72-1015

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July 18, 2001

U.S. Nuclear Regulatory Commission
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Attn: Document Control Desk

Subject: Submittal of Safety Analysis Report (SAR) Changed Pages for the UMS® Universal Storage System Amendment #2 for Maine Yankee Atomic Power Company Site Specific Spent Fuel (TAC No. L23217)

Docket No. 72-1015

References:

1. Request for Amendment of the Certificate of Compliance for the NAC-UMS® Universal Storage System to Incorporate Nonfuel Components and Uncanistered Damaged Fuel Rods as Approved Contents, Revision UMSS-00L, NAC International, October 17, 2000
2. Request for Additional Information (RAI) for the UMS® Universal Storage System Amendment #2, U.S. Nuclear Regulatory Commission, January 22, 2001
3. Submittal of the NAC Responses to the U.S. NRC Request for Additional Information for the UMS® Universal Storage System Amendment #2 for Maine Yankee Atomic Power Company Site Specific Spent Fuel, Revision UMSS-01A, NAC International, April 27, 2001
4. Review of Changes to Technical Specifications and Authorized Contents Requested for the NAC-UMS Spent Fuel Storage Cask, U.S. Nuclear Regulatory Commission, June 26, 2001
5. Submittal of Safety Analysis Report (SAR) Changed Pages for the UMS® Universal Storage System Amendment #2 for Maine Yankee Atomic Power Company Site Specific Spent Fuel, Revision UMSS-01B, July 5, 2001
6. NRC/NAC conference calls to discuss inconsistencies in the UMS® Amendment #2 Technical Specifications, July 12, 2001

In accordance with conference call discussions (Reference 6), NAC International (NAC) herewith submits ten copies of Safety Analysis Report (SAR) changed pages to supplement the request for Amendment #2 of the UMS® Universal Storage System Certificate of Compliance (Reference 1).

This submittal includes the SAR changed pages, which are designated as Revision UMSS-01D, for the UMS® SAR. The changed pages have been prepared in accordance with the following conventions:

- Revision indicators (revision bars) are used to highlight changes. Revision bars are not used to indicate text flow, but the revised "text flow" pages are provided for completeness.

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U.S. Nuclear Regulatory Commission
July 18, 2001

Attachment 1

List of Changes for Revision UMSS-01D for the UMS® Storage SAR

Page/Section	Change
LOEP	Updated to reflect changes
MTOC	Updated to reflect changes
Chapter 1, Page 1-3	Table 1-1, Consolidated Fuel definition – added "Consolidated Fuel is stored in a Maine Yankee Fuel Can"
Chapter 1, Page 1-4	Table 1-1, Damaged Fuel definition – added "Damaged Fuel must be placed in a Maine Yankee Fuel Can"
Chapter 1, Page 1-4	Table 1-1, High Burnup Fuel definition – changed last two paragraphs to be consistent with Chapter 12
Chapter 1, Pages 1-5 through 1-8	Text flow
Chapter 9, TOC	Updated to reflect changes
Chapter 9, Page 9.2-2	Section 9.2.3, Required Surveillance of First Storage System Placed in Service, added
Chapter 12, Page 12-3	In 4th paragraph - added the acronym CEA, added "or a CEA plug", and changed the sentence to end with "with either of these components installed," instead of "with the control element installed"
Chapter 12, Appendix A, TOC	Updated to reflect changes in section A 5.0
Chapter 12, Appendix A, Page 12A1-4	Damaged Fuel definition – added "DAMAGED FUEL must be placed in a MAINE YANKEE FUEL CAN"
Chapter 12, Appendix A, Page 12A1-5	High Burnup Fuel definition, 3 paragraph – added "is stored as DAMAGED FUEL in a MAINE YANKEE FUEL CAN"
Chapter 12, Appendix A, Page 12A1-5	Fuel Debris definition – added sentence, "FUEL DEBRIS are stored in a MAINE YANKEE FUEL CAN"
Chapter 12, Appendix A, Page 12A1-6	Maine Yankee Fuel Can definition – added "FUEL DEBRIS" to the list of what the fuel can holds and moved "only" to be after "may"
Chapter12, Appendix A, Pages 12A5-2 through 12A5-5	Added new Section A 5.3, Special Requirements for the First System Placed in Service; all other sections renumbered, Table 12A5-1 note changed Tech Spec reference to match renumbered sections
Chapter 12, Appendix B, Page 12B2-4	In 2nd paragraph, 3rd line - added "burnable poison rods"

Attachment 1 (continued)

