DOE/RW-0425 Rev. 1 DCN01

Office of Civilian Radioactive Waste Management

Transportation System Requirements Document

Revision 1 DCN01

(D00000000-00811-1708-00002)

May 1995

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

DISCLAIMER

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

Document Number: DOE/RW-0425/D00000000-00811-1708-00002

Document Title: Transportation System Requirements Document

Revision Date/ Number	BCP Number	Revision/Change Description	Pages Affected
Rev. 01 March 1994	BCP-00-94-0001	Incorporates the Multi-Purpose Canister (MPC) concept into the CRWMS technical baseline.	All
Rev. 01 DCN 01 May 1995	BCP-00-94-0005	Resolves issues needed for the procurement of the MPC system. Also incorporates the collocation of the Cask Maintenance Facility at the MGDS.	16, 17, 18, 36, 37, 38, 39, 40, 44, 46, 47, 53, 55, 56, 93, 94, 96, 161, 167

Office of Civilian Radioactive Waste Management

WBS: 9.2.1
QA: N/A
Page: 1 Of: 2

BCCB CHANGE DISPOSITION SUMMARY RECORD

1. BCP NUMBER / REV.	3. ORIGINATOR'S NAME	5. CHANGE LEVEL	6. PRIORITY LEVEL	7. DISPOSITION DATE
BCP-00-94-0005	James Carlson	☐ 0 ☑ 1 ☐ 2 ☐ 3	☐ ROUTINE ☐ FIELD ☑ PRIORITY ☐ EMERGENCY ☐ URGENT	
2. DATE REC'D	**4. ORIGINATOR'S ORGANIZATION**			**8. BCP TYPE**
10/11/94	RW-37			☑ TECHNICAL ☑ MANAGEMENT ☐ DEVIATION ☐ ADMINISTRATIVE

9. BCP DESCRIPTION/TITLE

Implementation of the Program Approach

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

BOARD MEMBER SIGNATURE		RECOMMENDATIONS (See Block 10 Instructions)
L. Barrett, RW-2	See attached Request for Disposition.	Approved
D. Horton, RW-3	See attached Request for Disposition.	Approved
J. Bresee, RW-10	See attached Request for Disposition.	Approved with Conditions (Comments Resolved)
R. Milner, RW-30	See attached Request for Disposition.	Approved
S. Rousso, RW-40	See attached Request for Disposition.	Approved with Conditions (Comments Resolved)
R. Nelson, YMSCO	See attached Request for Disposition	Approved with Conditions (Condition Accepted)

DIRECTIVE

11. CHANGE DISPOSITION: * SEE BLOCK 13

☑ APPROVE ☐ DEFER* ☐ APPROVE WITH CONDITIONS* ☐ DISAPPROVE* ☐ CANCEL*

12. BCCB CHAIRMAN SIGNOFF:

PRINT Daniel A. Dreyfus, RW-1

SIGN [signature] DATE 11-21-94

13. CHAIRMAN'S JUSTIFICATION/CONDITIONS/LIMITATIONS

☐ See Continuation Page ____

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

See Attached Page.

☑ See Continuation Page 2

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

☐ See Continuation Page ____

BCCB CHANGE DISPOSITION SUMMARY RECORD AND DIRECTIVE

BCP-00-94-0005: Implementation of the Program Approach

14. BCCB Directive/Implementing Instructions for Documentation(s)

A. RW-37 shall immediately initiate the revision for review and approval the following documents to reflect the approved baseline change as described in BCP-00-94-0005:

(1) CRWMS Requirements Document (DOE/RW-0406P)(A00000000-00811-1708-00003);
(2) Waste Acceptance System Requirements Document (DOE/RW-0351P)(E00000000-00811-1708-00001);
(3) Transportation System Requirements Document (DOE/RW-0425)(D00000000-00811-1708-00002);
(4) Mined Geologic Disposal System Requirements Document (DOE-0404P)(B00000000-00811-1708-00002);
(5) Monitored Retrievable Storage System Requirements Document (DOE/RW-0420)(C00000000-00811-1708-00002).

B. RW-35 shall provide change pages of the Program Cost and Schedule Baseline (DOE/RW-0253) which reflect the program interim cost and schedule baseline as described in BCP-00-94-0005 to the PBCCB Executive Secretary for printing and distribution.

C. RW-40 and YMSCO shall revise the WAST Project and YMSCO Cost and Schedule Baseline, respectively, and submit a BCP to update the Program Cost and Schedule Baseline per schedule consistent with the FY95 Work Plan, and any justification of changes to the program interim cost and schedule baseline.

D. YMSCO and RW-40 shall revise the design requirements documents to incorporate the PA and the revision 2 of the CRD and SRDs.

E. All ODs and YMSCO Project Manager shall assess the impact of the PA on all technical and programmatic documents and provide a list of the impacted documents to be revised and forecast date of completion to the PBCCB Secretary within 90 days from the approval date of this BCP.

F. Technical review of all affected document shall be conducted in accordance with applicable Quality Assurance procedures prior to official release to assure the Program Approach is completely captured and in accordance with the BCP.

LIST OF TABLES

G.	ANSI C2	National Electric Safety Code
H.	ANSI/HFS 100-1988	American National Standard for Human Factors Engineering of Visual Display Terminal Workstations
I.	ANSI/NFPA 70	National Electric Code
J.	ANSI N 14.5	American National Standards for Radioactive Materials - Leakage Tests on Packages for Shipment
K.	ANSI N14.6-1986	For Radioactive Materials - Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More
L.	ANSI N14.19-1986	For Nuclear Materials - Irradiated Fuel Shipping Casks - Ancillary Features
M.	ANSI N14.24-1985[1]	For Highway Route Controlled Quantities of Radioactive Material - Domestic Barge Transport
N.	ASTM D4256	Standard Test Method for Determination of the Decontaminability of Coating Used in Light Water Nuclear Power Plants
O.	ASTM D5144	Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants

2.4.2 Other Publications

A. A00000000-01717-2200-00001, Operational Throughput for the Multi-Purpose Canister System

B. MTR 10090, Guidelines for Designing User Interface Software

C. ORNL/Sub/89-SD841/2, Acceptance of Canisters of High-Level Waste by the Federal Waste Management System

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

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[1] This document is identified in Trans-SRD Requirement 3.4.1.1.B. It must be reviewed for design impact and for inclusion of requirements into the Transportation System DRD.

