storage to MPC Transportation Cask 1.3.2.3.3

Figure A-39. N-Square Chart for 1.3.2.3 Store MPC On-Site

Purchaser	• SNF • Empty MPC • Unloaded MPC Transportation Cask System	• SNF • Unloaded SNF Transportation Cask System
• Loaded MPC • Loaded MPC Transportation Cask System	**Transfer SNF into an MPC in an MPC Transportation Cask in Fuel Pool 1.3.2.4.1**	
• Loaded SNF Transportation Cask System		**Transfer SNF into an SNF Transportation Cask in Fuel Pool 1.3.2.4.2**

Figure A-40. N-Square Chart for 1.3.2.4 Transfer SNF into a Transportation Cask

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APPENDIX B. MRS Function Allocation Table

Table B-1. Allocation of Functions to Architecture for the MRS Facility

Function Title	MRS Facility Segment							
	A	B	C	D	E	F	G	H
Store Waste	X	X	X	X	X	X	X	X
Store Waste at MRS	X	X	X	X	X	X	X	X
Handle SNF or Loaded MPC	X	X	X	X	X	X		
Receive Loaded/Unloaded Transportation Cask System	X		X	X		X		
Accept Transportation Cask/Transporter	X		X					
Detach Prime Mover			X			X		
Inspect Transportation Cask/Transporter			X					
Move Transportation Cask/Transporter to Parking Area	X					X		
Move Cask/Transporter Inside Controlled Area	X		X			X		
Move Off-Normal Transportation Cask /Transporter to Holding	X					X		
Move Suspect Transportation Cask/Transporter to Holding	X		X			X		
Process Off-Normal Transportation Cask/Transporter	X			X				
Process Suspect Transportation Cask/Transporter	X		X					
Park Transportation Cask/Transporter	X					X		
Prepare SNF or Loaded MPC for Storage	X	X		X	X	X		
Remove Loaded Transportation Cask from Transporter		X		X				
Prepare Loaded Transportation Cask for Transfer		X		X				
Remove SNF or Loaded MPC from Loaded Transportation Cask		X		X				

MRS Facility Segments:
A - Site Development
B - Utilities
C - Security Facilities
D - Preparation and Transfer
E - Storage Mode Facility
F - Site Vehicles
G - Support Facilities
H - Cask Maintenance Facility

Table B-1. Allocation of Functions to Architecture for the MRS Facility (Continued)

Function Title	MRS Facility Segment							
	A	B	C	D	E	F	G	H
Verify SNF and Loaded MPC Identity and Condition		X		X				
Prepare Unloaded Transportation Cask for Return to Service		X		X				
Move TSC to Storage Area	X					X		
Place TSC into Storage					X	X		
Return Transporter to Debarkation	X					X		
Transfer SNF or Loaded MPC into Storage	X	X		X	X			
Configure Storage Mode		X		X				
Place SNF or Loaded MPC into Storage Mode		X		X				
Close MPC and/or Storage Mode		X		X				
Move Loaded Storage Mode to Storage Location	X	X			X			
Emplace Loaded Storage Mode into Storage		X			X			
Retrieve MPC from Storage	X	X		X	X			
Retrieve Loaded Storage Mode from Storage	X	X			X			
Move Loaded Storage Mode into Transfer Area		X		X	X			
Open Storage Mode		X		X				
Remove MPC from Storage Mode		X		X				
Verify MPC Identity and Condition		X		X				
Handle Unloaded Storage Mode	X	X		X	X			
Recover SNF from Off-Normal MPC		X		X				
Prepare MPC for Transport	X	X	X	X		X		
Retrieve Unloaded MPC Transportation Cask	X			X		X		
Prepare Unloaded MPC Transportation Cask for Loading		X		X				
Place SNF or Loaded MPC into MPC Transportation Cask		X		X				
Prepare Loaded MPC Transportation Cask System for Transport	X	X		X				

MRS Facility Segments:
A - Site Development
B - Utilities
C - Security Facilities
D - Preparation and Transfer
E - Storage Mode Facility
F - Site Vehicles
G - Support Facilities
H - Cask Maintenance Facility

Table B-1. Allocation of Functions to Architecture for the MRS Facility (Continued)