List of Changes for Revision UMSS-01D for the UMS® Storage SAR

Page/Section	Change
Chapter 12, Appendix B, Page 12B2-4	In 5th paragraph, 5th line – deleted "flow" from "CEA flow plug"
Chapter 12, Appendix B, Page 12B2-5	In 1st paragraph, 3rd line – deleted extra "HIGH BURNUP FUEL," and added "FUEL DEBRIS"
Chapter 12, Appendix B, Page 12B2-14	Table 12B2-6, 1st line – changed "STANDARD Fuel" to "Total Number of Fuel Assemblies"; changed canister loading position from "Any" to "—"
Chapter 12, Appendix B, Page 12B2-14	Table 12B2-6, Note 3 – revised to say "these site specific spent fuel configurations and standard fuel assemblies. Standard fuel assemblies may be loaded in any canister position."
Chapter12, Appendix B, Page 12B2-14	Table 12B2-6, Notes 4 and 5 – added "Basket" before "corner" in Note 4 and before "periphery" in Note 5
Chapter 12, Appendix B, Page 12B2-15	In A(2), – took out "Flow" in "CEA Flow Plugs"; changed "with these components installed" to "with a CEA or CEA Plug inserted"; added "CEAs or CEA Plugs may not be inserted in damaged fuel assemblies, consolidated fuel assemblies or assemblies with irradiated stainless steel replacement rods"; and added last sentence, "Fuel assemblies without an inserted CEA or CEA Plug, including those with inserted ICI Thimbles, must be loaded in a Class 1 Canister"
Chapter12, Appendix B, Page 12B2-15	In B(2), changed reference to "Section A 5.7(1)" to be consistent with renumbered A 5.0 section
Chapter 12, Appendix B, Page 12B2-16	Item 5, deleted "flow" in "CEA flow plug"
Chapter 12, Appendix B, Page 12B2-17	Item (e) – reworded
Chapter 12, Appendix B, Page 12B2-17	Item (f) added

EA790-SAR-002

DOCKET NO. 72-1015

UMS®

UNIVERSAL MPC SYSTEM®

SAFETY ANALYSIS REPORT

for the

UMS® Universal Storage System

JULY 2001 REVISION UMSS-01D

NAC INTERNATIONAL

List of Effective Pages

Master Table of Contents

i ..... Revision 5
ii ..... Revision 5
iii ..... Revision 2
iv ..... Revision UMSS-00L
v ..... Revision 5
vi ..... Revision UMSS-00L
vii ..... Revision 5
viii ..... Revision UMSS-00L
ix ..... Revision UMSS-00L
x ..... Revision UMSS-00L
xi ..... Revision UMSS-01D
xii ..... Revision 5
xiii ..... Revision 5
xiv ..... Revision 5
xv ..... Revision UMSS-00L
xvi ..... Revision 5

Chapter 1

1-i ..... Revision 5
1-ii ..... Revision 1
1-1 ..... Revision 1
1-2 ..... Revision 1
1-3 ..... Revision UMSS-01D
1-4 ..... Revision UMSS-01D
1-5 ..... Revision UMSS-01D
1-6 ..... Revision UMSS-01D
1-7 ..... Revision UMSS-01D
1-8 ..... Revision UMSS-01D
1.1-1 ..... Revision 5
1.1-2 ..... Revision 5
1.1-3 ..... Revision 1
1.1-4 ..... Revision 1
1.2-1 ..... Revision 1
1.2-2 ..... Revision 1
1.2-3 ..... Revision 1
1.2-4 ..... Revision 1
1.2-5 ..... Revision 5
1.2-6 ..... Revision 5
1.2-7 ..... Revision 1
1.2-8 ..... Revision 1
1.2-9 ..... Revision 1
1.2-10 ..... Revision 1
1.2-11 ..... Revision 1
1.2-12 ..... Revision 1
1.2-13 ..... Revision 1
1.2-14 ..... Revision 1
1.2-15 ..... Revision 1
1.2-16 ..... Revision 1
1.2-17 ..... Revision 1
1.2-18 ..... Revision 1
1.2-19 ..... Revision 1
1.2-20 ..... Revision 1
1.2-21 ..... Revision 1
1.2-22 ..... Revision 2
1.2-23 ..... Revision 1
1.2-24 ..... Revision 1
1.2-25 ..... Revision 1
1.2-26 ..... Revision 1
1.2-27 ..... Revision 1
1.3-1 ..... Revision 5
1.3-2 ..... Revision 5
1.3-3 ..... Revision UMSS-00L
1.4-1 ..... Revision 1
1.4-2 ..... Revision 1
1.5-1 ..... Revision 1
1.5-2 ..... Revision 1
1.5-3 ..... Revision 1

List of Effective Pages (continued)