E.	ANSI/ANS 57.9	Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type)
F.	ANSI/ASA-38	Evaluation of Human Exposure to Whole Body Vibration
G.	ANSI C2	National Electric Safety Code
H.	ANSI/HFS 100-1988	American National Standard for Human Factors Engineering of Visual Display Terminal Workstations
I.	ANSI/NFPA 70	National Electric Code
J.	ANSI N 14.5	American National Standards for Radioactive Materials - Leakage Tests on Packages for Shipment
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N.	ASTM D4256	Standard Test Method for Determination of the Decontaminability of Coating Used in Light Water Nuclear Power Plants
O.	ASTM D5144	Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants

2.4.2 Other Publications

A. A20000000-00811-5705-00008, Volume V - MPC Supporting Studies and Reports Operational Throughput for the Multi-Purpose Canister System

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[1] This document is identified in Trans-SRD Requirement 3.4.1.1.B. It must be reviewed for design impact and for inclusion of requirements into the Transportation System DRD.

B. MTR 10090, Guidelines for Designing User Interface Software

C. ORNL/Sub/89-SD841/2, Acceptance of Canisters of High-Level Waste by the Federal Waste Management System

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

E. * MGDS-MPC Thermal Requirements (R. H. Bahney, M&O)

2.5 OTHER REFERENCES

In addition to the above source documents, the following documents were used as reference material for the initial development of this document. These documents have not been used as sources of requirements.

A.	45USC421 et seq.	Federal Railroad Safety Act (P.L. 100-342)
B.	49USC1808 et seq.	Hazardous Materials Transportation Act (P.L. 93-633)
C.	49USC1808 et seq.	Hazardous Materials Transportation Uniform Safety Act (P.L. 101-615)
D.	ANSI N14.5-1987	American National Standard for Leakage Tests on Packages for Shipment of Radioactive Materials
E.	DOE/RW-0253	Program Cost and Schedule Baseline, Revision 3, September 1992
F.	DOE/RW-0352	Physical System Requirements - Transport Waste, Revision 0, April, 1992
G.	DOE/RW-0381P	OCRWM Baseline Management Plan, Revision 0, November 1992
H.	DOE/RW-0051P	OCRWM Systems Engineering Management Plan, Revision 2, January 1993

I. A00000000-01717-4600-00009, CRWMS M&O Technical Document Preparation Plan (TDPP) for the Revision of System Requirements Documents, Revision 4

J.	ORNL/SUB/86-02217/1	Preliminary Description of the Transportation Operations System, March 1988

K. ORNL/TM-11232 Transportation Functions of the Federal Waste Management System, March 1992

L. DOE/RW-0351P Waste Acceptance System Requirements Document, Revision 1 DCN 1 (E00000000-00811-1708-00001)

M. DOE/RW-0420 MRS System Requirements Document, Revision 1 DCN 1 (C00000000-00811-1708-00002)

N. DOE/RW-0404P MGDS Requirements Document, Revision 1 DCN 1 (B00000000-00811-1708-00002)

O. DOE/RW-0043 Program Management System Manual, Revision 5

P. A00000000-00811-6300-00001, CRWMS Interface Specification, Rev. 1C (Draft)

Q. A20000000-00811-5705-00002, MPC Conceptual Design Report, Revision 0, September 1994

R. A00000000-01717-0200-00016, Analyses for Resolution of Issues in TBD/TBR Issue Categories 11 and 29: MPC Service Life and SNF Structural Integrity, Revision 0

S. A00000000-01717-0200-00022, CRWMS Capabilities Issue, Revision 0

T. A00000000-01717-0200-00024, Analysis for Resolution of Issues: Throughput Rate Issue, Revision 0

transported to the MRS facility and the MGDS in truck cask subsystems. Rail shipments will be in MPC cask subsystems.

M. Table 3-2 lists the design basis SNF characteristics for the MPC. These characteristics are preliminary and are based on the MPC Conceptual Design Report (Ref. 2.5.P).

Table 3-2. SNF Characteristics for MPCs <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
Reference 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

Transportation is expected to operate in the following phases and conditions:

A. **Normal Operations.** This phase is subdivided into three subphases:

(1) **Initial Operation.** In this phase, SNF is being accepted and shipped to the MRS facility. The shipment rate of SNF is ramping up to full operations.

(2) **Steady State Operation.** In this phase, SNF is being shipped from reactors and

MGDS in (non-MPC) transportation cask subsystems. Bare SNF will be transported to the MRS facility and the MGDS in truck cask subsystems. Rail shipments will be in MPC cask subsystems.

M. Table 3-2 lists the design basis SNF characteristics for the MPC. These characteristics are based on the MPC Conceptual Design Report (Ref. 2.5.Q), and include consideration of 80% of the standard fuel available for pickup in the first ten years of CRWMS operation with acceptance rates specified in the Annual Capacity Report.

Table 3-2. SNF Characteristics for MPCs

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
Reference 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

Transportation is expected to operate in the following phases and conditions:

A. **Normal Operations.** This phase is subdivided into three subphases:

(1) **Initial Operation.** In this phase, SNF is being accepted and shipped to the MRS facility. The shipment rate of SNF is ramping up to full operations.

(2) **Steady State Operation.** In this phase, SNF is being shipped from reactors and storage sites to both the MRS facility and MGDS, and from the MRS facility to the MGDS. Commercial and defense HLW is being shipped to the MGDS.

(3) **End of Life Cycle.** In this phase, SNF and HLW are no longer being shipped on a regular basis to the MGDS. However, Transportation must remain capable of shipping any waste that may need to be retrieved from the repository until closure.

B. **Off-Normal Conditions.** In this phase, the system is operating under one or more accident or off-normal event(s).

Transportation casks have an additional operating phase:

C. **Cask Decommissioning.** Transportation casks that have reached the end of their life cycle are decontaminated to the maximum extent practicable and disposed of. This phase occurs throughout the operation of Transportation.