Function Title	MRS Facility Segment							
	A	B	C	D	E	F	G	H
Prepare Cask/Transporter for Release from Site	X		X	X		X		
Store SNF	X	X	X	X	X		X	
Maintain SNF Integrity				X	X			
Maintain Storage System Containment					X			
Monitor SNF Storage System		X	X	X	X		X	
Monitor Radiological/Thermal Condition		X			X			
Account for SNF		X	X		X		X	
Support Storage Operations	X	X	X	X	X	X	X	X
Provide Operations Support		X	X	X	X	X	X	X
Provide Utilities		X						
Provide HVAC		X	X	X	X		X	X
Provide Central Stores							X	
Provide On-Site Transportation					X	X		
Provide Technical Services							X	
Acquire Off-Site Services							X	
Maintain Operating Facilities						X	X	
Maintain Equipment						X	X	
Maintain Buildings						X	X	
Maintain Site						X	X	
Provide Protective Services	X	X	X	X	X	X	X	X
Safeguard SNF	X	X	X	X	X		X	
Maintain Physical Security	X		X			X		
Maintain Emergency Plan							X	
Provide Emergency Medical Treatment						X	X	
Provide Fire Protection		X						
Provide Radiological Protection	X	X		X	X		X	X
Provide Environmental Monitoring	X	X					X	
Provide QA/QC Services							X	

MRS Facility Segments:
A - Site Development
B - Utilities
C - Security Facilities
D - Preparation and Transfer
E - Storage Mode Facility
F - Site Vehicles
G - Support Facilities
H - Cask Maintenance Facility

Table B-1. Allocation of Functions to Architecture for the MRS Facility (Continued)

Function Title	MRS Facility Segment							
	A	B	C	D	E	F	G	H
Provide Administrative Support		X					X	
Provide for Human Resources		X					X	
Maintain Records		X					X	
Maintain Institutional and External Relations		X					X	
Maintain Financial Accounting		X					X	
Provide Office Space for Regulatory Inspectors							X	
Process Site-Generated Radwaste		X		X	X	X		X
Collect Liquid Radwaste		X		X	X			X
Collect Solid Radwaste		X		X	X			X
Treat/Package/Monitor/Ship Radwaste for Off-Site Disposal		X		X		X		
Store Packaged Radwaste for Off-Site Disposal				X				
Control Site-Generated Wastes Other than Radwaste		X		X			X	X
Monitor All Off-Site Releases		X					X	
Avoid Use of RCRA Listed Materials				X			X	X
Segregate Hazardous Waste Streams		X		X			X	X
Maintain and Repair Transportation Casks Systems		X		X				X
Maintain and Repair Transportation Casks		X		X				X
Maintain and Repair Ancillary Equipment and Special Tools and Fixtures		X		X				X
Perform Cask Reconfigurations		X						X
Manage Transportation Cask System Inventory		X						X
Manage Unloaded Cask Inventory		X						X
Manage Transporter Inventory		X						X
Manage Ancillary Equipment and Special Tools and Fixtures Inventory		X						X
Manage Spare Parts and Consumables Inventory		X						X

MRS Facility Segments:
A - Site Development
B - Utilities
C - Security Facilities
D - Preparation and Transfer
E - Storage Mode Facility
F - Site Vehicles
G - Support Facilities
H - Cask Maintenance Facility

Table B-1. Allocation of Functions to Architecture for the MRS Facility (Continued)

Function Title	MRS Facility Segment							
	A	B	C	D	E	F	G	H
Create and Maintain Records		X		X				X
Manage Transporter Repair and Maintenance		X						X

MRS Facility Segments:
A - Site Development
B - Utilities
C - Security Facilities
D - Preparation and Transfer
E - Storage Mode Facility
F - Site Vehicles
G - Support Facilities
H - Cask Maintenance Facility

Table B-2. Allocation of Functions to Architecture for the OSTS

Function Title	OSTS Segment			
	I	J	K	T
Store Waste	X	X	X	X
Perform Transfer and Storage Operations	X	X	X	X
Transfer SNF into an MPC in Fuel Pool	X			X
Transfer SNF into an MPC in Transfer Cask in Fuel Pool	X			X
Transfer Loaded MPC from MPC Transfer Cask into MPC Transportation Cask Outside of Fuel Pool	X			X
Transfer SNF into an MPC Outside of Fuel Pool	X		X	X
Transfer SNF in Fuel Pool into SNF Transfer Device			X	
Transfer SNF from SNF Transfer Device into a MPC in MPC Transportation Cask Outside of Fuel Pool			X	X
Transfer SNF from SNF Transfer Device into an MPC in MPC Transfer Cask Outside of Fuel Pool	X		X	X
Store MPC On-Site	X	X		X
Transfer MPC from MPC Transfer Cask to Storage Mode for On-Site Storage	X	X		X
Conduct Storage Mode Operations		X		X
Transfer MPC from Storage to MPC Transportation Cask	X[1]	X		X
Transfer SNF into Transportation Cask in Fuel Pool				X
Transfer SNF into an MPC in MPC Transportation Cask in Fuel Pool				X
Transfer SNF into SNF Transportation Cask in Fuel Pool				X

[1] The MPC may or may not be transferred from the storage mode with and MPC Transfer Cask. The use of the MPC Transfer Cask is design dependent.

OSTS Segments:
I - On-Site Transfer Segment
J - On-Site Storage Segment
K - Bare SNF Transfer System
T - Transportation

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