1.5-4 ..... Revision 1
1.5-5 ..... Revision 1
1.5-6 ..... Revision 1
1.5-7 ..... Revision 1
1.5-8 ..... Revision 1
1.5-9 ..... Revision 1
1.5-10 ..... Revision 1
1.5-11 ..... Revision 1
1.5-12 ..... Revision 1
1.5-13 ..... Revision 1
1.5-14 ..... Revision 1
1.5-15 ..... Revision 1
1.5-16 ..... Revision 1
1.5-17 ..... Revision 1
1.5-18 ..... Revision 1
1.5-19 ..... Revision 1
1.5-20 ..... Revision 1
1.5-21 ..... Revision 1
1.5-22 ..... Revision 1
1.5-23 ..... Revision 1
1.5-24 ..... Revision 1
1.5-25 ..... Revision 1
1.5-26 ..... Revision 1
1.5-27 ..... Revision 1
1.5-28 ..... Revision 1
1.5-29 ..... Revision 1
1.5-30 ..... Revision 1
1.5-31 ..... Revision 1
1.5-32 ..... Revision 1
1.5-33 ..... Revision 1
1.5-34 ..... Revision 1
1.5-35 ..... Revision 1
1.5-36 ..... Revision 1
1.5-37 ..... Revision UMSS-00L
1.5-38 ..... Revision 1
1.5-39 ..... Revision 1
1.5-40 ..... Revision 1
1.5-41 ..... Revision 1
1.5-42 ..... Revision 1
1.5-43 ..... Revision 1
1.5-44 ..... Revision 1
1.5-45 ..... Revision 1
1.5-46 ..... Revision 1
1.5-47 ..... Revision 1
1.5-48 ..... Revision 1
1.5-49 ..... Revision 1
1.5-50 ..... Revision 1
1.5-51 ..... Revision 1
1.5-52 ..... Revision 1
1.5-53 ..... Revision 1
1.5-54 ..... Revision 1
1.6-1 ..... Revision 1
1.6-2 ..... Revision 1
1.7-1 ..... Revision 1
1.7-2 ..... Revision 1
1.7-3 ..... Revision 1
1.8-1 ..... Revision 3
1.8-2 ..... Revision 5

Chapter 2

2-i ..... Revision 5
2-ii ..... Revision 1
2-iii ..... Revision UMSS-00L
2-iv ..... Revision UMSS-00L
2-1 ..... Revision 1
2-2 ..... Revision 1
2-3 ..... Revision 1
2.1-1 ..... Revision UMSS-00L
2.1.1-1 ..... Revision 5
2.1.1-2 ..... Revision 1

List of Effective Pages (continued)

2.1.1-3 ..... Revision 1
2.1.1-4 ..... Revision 1
2.1.2-1 ..... Revision 1
2.1.2-2 ..... Revision 1
2.1.2-3 ..... Revision 1
2.1.2-4 ..... Revision 1
2.1.3-1 ..... Revision UMSS-00L
2.1.3-2 ..... Revision UMSS-00L
2.1.3-3 ..... Revision UMSS-00L
2.1.3-4 ..... Revision UMSS-00L
2.1.3-5 ..... Revision UMSS-00L
2.1.3-6 ..... Revision UMSS-00L
2.1.3-7 ..... Revision UMSS-00L
2.1.3-8 ..... Revision UMSS-00L
2.1.3-9 ..... Revision UMSS-00L
2.1.3-10 ..... Revision UMSS-00L
2.1.3-11 ..... Revision UMSS-00L
2.1.3-12 ..... Revision UMSS-00L
2.2-1 ..... Revision 5
2.2-2 ..... Revision 1
2.2-3 ..... Revision 1
2.2-4 ..... Revision 1
2.2-5 ..... Revision 1
2.2-6 ..... Revision 1
2.2-7 ..... Revision 1
2.2-8 ..... Revision 1
2.2-9 ..... Revision 1
2.2-10 ..... Revision 1
2.2-11 ..... Revision 1
2.3-1 ..... Revision 1
2.3-2 ..... Revision 1
2.3-3 ..... Revision 1
2.3-4 ..... Revision 1
2.3-5 ..... Revision 2
2.3-6 ..... Revision 1
2.3-7 ..... Revision 1
2.3-8 ..... Revision 1
2.3-9 ..... Revision 1
2.3-10 ..... Revision 1
2.3-11 ..... Revision 1
2.3-12 ..... Revision 5
2.3-13 ..... Revision 5
2.3-14 ..... Revision 5
2.3-15 ..... Revision 5
2.3-16 ..... Revision 5
2.4-1 ..... Revision 1
2.4-2 ..... Revision 1
2.4-3 ..... Revision 1
2.4-4 ..... Revision 1
2.5-1 ..... Revision 1
2.5-2 ..... Revision 5

Chapter 3

3-i ..... Revision 5
3-ii ..... Revision UMSS-00L
3-iii ..... Revision 1
3-iv ..... Revision 1
3-v ..... Revision 5
3-vi ..... Revision 1
3.1-1 ..... Revision 1
3.1-2 ..... Revision 1
3.1-3 ..... Revision 3
3.1-4 ..... Revision 3
3.1-5 ..... Revision 3
3.1-6 ..... Revision 3
3.1-7 ..... Revision 1
3.2-1 ..... Revision 2
3.2-2 ..... Revision 2
3.2-3 ..... Revision 2
3.3-1 ..... Revision 3