3.2.1.1 Normal Operations

A. Transportation shall provide transport of SNF and HLW in a manner that protects the health and safety of the public and the environment. [NWPA 111(a)(4)] [CRD 3.2.1.A]

B. Transportation shall provide for the transport of SNF to the MRS facility for storage and SNF and HLW to the MGDS for disposal. All of the SNF and HLW must be of domestic origin, generated by civilian nuclear power reactor(s) and specified in the standard contracts or agreements. [10CFR961.11 Art IV.B.1] [CRD 3.2.1.B]

C. Transportation shall provide for the transport of defense HLW that the CRWMS is designed to accept and dispose of. [Presidential Memo 1985] [CRD 3.2.1.1.D]

D. Transportation shall be operational with the commencement of CRWMS facilities operations, and must continue until such time as all SNF, as specified in standard contracts, and HLW, as specified in the MOA between EM and RW **<TBP>**, has been disposed of. [NWPA 302(a)(5)] [10CFR961.11 Art II] [DOE/RW-0247] [CRD 3.2.1.1.E] **<TBR>**

E. Transportation shall be capable of shipping SNF and HLW on the nominal schedule shown in Table 3-3. [HLW: DOE/RW-0316P, ORNL/Sub/89-SD841/2] [SNF 1998-2007: DOE/RW-0412] [SNF 2000-2034: A20000000-00811-5705-00008] [CRD 3.2.1.C]

F. Shipments of loaded and unloaded transportation casks shall be as exclusive use. [Derived]

Table 3-3. Transportation Shipping Capability (In Metric Tons of Initial Uranium or Equivalent)

Year	Shipment Destination: MRS Facility	Shipment Destination: MGDS	
	SNF	SNF[1]	HLW
INITIAL OPERATION			
1998	400[2]	0	0
1999	600[2]	0	0
2000	900	0	0
2001	900	0	0
2002	900	0	0
2003	900	0	0
2004	900	0	0
2005	900	0	0
2006	900	0	0
2007	900	0	0
2008	900	0	0
2009	900[3]	0	0
2010	1,400	300	0
2011	2,000	600	0
2012	2,600	1,200	0
2013	3,000	2,000	0
2014	3,000	3,000	0

[1] In years when SNF is shipped directly from the Purchasers to the MGDS, the sum of the waste shipped directly and waste shipped from the MRS facility will be as stated in this column.

[2] Transportation will be operational with the capabilities identified beginning January 31, 1998. The MRS facility is assumed to begin operation in the year 2000. Any waste accepted prior to that would be placed in an alternative storage location.

[3] The current legal limit at the MRS facility is 10,000 MTU prior to operation of the MGDS.

Table 3-3. Transportation Shipping Capability (Continued)
(In Metric Tons of Initial Uranium or Equivalent)

Year	Shipment Destination: MRS Facility	Shipment Destination: MGDS	
	SNF	SNF[1]	HLW
STEADY STATE OPERATIONS			
2015	3,000	3,000	400
2016	3,000	3,000	400
2017	3,000	3,000	400
2018	3,000	3,000	400
2019	3,000	3,000	400
2020	3,000	3,000	400
2021	3,000	3,000	400
2022	3,000	3,000	400
2023	3,000	3,000	400
2024	3,000	3,000	400
2025	3,000	3,000	400
2026	3,000	3,000	400
2027	3,000	3,000	400
2028	2,000	3,000	400
2029	0	3,000	400
2030	0	3,000	400
2031	0	3,000	400
2032	0	3,000	200
2033	0	1,900	0

[1] In years when SNF is shipped directly from the Purchasers to the MGDS, the sum of the waste shipped directly and waste shipped from the MRS facility will be as stated in this column.

Table 3-3. Transportation Shipping Capability (Continued)
(In Metric Tons of Initial Uranium or Equivalent)

Year	Shipment Destination: MRS Facility	Shipment Destination: MGDS	
	SNF	SNF[1]	HLW
END OF LIFE			
2034	0	0	0
2035	0	0	0
2036	0	0	0

[1] In years when SNF is shipped directly from the Purchasers to the MGDS, the sum of the waste shipped directly and waste shipped from the MRS facility will be as stated in this column.

(2) Producers shall be provided with a rail cask subsystem for delivery of defense HLW to the MGDS. [DOE/RW-0005] [DOE/RW-0187] [DOE/RW-0270P] [CRD 3.2.1.1.F]

(3) Producers shall be provided with a rail cask subsystem for delivery of commercial HLW to the MGDS. [DOE/RW-0005] [DOE/RW-0187] [DOE/RW-0270P] [CRD 3.2.1.1.F] **<TBR>**

B. Transportation shall be capable of receiving and shipping SNF and HLW loaded in transportation cask subsystems from Purchasers/Producers, after title has been accepted by Waste Acceptance, at the nominal shipping rate shown in Table 3-3. Some SNF will be loaded into MPCs. [HLW: DOE/RW-0316P; ORNL/Sub/89-SD841/2] [SNF 1998-2007: DOE/RW-0412] [SNF 2000-2034: A00000000-01717-2200-00001] [CRD 3.2.1.C]

C. Transportation shall establish cleanliness requirements for the interior of the transportation cask for the beginning of each shipping campaign. Negotiations with each Purchaser/Producer through Waste Acceptance may be necessary. [10CFR961.11 Art IV.B.2] [CRD 3.2.1.1.F]

D. Transportation shall work with Waste Acceptance to identify, document, and plan the site interface capabilities and the life-cycle waste selection sequence that will be used for MPC and/or transportation cask loadings. Negotiations with each Purchaser/Producer will be necessary to determine if special equipment or facility modifications are needed to satisfy the site interface constraints. Initial site interface capabilities are documented in Facility Interface Capability Assessment (FICA) and Services Planning Documents (SPDs). [10CFR961.11 Art IV.B.2] [CRD 3.2.1.1.F]

E. The outside of the transportation cask shall incorporate a feature, such as a seal, which is not readily breakable, and which, while intact would be evidence that the cask has not been opened by unauthorized persons. This sealing feature will be inspected by Waste Acceptance and Transportation prior to acceptance of loaded transportation casks from each Purchaser/Producer and upon arrival at its destination. [10CFR71.43(b)] [CRD 3.7.2.2.K]

F. Transportation shall provide pertinent information on transportation cask subsystems to the Purchaser/Producer in sufficient time prior to a shipping campaign for the development of site-specific procedures, including, but not limited to, the following:

(1) Generic written procedures that can be tailored for each site for cask and MPC handling, inspection, loading, decontamination, and incidental maintenance, including specifications on Purchaser/Producer-furnished canisters for containment of failed fuel.