List of Effective Pages (continued)

3.3-2 ..... Revision 3
3.3-3 ..... Revision 3
3.3-4 ..... Revision 3
3.3-5 ..... Revision 3
3.3-6 ..... Revision 3
3.3-7 ..... Revision 3
3.3-8 ..... Revision 3
3.3-9 ..... Revision 3
3.3-10 ..... Revision 3
3.3-11 ..... Revision 3
3.3-12 ..... Revision 3
3.3-13 ..... Revision 3
3.3-14 ..... Revision 3
3.4.1-1 ..... Revision 1
3.4.1-2 ..... Revision 1
3.4.1-3 ..... Revision 1
3.4.1-4 ..... Revision 1
3.4.1-5 ..... Revision 2
3.4.1-6 ..... Revision 2
3.4.1-7 ..... Revision 1
3.4.1-8 ..... Revision 1
3.4.1-9 ..... Revision 3
3.4.1-10 ..... Revision 3
3.4.1-11 ..... Revision 3
3.4.2-1 ..... Revision 1
3.4.2-2 ..... Revision 1
3.4.3-1 ..... Revision 1
3.4.3-2 ..... Revision 1
3.4.3-3 ..... Revision 1
3.4.3-4 ..... Revision 2
3.4.3-5 ..... Revision 1
3.4.3-6 ..... Revision 1
3.4.3-7 ..... Revision 1
3.4.3-8 ..... Revision 1
3.4.3-9 ..... Revision 1
3.4.3-10 ..... Revision 1
3.4.3-11 ..... Revision 1
3.4.3-12 ..... Revision 1
3.4.3-13 ..... Revision 1
3.4.3-14 ..... Revision 1
3.4.3-15 ..... Revision 1
3.4.3-16 ..... Revision 1
3.4.3-17 ..... Revision 1
3.4.3-18 ..... Revision 1
3.4.3-19 ..... Revision 1
3.4.3-20 ..... Revision 2
3.4.3-21 ..... Revision 1
3.4.3-22 ..... Revision 1
3.4.3-23 ..... Revision 1
3.4.3-24 ..... Revision 1
3.4.3-25 ..... Revision 1
3.4.3-26 ..... Revision 1
3.4.3-27 ..... Revision 1
3.4.3-28 ..... Revision 1
3.4.3-29 ..... Revision 1
3.4.3-30 ..... Revision 1
3.4.3-31 ..... Revision 1
3.4.3-32 ..... Revision 1
3.4.3-33 ..... Revision 1
3.4.3-34 ..... Revision 1
3.4.3-35 ..... Revision 1
3.4.3-36 ..... Revision 1
3.4.3-37 ..... Revision 1
3.4.3-38 ..... Revision 1
3.4.3-39 ..... Revision 1
3.4.3-40 ..... Revision 1
3.4.3-41 ..... Revision 1
3.4.3-42 ..... Revision 1
3.4.3-43 ..... Revision 1
3.4.3-44 ..... Revision 1

List of Effective Pages (continued)

3.4.3-45 ..... Revision 1
3.4.3-46 ..... Revision 1
3.4.3-47 ..... Revision 1
3.4.3-48 ..... Revision 1
3.4.3-49 ..... Revision 1
3.4.3-50 ..... Revision 1
3.4.3-51 ..... Revision 1
3.4.3-52 ..... Revision 1
3.4.3-53 ..... Revision 1
3.4.3-54 ..... Revision 1
3.4.3-55 ..... Revision 1
3.4.4-1 ..... Revision 1
3.4.4-2 ..... Revision 1
3.4.4-3 ..... Revision 1
3.4.4-4 ..... Revision 1
3.4.4-5 ..... Revision 1
3.4.4-6 ..... Revision 1
3.4.4-7 ..... Revision 1
3.4.4-8 ..... Revision 1
3.4.4-9 ..... Revision 1
3.4.4-10 ..... Revision 1
3.4.4-11 ..... Revision 1
3.4.4-12 ..... Revision 1
3.4.4-13 ..... Revision 1
3.4.4-14 ..... Revision 1
3.4.4-15 ..... Revision 1
3.4.4-16 ..... Revision 1
3.4.4-17 ..... Revision 1
3.4.4-18 ..... Revision 1
3.4.4-19 ..... Revision 3
3.4.4-20 ..... Revision 1
3.4.4-21 ..... Revision 1
3.4.4-22 ..... Revision 1
3.4.4-23 ..... Revision 1
3.4.4-24 ..... Revision 1
3.4.4-25 ..... Revision 1
3.4.4-26 ..... Revision 1
3.4.4-27 ..... Revision 1
3.4.4-28 ..... Revision 1
3.4.4-29 ..... Revision 1
3.4.4-30 ..... Revision 1
3.4.4-31 ..... Revision 1
3.4.4-32 ..... Revision 1
3.4.4-33 ..... Revision 1
3.4.4-34 ..... Revision 1
3.4.4-35 ..... Revision 1
3.4.4-36 ..... Revision 1
3.4.4-37 ..... Revision 1
3.4.4-38 ..... Revision 1
3.4.4-39 ..... Revision 1
3.4.4-40 ..... Revision 1
3.4.4-41 ..... Revision 1
3.4.4-42 ..... Revision 1
3.4.4-43 ..... Revision 1
3.4.4-44 ..... Revision 1
3.4.4-45 ..... Revision 1
3.4.4-46 ..... Revision 1
3.4.4-47 ..... Revision 1
3.4.4-48 ..... Revision 1
3.4.4-49 ..... Revision 1
3.4.4-50 ..... Revision 1
3.4.4-51 ..... Revision 1
3.4.4-52 ..... Revision 1
3.4.4-53 ..... Revision 1
3.4.4-54 ..... Revision 1
3.4.4-55 ..... Revision 1
3.4.4-56 ..... Revision 1
3.4.4-57 ..... Revision 1
3.4.4-58 ..... Revision 1
3.4.4-59 ..... Revision 1

List of Effective Pages (continued)

3.4.4-60 ..... Revision 1
3.4.4-61 ..... Revision 1
3.4.4-62 ..... Revision 1
3.4.4-63 ..... Revision 1
3.4.4-64 ..... Revision 1
3.4.4-65 ..... Revision 1
3.4.4-66 ..... Revision 1
3.4.4-67 ..... Revision 1
3.4.4-68 ..... Revision 1
3.4.4-69 ..... Revision 1
3.4.4-70 ..... Revision 1
3.4.4-71 ..... Revision 1
3.4.4-72 ..... Revision 1
3.4.4-73 ..... Revision 1
3.4.4-74 ..... Revision 1
3.4.4-75 ..... Revision 1
3.4.4-76 ..... Revision 1
3.4.4-77 ..... Revision 1
3.4.5-1 ..... Revision 5
3.5-1 ..... Revision 1
3.6-1 ..... Revision UMSS-00L
3.6-2 ..... Revision UMSS-00L
3.6-3 ..... Revision UMSS-00L
3.6-4 ..... Revision UMSS-00L
3.6-5 ..... Revision UMSS-00L
3.6-6 ..... Revision UMSS-00L
3.6-7 ..... Revision UMSS-00L
3.6-8 ..... Revision UMSS-00L
3.7-1 ..... Revision 1
3.7-2 ..... Revision 1
3.7-3 ..... Revision 1
3.8-1 ..... Revision 1
3.8-2 ..... Revision 1
3.8-3 ..... Revision 1
3.8-4 ..... Revision 1
3.8-5 ..... Revision 1
3.8-6 ..... Revision 1
3.8-7 ..... Revision 1
3.8-8 ..... Revision 1
3.8-9 ..... Revision 1
3.8-10 ..... Revision 1
3.8-11 ..... Revision 1

Chapter 4

4-i ..... Revision 5
4-ii ..... Revision UMSS-00L
4-iii ..... Revision 5
4-iv ..... Revision UMSS-00L
4-v ..... Revision 5
4-vi ..... Revision 5
4-vii ..... Revision UMSS-00L
4.1-1 ..... Revision 1
4.1-2 ..... Revision 1
4.1-3 ..... Revision 1
4.1-4 ..... Revision 1
4.1-5 ..... Revision 1
4.1-6 ..... Revision 5
4.1-7 ..... Revision 1
4.1-8 ..... Revision 1
4.2-1 ..... Revision 1
4.2-2 ..... Revision 1
4.2-3 ..... Revision 5
4.2-4 ..... Revision 1
4.2-5 ..... Revision 1
4.2-6 ..... Revision 1
4.2-7 ..... Revision 1
4.3-1 ..... Revision 1
4.4-1 ..... Revision 1
4.4.1-1 ..... Revision 5
4.4.1-2 ..... Revision 5

List of Effective Pages (continued)