(2) Producers shall be provided with a rail cask subsystem for delivery of defense HLW to the MGDS. [DOE/RW-0005] [DOE/RW-0187] [DOE/RW-0270P] [CRD 3.2.1.1.F]

(3) Producers shall be provided with a rail cask subsystem for delivery of commercial HLW to the MGDS. [DOE/RW-0005] [DOE/RW-0187] [DOE/RW-0270P] [CRD 3.2.1.1.F] **<TBR>**

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(1) Generic written procedures that can be tailored for each site for cask and MPC handling, inspection, loading, decontamination, and incidental maintenance, including specifications on Purchaser/Producer-furnished canisters for containment of failed fuel.

L. When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known by the Purchaser/Producer, Transportation shall assure that the Purchaser/Producer packages the fissile material as if the unknown properties have credible values that will cause the maximum nuclear reactivity. [10CFR71.83] [CRD Appendix A (10CFR71)]

3.2.3.2.2 Transportation-MRS Interface Requirements

This section contains interface requirements between the Transportation and the MRS system elements. The MRS system element consists of the MRS facility and the OSTS.

3.2.3.2.2.1 Transportation-MRS Facility Interface Requirements

The types of interfaces between these two elements reflect transfer of empty or loaded MPCs, loaded, unloaded, or new transportation cask subsystems, and the documentation, reports, and communications regarding these transportation cask subsystems.

A. Transportation shall procure or contract for motive support equipment equipped with communication equipment to ensure compatibility with the MRS facility to allow communication for shipments to provide advance notice of their arrival. [10CFR73.37(c)(3), (d)(3)] [CRD 3.2.4.3.1.B]

B. Transportation shall procure or contract transportation cask subsystems, which allow for inspection upon receipt at the MRS facility to ensure that external radiation levels and surface contamination levels can be measured. [Derived] [CRD 3.2.1.1.F]

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

D. Transportation shall be capable of delivering SNF to the MRS facility at the nominal shipping rate shown in Table 3-3. Some SNF will be loaded into MPCs. [SNF 1998-2007: DOE/RW-0412] [SNF 2000-2034: A00000000-01717-2200-00001] [CRD 3.2.1.C]

E. Transportation shall deliver compatible transportation cask subsystems, which include NRC-certified casks, to the MRS facility for loading and/or unloading operations. The types of cask subsystems that presently exist or are anticipated to be available are shown in Table 3-4. [10CFR961.11 Art IV.B.2] [CRD 3.2.1.1.F]

L. When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known by the Purchaser/Producer, Transportation shall assure that the Purchaser/Producer packages the fissile material as if the unknown properties have credible values that will cause the maximum nuclear reactivity. [10CFR71.83] [CRD Appendix A (10CFR71)]

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

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Table 3-4. RESERVED

K. The design of the MPC shall be compatible with the service life of the MRS facility. [DOE Order 4700.1 Ch III.B.2.c(2)(c)] [CRD 3.2.3.2.B]

The MRS facility design and operation are responsible for ensuring the loaded MPC and its contents are not degraded, including shipment to the MGDS.

L. The design of the MPC shall be compatible with the MRS facility design to ensure that the MPC weight, dimensional envelope, and configuration are compatible with the storage mode. [DOE Order 4700.1 Ch III.B.2.c(2)(c)] [CRD 3.2.3.2.B]

The MRS facility design is responsible for coordinating with the MPC design to ensure it is capable of handling loaded/empty MPCs under the requirements of 10CFR72 for storage at the MRS facility.

M. The design of the MPC shall maintain SNF subcritical under normal and off-normal conditions. [10CFR72.124(a)] [CRD 3.2.2.5]

The MRS facility design of handling, transfer, and storage systems is responsible for ensuring that SNF is maintained subcritical. The design must ensure that, before a nuclear criticality accident is possible, at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. The design of MRS facility 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.

N. The design of the MPC shall maintain the peak SNF cladding temperature below the maximum cladding temperature designated for storage that would lead to gross rupture without active cooling systems. [10CFR72.122(h)(1)] [10CFR72.236(f)] [CRD 3.2.1.1.H]

The MRS facility design is responsible for providing a storage environment capable of maintaining an ambient temperature not to exceed the ambient temperature for storage.

O. The design of the MPC shall provide structural and confinement integrity of the loaded MPC outside of any overpacks under loads imposed by MRS facility transfer operations and off-normal occurrences. [10CFR72.122(h)(5)] [CRD 3.2.1.1.H] [CRD 3.2.5.1.C]

The MRS facility storage mode design is responsible for providing structural integrity for loaded MPCs to withstand the loads induced by MRS facility handling operations.

3.2.3.2.3 Transportation-MGDS Interface Requirements

The types of interfaces between these two elements reflect transfer of empty or loaded MPCs, loaded, unloaded, or new transportation cask subsystems, and the documentation, reports, and communications regarding these transportation cask subsystems.

It is recognized that the MPC and transportation cask designs will be required years before a final MGDS design is available. The required interface coordination will be done on an iterative basis.

A. Transportation shall procure or contract for motive support equipment equipped with communication equipment to ensure compatibility with the MGDS to allow communication for shipments to provide advance notice of their arrival. [10CFR73.37(c)(3), (d)(3)] [CRD 3.2.4.3.1.B]

B. Transportation shall procure or contract transportation cask subsystems to allow for inspection upon receipt to ensure that external radiation levels and surface contamination levels can be measured. [Derived] [CRD 3.2.1.1.F]

C. Shipments from Purchaser facilities shall be made by truck or rail. [DOE/RW-0005] [CRD 3.2.1.1.F]

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

E. All shipments from Producer sites (for commercial and defense HLW) to the MGDS shall be made by rail in dedicated trains. [DOE/RW-0316P] [CRD 3.2.1.1.F]

F. Transportation shall be capable of delivering SNF and HLW to the MGDS at the nominal shipping rate shown in Table 3-3. Some SNF will be loaded into MPCs. [HLW: DOE/RW-0316P, ORNL/Sub/89-SD841/2] [SNF 1998-2007: DOE/RW-0412] [SNF 2000-2034: A20000000-00811-5705-00008][CRD 3.2.1.C]

G. Transportation shall deliver compatible transportation cask subsystems, which include NRC-certified casks, to the MGDS for loading and/or unloading operations. [10CFR961.11 Art IV.B.2] [CRD 3.2.1.1.F]

H. Transportation shall provide pertinent information on transportation cask subsystems to the MGDS in sufficient time prior to loading and/or unloading operations for the development of site-specific procedures, including, but not limited to, the following:

   (1) Written procedures for cask and MPC handling, inspection, loading, cleaning, decontamination, and incidental maintenance.