4.4.1-3 ..... Revision 5
4.4.1-4 ..... Revision 1
4.4.1-5 ..... Revision 1
4.4.1-6 ..... Revision 1
4.4.1-7 ..... Revision 1
4.4.1-8 ..... Revision 1
4.4.1-9 ..... Revision 1
4.4.1-10 ..... Revision 1
4.4.1-11 ..... Revision 1
4.4.1-12 ..... Revision 1
4.4.1-13 ..... Revision 1
4.4.1-14 ..... Revision 1
4.4.1-15 ..... Revision 1
4.4.1-16 ..... Revision 1
4.4.1-17 ..... Revision 1
4.4.1-18 ..... Revision 1
4.4.1-19 ..... Revision 1
4.4.1-20 ..... Revision 1
4.4.1-21 ..... Revision 1
4.4.1-22 ..... Revision 1
4.4.1-23 ..... Revision 1
4.4.1-24 ..... Revision 1
4.4.1-25 ..... Revision 1
4.4.1-26 ..... Revision 1
4.4.1-27 ..... Revision 1
4.4.1-28 ..... Revision 1
4.4.1-29 ..... Revision 1
4.4.1-30 ..... Revision 1
4.4.1-31 ..... Revision 1
4.4.1-32 ..... Revision 1
4.4.1-33 ..... Revision 1
4.4.1-34 ..... Revision 1
4.4.1-35 ..... Revision 1
4.4.1-36 ..... Revision 1
4.4.1-37 ..... Revision 1
4.4.1-38 ..... Revision 1
4.4.1-39 ..... Revision 1
4.4.1-40 ..... Revision 1
4.4.1-41 ..... Revision 1
4.4.1-42 ..... Revision 1
4.4.1-43 ..... Revision 1
4.4.1-44 ..... Revision 1
4.4.1-45 ..... Revision 1
4.4.1-46 ..... Revision 1
4.4.1-47 ..... Revision 1
4.4.1-48 ..... Revision 1
4.4.1-49 ..... Revision 1
4.4.1-50 ..... Revision 1
4.4.1-51 ..... Revision 1
4.4.1-52 ..... Revision 5
4.4.1-53 ..... Revision 5
4.4.2-1 ..... Revision 1
4.4.3-1 ..... Revision 5
4.4.3-2 ..... Revision 5
4.4.3-3 ..... Revision 5
4.4.3-4 ..... Revision 5
4.4.3-5 ..... Revision 5
4.4.3-6 ..... Revision 5
4.4.3-7 ..... Revision 5
4.4.3-8 ..... Revision 5
4.4.3-9 ..... Revision 5
4.4.3-10 ..... Revision 5
4.4.3-11 ..... Revision 5
4.4.3-12 ..... Revision 5
4.4.3-13 ..... Revision 5
4.4.3-14 ..... Revision 5
4.4.3-15 ..... Revision 5
4.4.4-1 ..... Revision 1
4.4.5-1 ..... Revision 1
4.4.5-2 ..... Revision 1

List of Effective Pages (continued)

4.4.5-3 ..... Revision 1
4.4.5-4 ..... Revision 1
4.4.5-5 ..... Revision 1
4.4.5-6 ..... Revision 1
4.4.6-1 ..... Revision 1
4.4.7-1 ..... Revision 1
4.4.7-2 ..... Revision 1
4.4.7-3 ..... Revision 1
4.4.7-4 ..... Revision 1
4.4.7-5 ..... Revision 1
4.4.7-6 ..... Revision 1
4.4.7-7 ..... Revision 1
4.4.7-8 ..... Revision 1
4.4.7-9 ..... Revision 1
4.4.7-10 ..... Revision 1
4.4.7-11 ..... Revision 1
4.4.8-1 ..... Revision 1
4.5-1 ..... Revision UMSS-00L
4.5-2 ..... Revision UMSS-00L
4.5-3 ..... Revision UMSS-00L
4.5-4 ..... Revision UMSS-00L
4.5-5 ..... Revision UMSS-00L
4.5-6 ..... Revision UMSS-00L
4.5-7 ..... Revision UMSS-00L
4.5-8 ..... Revision UMSS-00L
4.5-9 ..... Revision UMSS-00L
4.5-10 ..... Revision UMSS-00L
4.5-11 ..... Revision UMSS-00L
4.5-12 ..... Revision UMSS-00L
4.5-13 ..... Revision UMSS-00L
4.5-14 ..... Revision UMSS-00L
4.5-15 ..... Revision UMSS-00L
4.5-16 ..... Revision UMSS-00L
4.5-17 ..... Revision UMSS-00L
4.5-18 ..... Revision UMSS-00L
4.5-19 ..... Revision UMSS-00L
4.5-20 ..... Revision UMSS-00L
4.5-21 ..... Revision UMSS-00L
4.5-22 ..... Revision UMSS-00L
4.5-23 ..... Revision UMSS-00L
4.5-24 ..... Revision UMSS-00L
4.5-25 ..... Revision UMSS-00L
4.5-26 ..... Revision UMSS-00L
4.6-1 ..... Revision 1
4.6-2 ..... Revision 1
4.6-3 ..... Revision 1
4.6-4 ..... Revision 5

Chapter 5

5-i ..... Revision 1
5-ii ..... Revision 5
5-iii ..... Revision 1
5-iv ..... Revision 1
5-v ..... Revision UMSS-00L
5-vi ..... Revision 1
5-vii ..... Revision UMSS-00L
5-viii ..... Revision UMSS-00L
5-ix ..... Revision UMSS-00L
5.1-1 ..... Revision 1
5.1-2 ..... Revision 1
5.1-3 ..... Revision 5
5.1-4 ..... Revision 5
5.1-5 ..... Revision 1
5.1-6 ..... Revision 1
5.1-7 ..... Revision 1
5.1-8 ..... Revision 1
5.1-9 ..... Revision 1
5.1-10 ..... Revision 1
5.1-11 ..... Revision 1
5.2-1 ..... Revision 1

List of Effective Pages (continued)

5.2-2 ..... Revision 1
5.2-3 ..... Revision 1
5.2-4 ..... Revision 1
5.2-5 ..... Revision 1
5.2-6 ..... Revision 1
5.2-7 ..... Revision 1
5.2-8 ..... Revision 1
5.2-9 ..... Revision 1
5.2-10 ..... Revision 1
5.2-11 ..... Revision 1
5.2-12 ..... Revision 1
5.2-13 ..... Revision 1
5.2-14 ..... Revision 1
5.2-15 ..... Revision 1
5.2-16 ..... Revision 1
5.2-17 ..... Revision 1
5.2-18 ..... Revision 1
5.2-19 ..... Revision 1
5.2-20 ..... Revision 1
5.2-21 ..... Revision 1
5.2-22 ..... Revision 1
5.2-23 ..... Revision 1
5.2-24 ..... Revision 1
5.2-25 ..... Revision 1
5.2-26 ..... Revision 1
5.2-27 ..... Revision 1
5.2-28 ..... Revision 1
5.2-29 ..... Revision 1
5.2-30 ..... Revision 1
5.2-31 ..... Revision 1
5.3-1 ..... Revision 1
5.3-2 ..... Revision 1
5.3-3 ..... Revision 1
5.3-4 ..... Revision 1
5.3-5 ..... Revision 1
5.3-6 ..... Revision 1
5.3-7 ..... Revision 1
5.3-8 ..... Revision 1
5.3-9 ..... Revision 1
5.3-10 ..... Revision 1
5.3-11 ..... Revision 1
5.3-12 ..... Revision 1
5.3-13 ..... Revision 1
5.3-14 ..... Revision 1
5.3-15 ..... Revision 1
5.3-16 ..... Revision 1
5.3-17 ..... Revision 1
5.3-18 ..... Revision 1
5.3-19 ..... Revision 1
5.3-20 ..... Revision 1
5.3-21 ..... Revision 1
5.3-22 ..... Revision 1
5.3-23 ..... Revision UMSS-00L
5.4-1 ..... Revision 1
5.4-2 ..... Revision 1
5.4-3 ..... Revision 1
5.4-4 ..... Revision 1
5.4-5 ..... Revision 1
5.4-6 ..... Revision 1
5.4-7 ..... Revision 1
5.4-8 ..... Revision 1
5.4-9 ..... Revision 1
5.4-10 ..... Revision 1
5.4-11 ..... Revision 1
5.4-12 ..... Revision 1
5.4-13 ..... Revision 1
5.4-14 ..... Revision 1
5.4-15 ..... Revision 1
5.4-16 ..... Revision 1
5.4-17 ..... Revision 1

List of Effective Pages (continued)

5.4-18 ..... Revision 1
5.4-19 ..... Revision 1
5.4-20 ..... Revision 1
5.4-21 ..... Revision 1
5.4-22 ..... Revision 1
5.4-23 ..... Revision 1
5.4-24 ..... Revision 1
5.5-1 ..... Revision 1
5.5-2 ..... Revision 1
5.5-3 ..... Revision 1
5.5-4 ..... Revision 1
5.5-5 ..... Revision 1
5.5-6 ..... Revision 1
5.5-7 ..... Revision 1
5.5-8 ..... Revision 1
5.5-9 ..... Revision 1
5.5-10 ..... Revision 1
5.6-1 ..... Revision 5
5.6.1-1 ..... Revision UMSS-00L
5.6.1-2 ..... Revision 5
5.6.1-3 ..... Revision 5
5.6.1-4 ..... Revision 5
5.6.1-5 ..... Revision 5
5.6.1-6 ..... Revision 5
5.6.1-7 ..... Revision 5
5.6.1-8 ..... Revision UMSS-00L
5.6.1-9 ..... Revision 5
5.6.1-10 ..... Revision 5
5.6.1-11 ..... Revision 5
5.6.1-12 ..... Revision UMSS-00L
5.6.1-13 ..... Revision UMSS-00L
5.6.1-14 ..... Revision UMSS-00L
5.6.1-15 ..... Revision UMSS-00L
5.6.1-16 ..... Revision UMSS-00L
5.6.1-17 ..... Revision UMSS-00L
5.6.1-18 ..... Revision UMSS-00L
5.6.1-19 ..... Revision UMSS-00L
5.6.1-20 ..... Revision UMSS-00L
5.6.1-21 ..... Revision UMSS-00L
5.6.1-22 ..... Revision UMSS-00L
5.6.1-23 ..... Revision UMSS-00L
5.6.1-24 ..... Revision UMSS-00L
5.6.1-25 ..... Revision UMSS-00L
5.6.1-26 ..... Revision UMSS-00L
5.6.1-27 ..... Revision UMSS-00L
5.6.1-28 ..... Revision UMSS-00L
5.6.1-29 ..... Revision UMSS-00L
5.6.1-30 ..... Revision UMSS-00L
5.6.1-31 ..... Revision UMSS-00L
5.6.1-32 ..... Revision UMSS-00L
5.6.1-33 ..... Revision UMSS-00L
5.6.1-34 ..... Revision UMSS-00L
5.7-1 ..... Revision 1
5.7-2 ..... Revision 1
5.7-3 ..... Revision 1