N. The design of the MPC shall maintain SNF subcritical under normal and off-normal conditions. [10CFR60.131(b)(7)] [CRD 3.2.2.5]

The MGDS design of handling, transfer, and disposal systems is responsible for ensuring that SNF is maintained subcritical under normal and off-normal conditions.

O. The design of the MPC shall maintain the peak SNF cladding temperature below the maximum cladding temperature designated for disposal, when emplaced, without active cooling systems. To meet this requirement, the peak SNF cladding temperature in the loaded MPC with thermal output of 14.2 kW **<TBR>** may not exceed 350°C **<TBR>** when subjected to an MPC external wall temperature of 225°C **<TBR>**. [10CFR60.135(a)(2)] [DOE/RW-0199] [Ref. 2.4.2.F] [CRD 3.2.1.1.H] **<TBR>**

The MGDS design is responsible for providing an emplacement environment (e.g., waste package design, underground facility design, emplacement mode or orientation, spacing between waste packages, etc.) for the MPC with disposal container, such that an emplaced waste package with a thermal output of 14.2 kW will not result in surface temperature higher than 225°C.

P. The design of the MPC shall maintain the peak SNF cladding temperature below the maximum cladding temperature designated for storage that would lead to a gross rupture without active cooling systems. [10CFR60.135(a)(2)] [10CFR72.122(h)(1)] [10CFR72.236(f)] [CRD 3.2.1.1.H]

The MGDS waste storage facilities design is responsible for providing a storage environment capable of maintaining an ambient temperature not to exceed the ambient temperature designated for storage (in the MPC).

Q. The design of the MPC shall provide structural and confinement integrity of the loaded MPC outside of any overpacks under loads imposed by repository waste transfer operations (including transfer operations after retrieval) and off-normal occurrences. [10CFR60.135(b)(3)] [CRD 3.2.1.1.H] [CRD 3.2.5.1.C]

The MGDS design is responsible for providing the protection of workers and the public in the event of accidents involving loss of containment within the MPC or waste package.

R. The design of the MPC shall provide structural integrity of the loaded MPC and SNF assemblies while loaded in the waste package under loads imposed by repository handling operations and off-normal occurrences. This includes the requirement that structural integrity be preserved for 100 years **<TBR>** after loading. [NWPA 122] [10CFR60.135(b)(3)] [CRD 3.2.1.1.H] [CRD 3.2.1.1.J] [CRD 3.2.5.1.C]

The MGDS design is responsible for providing structural integrity for loaded MPCs to withstand the loads induced by waste-handling operations, including retrieval.

N. The design of the MPC shall maintain SNF subcritical under normal and off-normal conditions. [10CFR60.131(b)(7)] [CRD 3.2.2.5]

The MGDS design of handling, transfer, and disposal systems is responsible for ensuring that SNF is maintained subcritical under normal and off-normal conditions.

O. The design of the MPC shall maintain the peak SNF cladding temperature below the maximum cladding temperature designated for disposal, when emplaced, without active cooling systems. To meet this requirement, the peak SNF cladding temperature in the loaded MPC with thermal output of 14.2 kW <**TBV**> may not exceed 350°C <**TBV**> when subjected to an MPC external wall temperature of 225°C <**TBV**>. [10CFR60.135(a)(2)][DOE/RW-0199] [Ref. 2.4.2.E] [CRD 3.2.1.1.H] <**TBV**>

The MGDS design is responsible for providing an emplacement environment (e.g., waste package design, underground facility design, emplacement mode or orientation, spacing between waste packages, etc.) for the MPC with disposal container, such that an emplaced waste package with a thermal output of 14.2 kW will not result in surface temperature higher than 225°C.

P. The design of the MPC shall maintain the peak SNF cladding temperature below the maximum cladding temperature designated for storage that would lead to a gross rupture without active cooling systems. [10CFR60.135(a)(2)][10CFR72.122(h)(1)] [10CFR72.236(f)][CRD 3.2.1.1.H]

The MGDS waste storage facilities design is responsible for providing a storage environment capable of maintaining an ambient temperature not to exceed the ambient temperature designated for storage (in the MPC).

Q. An MPC loaded with SNF shall be capable of withstanding, without loss of containment, loads imposed by repository waste handling operations (including transfer operations after retrieval) and off-normal occurrences. [10CFR60.135(b)(3)] [CRD 3.2.1.1.H][CRD 3.2.5.1.C]

The MGDS design is responsible for providing for protection of workers and the public in the event of accidents involving loss of containment within the MPC or waste package.

R. The design of the MPC shall provide protection for loaded SNF assemblies while loaded in the waste package from adverse effects of loads imposed by repository handling operations (including transfer to and from a disposal container) and off-normal occurrences. [NWPA 122] [10CFR60.135(b)(3)] [CRD 3.2.1.1.H] [CRD 3.2.1.1.J] [CRD 3.2.5.1.C]

The MGDS design is responsible for providing protection for loaded MPCs from structural damage due to the loads induced by waste-handling operations, including retrieval.

S. The design of the MPC shall provide access to SNF for response to off-normal conditions. [10CFR72.122(l)] [CRD 3.3.1.B]

The MGDS design is responsible for providing access to SNF for response to off-normal conditions.

T. The design of the MPC shall provide the capability to add filler material at the MGDS. [10CFR60.131(b)(7)] [10CFR60.135(a)] [CRD 3.2.2.5]

The MGDS design will ensure that MPCs (as delivered to the MGDS) do not compromise the ability of the waste package to meet its requirements. This may require that MPCs be modified at the MGDS for the addition of filler material to contribute to criticality control, corrosion control, and heat transfer.

U. The design and loaded content of the MPC shall meet applicable requirements imposed on waste forms in 10CFR60.135(c) as stated in Section 3.7.1.2.3. [10CFR60.135(c)] [CRD Appendix A (10CFR60)]

The MGDS design (including the waste package) is responsible for interfacing with the MPC design to ensure compliance with the requirements in 10CFR60.135(c).

V. The design of the MPC shall not preclude removal of SNF, without damage, at the MGDS. [10CFR72.122(l)] [CRD 3.2.1.3] [CRD 3.3.1.B]

The MGDS design is responsible for not precluding the removal of the MPC from the waste package without damage to the MPC.

W. The design of the MPC shall provide the capability to be cut open and re-sealed for disposal at the MGDS. [10CFR60.131(b)][10CFR72.122(l)][CRD 3.2.1.3][CRD 3.3.1.B]

The MGDS design is responsible for having the capability to cut open an MPC, remove and replace SNF without damage to the SNF, and re-seal the MPC.

3.2.3.2.4 Segment Interface Summary

A. Transportation design shall address requirements for the Transportation segment interfaces with MRS facility identified in Table 3-5. When an interface exists, the block in the table contains an "X" indicating that there is a functional interface for Transportation to address between the segments involving Function 1.3.1 Store Waste at the MRS. 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]

The MRS facility is responsible for ensuring that the MRS facility segment interfaces to Function 1.2 Transport Waste are addressed.

C. The MPC together with its storage mode shall be designed as an integral assembly for certification/licensing under 10CFR72. [10CFR72.1] [10CFR72.210] [CRD 3.3.1.B]

D. The MPC together with its disposal container shall be designed as an integral assembly for certification/licensing of the repository under 10CFR60. [10CFR60.1] [CRD 3.3.1.B]

3.7.1.2.3.2 Material Compatibility

A. The MPC shall be designed not to adversely affect the waste package, storage mode, or transportation cask. [10CFR60.135(a)] [CRD 3.2.1.1.H]

B. The MPC shall be designed to not lead to internal corrosion such that there will be an adverse effect on normal handling, on the function of the waste package, storage mode or transportation cask, and on abnormal occurrence such as an MPC drop accident. [10CFR60.135(a)] [CRD 3.2.1.1.H]

3.7.1.2.3.3 SNF Characteristics

A. The MPC shall be designed to be loaded with, as a minimum, 80% of the SNF expected to be available for delivery in the first 10 years of CRWMS operations, in a configuration that complies with written procedures and in compliance with the transportation cask and storage mode Certificates of Compliance. [10CFR71.87(f)] [10CFR72.212(a)] [10CFR961.11 Appendix E] [CRD 3.2.1.1.C]

B. The MPC and its contents shall not contribute to free liquids in the waste packages to an amount that could compromise the ability of the waste package to achieve the performance objectives related to containment of the waste form or result in spillage and spread of contamination in the event of waste package perforation during the period through permanent closure. [10CFR60.135(b)(2)] [CRD Appendix A (10CFR60)]

C. The MPC and its contents shall not contain explosive, pyrophoric, or chemically reactive materials in an amount that could compromise the repository's ability for waste isolation or the repository's ability to satisfy the performance objectives. [10CFR60.135(b)(1)] [CRD Appendix A (10CFR60)]

3.7.1.2.3.4 Thermal Limitations

A. The MPC, when loaded in its storage mode, shall be designed to maintain the peak SNF cladding temperature below the maximum cladding temperature designated for storage that would lead to gross rupture without active cooling systems. [10CFR72.122(h)(1)] [10CFR72.236(f)] [CRD 3.2.1.1.H]

B. The MPC, when loaded in a transportation cask, shall be designed so that the heat generated within the transportation package does not, at any time during transportation, affect the integrity of the package under conditions normally incident to transportation and during and after postulated hypothetical accident conditions. [49CFR173.442(a)] [10CFR71.43(f)] [10CFR71.71] [10CFR71.73] [CRD 3.2.2.7] [CRD 3.2.6.2.C] [CRD 3.2.6.2.D] [CRD 3.7.2.2.G(1)]

C. The MPC shall be designed so that, when loaded in a transportation cask and ready for transport with the personnel barrier installed, the temperature of the accessible external surfaces of the loaded package does not, assuming still air in the shade at an ambient temperature of 38°C, exceed 82°C. [49CFR173.442(b)(2)] [10CFR71.43(g)] [CRD 3.2.2.7] [CRD 3.7.2.2.G(2)]

D. The MPC shall be designed to maintain the peak SNF cladding temperature below the maximum cladding temperature designated for disposal, when emplaced, without active cooling systems. To meet this requirement, the peak SNF cladding temperature in the loaded MPC with thermal output of 14.2 kW **<TBV>** may not exceed 350°C **<TBV>** when subjected to an MPC external wall temperature of 225°C **<TBV>**. [10CFR60.135(a)(2)] [DOE/RW-0199] [Ref. 2.4.2.E] [CRD 3.2.1.1.H] [**<TBV>**

3.7.1.2.3.5 Shielding Requirements

The MPC together with its overpack (transportation cask, storage mode, or disposal container) shall be designed to comply with the shielding and radiological protection requirements in 10CFR71.47 (see Trans-SRD 3.7.1.2.1.B) for transportation, 10CFR72.126 for storage, and 10CFR60.131(a) for disposal. [10CFR60.131(a)] [10CFR71.47] [10CFR72.126] [CRD 3.2.2.2.E]

3.7.1.2.3.6 Criticality Requirements

A. The MPC, in association with its appropriate overpacks, shall be designed to maintain SNF subcritical under normal and off-normal conditions by complying with 10CFR71.55 (see Trans-SRD 3.7.1.2.1.F) for transportation, 10CFR72.124(a) for storage, and 10CFR60.131(b)(7) for disposal. [10CFR60.131(b)(7)] [10CFR72.124(a)] [10CFR71.55] [CRD 3.2.2.5]

B. The exterior marking shall meet the MPC label requirements as specified in Section 3.7.1.2.3.7. [10CFR60.135(b)(4)] [CRD Appendix A (10CFR60)]

3.7.1.2.3.11 Tamper-indicating Device

The MPC shall be designed to permit the use of seals and other identifying and tamper-indicating devices for safeguards purposes. [10CFR71.43(b)] [CRD 3.7.2.2.K]

3.7.1.2.3.12 MPC Service Life

The MPC shall be designed to have a minimum service life of 100 years <**TBR**>. [NWPA 122] [10CFR60.135(b)(3)] [CRD 3.2.1.1.J] [CRD 3.2.5.1.C]

3.7.1.2.3.13 Standards for MPC Design

The MPC shall be designed, fabricated, and tested considering the requirements of applicable national standards, such as ANSI/ANS 57.2, ANSI/ANS 57.9, ANSI/ANS 8.1, ANSI/ANS 8.17, ANSI/ANS 8.21, and NRC RG 1.13 for criticality safety; ANSI N14.5 for leak testing. [QARD (DOE/RW-0333P)3.2.1] [CRD 3.3.1.C]

3.7.1.2.4 Ancillary Equipment

A. Ancillary equipment shall be designed, fabricated, tested, and inspected considering the requirements of applicable national standards, such as ANSI N14.19 to ensure containment integrity during normal and accident conditions as defined in 10CFR71.71 and 10CFR71.73. [10CFR71.71] [10CFR71.73] [CRD 3.3.1.C]

B. Ancillary equipment shall be designed to provide the capability to minimize the generation of mixed waste during operation. [Derived by CRD 3.2.2.8]

3.7.1.2.5 Special Tools and Fixtures

A. Special tools and fixtures shall be designed, fabricated, tested, and inspected considering the requirements of applicable national standards, such as ANSI N14.6 for lifting/handling devices. [QARD (DOE/RW-0333P) 3.2.1] [CRD 3.3.1.C]

B. Special tools and equipment shall be designed to provide the capability to minimize the generation of mixed waste during operation. [Derived by CRD 3.2.2.8]

3.7.1.2.3.10 Exterior Marking Requirement

A. An exterior marking shall be placed on the MPC to indicate the orientation of the SNF basket within the MPC. The marking must correspond to a map uniquely identifying the individual cells within the MPC basket and the specific SNF assembly within each cell. [10CFR60.135(a)] [CRD Appendix A (10CFR60)]

B. The exterior marking shall meet the MPC label requirements as specified in Section 3.7.1.2.3.7. [10CFR60.135(b)(4)] [CRD Appendix A (10CFR60)]

3.7.1.2.3.11 Tamper-indicating Device

The MPC shall be designed to permit the use of seals and other identifying and tamper-indicating devices for safeguards purposes. [10CFR71.43(b)] [CRD 3.7.2.2.K]

3.7.1.2.3.12 MPC Service Life

The MPC shall be designed to have a minimum service life of 150 years. [NWPA 122] [10CFR60.135(b)(3)] [CRD 3.2.1.1.J] [CRD 3.2.5.1.C]

3.7.1.2.3.13 Standards for MPC Design

The MPC shall be designed, fabricated, and tested considering the requirements of applicable national standards, such as ANSI/ANS 57.2, ANSI/ANS 57.9, ANSI/ANS 8.1, ANSI/ANS 8.17, ANSI/ANS 8.21, and NRC RG 1.13 for criticality safety; ANSI N14.5 for leak testing. [QARD (DOE/RW-0333P)3.2.1] [CRD 3.3.1.C]

3.7.1.2.4 Ancillary Equipment

A. Ancillary equipment shall be designed, fabricated, tested, and inspected considering the requirements of applicable national standards, such as ANSI N14.19 to ensure containment integrity during normal and accident conditions as defined in 10CFR71.71 and 10CFR71.73. [10CFR71.71] [10CFR71.73] [CRD 3.3.1.C]

B. Ancillary equipment shall be designed to provide the capability to minimize the generation of mixed waste during operation. [Derived by CRD 3.2.2.8]

Table 6-1. Requirements Cross-Reference (continued)

Source Document	CRD Paragraph	Trans-SRD Paragraph
49CFR177.804	Appendix A	3.7.4.2.9.E
49CFR177.825(a), (b), (c)	Appendix A	3.7.4.2.3.A
49CFR177.825(d)(1)	3.7.2.2.B	3.6.2.1.E
49CFR177.825(e)	Appendix A	3.7.4.2.6.H
49CFR177.842(f)	Appendix A	3.7.4.2.9.F
49CFR177.842(g)	Appendix A	3.2.2.2
49CFR177.843(a)	Appendix A	3.2.2.4.B
49CFR392.7	Appendix A	3.7.4.2.9.G
49CFR392.8	Appendix A	3.7.4.2.9.H
A20000000-00811-5705-00008	3.2.1.C	3.2.1.1.E
A20000000-00811-5705-00008	3.2.1.C	3.2.3.2.1.B
A20000000-00811-5705-00008	3.2.1.C	3.2.3.2.2.1.D
A20000000-00811-5705-00008	3.2.1.C	3.2.3.2.3.F
A00000000-01717-6700-00001	3.2.1.1.I	3.2.3.2.2.1.C
A00000000-01717-6700-00001	3.2.1.1.I	3.2.3.2.3.D
AAR Interchange Rule 91	Appendix A	3.2.7.1.B
DOE Order 1540.1A Ch I 4(c)	Appendix A	3.2.7.1
DOE Order 4330.4A Ch I 3.1.4	3.5.3.D	3.5.3.D
DOE Order 4330.4A Ch I 3.5	3.5.1.1.C	3.5.1.1.C
DOE Order 4330.4A Ch I 3.1.4	3.6.2.1.C	3.6.2.1.B
DOE Order 4700.1 Att III-1 1.a, 1.c(6)(b)3	3.3.8.1.D	3.3.5.B
DOE Order 4700.1 Att III-1 1.a, 1.c(6)(b)3	3.5.1.1.B	3.5.1.1.B
DOE Order 4700.1 Att III-1 1.a, 1.c(6)(b)3	3.5.2; 3.5.4	3.5.2.1
DOE Order 4700.1 Att III-1 1.a, 1.c(6)(b)3	3.5.3.E	3.5.3.E

Table 6-1. Requirements Cross-Reference (continued)

Source Document	CRD Paragraph	Trans-SRD Paragraph
DOE Order 5480.3 10.d	3.5.1.4	3.2.3.2.1.J
DOE Order 5480.3 10.d	3.5.1.4	3.2.3.2.2.1.I
DOE Order 5480.3 10.d	3.5.1.4	3.2.3.2.3.K
DOE Order 5480.3 10.e	Appendix A	3.7.4.2.2.C
DOE Order 5480.3 9.b(7)	3.5.1.4	3.2.3.2.1.J
DOE Order 5480.3 9.b(7)	3.5.1.4	3.2.3.2.2.1.I
DOE Order 5480.3 9.b(7)	3.5.1.4	3.2.3.2.3.K
DOE Order 5480.3 9.b(8)	Appendix A	3.7.4.2.8.C
DOE Order 6430.1A 0109	3.3.1.C; 3.3.4.B	3.3.4.2
DOE Order 6430.1A 0110-13.1	3.2.4.3.1.C	3.2.4.3.1.B
DOE Order 6430.1A 0110-99.8.4	3.3.2.C	3.3.2.C
DOE Order 6430.1A 0200-99.8.1	3.3.2.A	3.3.2.A
DOE Order 6430.1A 0900-99.0	3.2.4.1	3.2.4.1.A
DOE Order 6430.1A 0900-99.0	3.2.4.1	3.2.4.1.B
DOE Order 6430.1A 0950-1	3.2.4.1	3.2.4.1.C
DOE Order 6430.1A 1300-11.2	3.2.1.2.E	3.2.1.2.B
DOE Order 6430.1A 1300-12.4.10	Appendix A	3.2.5.2.C
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.A
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.B
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.C
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.D
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.E
DOE Order 6430.1A 1300-12.4.11	3.3.7.8	3.3.7.8
DOE Order 6430.1A 1300-12.4.11	3.3.3	3.3.3.I

Table 6-1. Requirements Cross-Reference (continued)

Source Document	CRD Paragraph	Trans-SRD Paragraph
QARD (DOE/RW-0333P)	3.9.A	3.9.B
QARD (DOE/RW-0333P) 3.2.1	3.3.1.C	3.3.1.B
QARD (DOE/RW-0333P) 3.2.1	3.3.1.C	3.7.1.2.1.M
QARD (DOE/RW-0333P) 3.2.1	3.3.1.C	3.7.1.2.3.13
QARD (DOE/RW-0333P) 3.2.1	3.3.1.C	3.7.1.2.5.A
QARD (DOE/RW-0333P) 3.2.1	3.3.1.C	3.7.1.2.6
Ref. 2.4.2.E MGDS-MPC Thermal Requirements	3.2.1.1.H	3.2.3.2.3.O
Ref. 2.4.2.E MGDS-MPC Thermal Requirements	3.2.1.1.H	3.7.1.2.3.4.D
(7USC136 et seq.)	3.3.11.F	3.3.11.E
(42USC4321 et seq.)	Appendix A	3.4.1.1.B
(42USC6901 et seq.)	3.3.11.G	3.3.11.F
(42USC7401)	3.3.11.B	3.3.11.B
(42USC9601 et seq.)	Appendix A	3.4.1.1.B
(10CFR19.12)	Appendix A	3.7.1.2.1.B
(10CFR51)	Appendix A	3.4.1.1.B
(10CFR71.10)	Appendix A	3.7.4.2.2.A
(10CFR71.12)	Appendix A	3.7.1.2.1.D
(10CFR71.41 - 47)	Appendix A	3.7.1.2.1.E
(10CFR71.57(a))	Appendix A	3.7.1.2.1.F
(10CFR71.59(b)(1))	Appendix A	3.7.1.2.1.F
(10CFR71.61(a))	Appendix A	3.7.1.2.1.F
(10CFR71.71)	Appendix A	3.7.1.2.1.E
(10CFR71.71)	Appendix A	3.7.1.2.1.F
(10CFR71.71)	Appendix A	3.7.1.2.1.H.6
(10CFR71.71)	Appendix A	3.7.1.2.4.A

Table 6-1. Requirements Cross-Reference (continued)

Source Document	CRD Paragraph	Trans-SRD Paragraph
(49CFR171 - 174)	Appendix A	3.7.1.2.1.L
(49CFR172 Subpart B)	Appendix A	3.3.3.H
(49CFR172 Subpart C)	Appendix A	3.3.3.H
(49CFR172 Subpart D)	3.7.2.2.H.2	3.3.3.G
(49CFR172 Subpart G)	Appendix A	3.7.3.2.6.A
(49CFR172)	3.7.2.2.H.3	3.3.3.H
(49CFR172.400 - 407)	Appendix A	3.3.3.G
(49CFR172.403)	Appendix A	3.7.4.2.9.C
(49CFR172.403)	Appendix A	3.7.4.2.9.F
(49CFR172.436 - 440)	Appendix A	3.3.3.G
(49CFR172.500 - 519)	Appendix A	3.3.3.H
(49CFR172.556)	Appendix A	3.3.3.H
(49CFR176 - 178)	Appendix A	3.7.1.2.1.L
(49CFR177.816)	Appendix A	3.6.2.1
(49CFR180)	3.7.2.2.H	3.7.1.2.1.L
(49CFR200 - 236)	Appendix A	3.4.1.1.B
(49CFR350 - 399)	Appendix A	3.4.1.1.B
(49CFR390 - 397)	Appendix A	3.7.4.2.9.E
(49CFR393.95)	Appendix A	3.7.4.2.9.H
(ANSI/ASA 38)	Appendix A	3.2.4.2.5
(ANSI/ANS 8.1)	3.3.1.C	3.7.1.2.1.M
(ANSI/ANS 8.1)	3.3.1.C	3.7.1.2.3.13
(ANSI/ANS 8.17)	3.3.1.C	3.7.1.2.1.M
(ANSI/ANS 8.17)	3.3.1.C	3.7.1.2.3.13
(ANSI/ANS 8.21)	3.3.1.C	3.7.1.2.1.M