Chapter 6

6-i ..... Revision 1
6-ii ..... Revision UMSS-00L
6-iii ..... Revision UMSS-00L
6-iv ..... Revision UMSS-00L
6-v ..... Revision 1
6-vi ..... Revision UMSS-00L
6-vii ..... Revision UMSS-00L
6.1-1 ..... Revision 1
6.1-2 ..... Revision 1
6.1-3 ..... Revision 1
6.2-1 ..... Revision 1
6.2-2 ..... Revision 1
6.2-3 ..... Revision 1

List of Effective Pages (continued)

6.3-1 ..... Revision 1
6.3-2 ..... Revision 1
6.3-3 ..... Revision 1
6.3-4 ..... Revision 1
6.3-5 ..... Revision 1
6.3-6 ..... Revision 1
6.3-7 ..... Revision 1
6.3-8 ..... Revision 1
6.3-9 ..... Revision 1
6.3-10 ..... Revision 1
6.3-11 ..... Revision 1
6.3-12 ..... Revision 1
6.3-13 ..... Revision 1
6.3-14 ..... Revision 1
6.4-1 ..... Revision 1
6.4-2 ..... Revision 1
6.4-3 ..... Revision 1
6.4-4 ..... Revision 1
6.4-5 ..... Revision 1
6.4-6 ..... Revision 1
6.4-7 ..... Revision 1
6.4-8 ..... Revision 1
6.4-9 ..... Revision 1
6.4-10 ..... Revision 1
6.4-11 ..... Revision 1
6.4-12 ..... Revision 1
6.4-13 ..... Revision 1
6.4-14 ..... Revision 1
6.4-15 ..... Revision 1
6.4-16 ..... Revision 1
6.4-17 ..... Revision 1
6.4-18 ..... Revision 1
6.4-19 ..... Revision 1
6.4-20 ..... Revision 1
6.4-21 ..... Revision 1
6.4-22 ..... Revision 1
6.4-23 ..... Revision 1
6.4-24 ..... Revision 1
6.4-25 ..... Revision 1
6.4-26 ..... Revision 1
6.4-27 ..... Revision 1
6.4-28 ..... Revision 1
6.4-29 ..... Revision 1
6.4-30 ..... Revision 1
6.4-31 ..... Revision 1
6.4-32 ..... Revision 1
6.4-33 ..... Revision 1
6.4-34 ..... Revision 1
6.5-1 ..... Revision UMSS-00L
6.5-2 ..... Revision 1
6.5.1-1 ..... Revision UMSS-00L
6.5.1-2 ..... Revision UMSS-00L
6.5.1-3 ..... Revision UMSS-00L
6.5.1-4 ..... Revision UMSS-00L
6.5.1-5 ..... Revision UMSS-00L
6.5.1-6 ..... Revision UMSS-00L
6.5.1-7 ..... Revision UMSS-00L
6.5.1-8 ..... Revision UMSS-00L
6.5.1-9 ..... Revision UMSS-00L
6.5.1-10 ..... Revision UMSS-00L
6.5.1-11 ..... Revision UMSS-00L
6.5.1-12 ..... Revision UMSS-00L
6.5.1-13 ..... Revision UMSS-00L
6.5.1-14 ..... Revision UMSS-00L
6.5.1-15 ..... Revision UMSS-00L
6.5.1-16 ..... Revision UMSS-00L
6.5.1-17 ..... Revision UMSS-00L
6.5.1-18 ..... Revision UMSS-00L
6.5.1-19 ..... Revision UMSS-00L
6.5.1-20 ..... Revision UMSS-00L

List of Effective Pages (continued)

6.5.1-21 ..... Revision UMSS-00L
6.5.1-22 ..... Revision UMSS-00L
6.5.1-23 ..... Revision UMSS-00L
6.5.2-1 ..... Revision UMSS-00L
6.5.2-2 ..... Revision UMSS-00L
6.5.2-3 ..... Revision UMSS-00L
6.5.2-4 ..... Revision UMSS-00L
6.5.2-5 ..... Revision UMSS-00L
6.5.2-6 ..... Revision UMSS-00L
6.5.2-7 ..... Revision UMSS-00L
6.5.2-8 ..... Revision UMSS-00L
6.5.2-9 ..... Revision UMSS-00L
6.5.2-10 ..... Revision UMSS-00L
6.5.2-11 ..... Revision UMSS-00L
6.5.2-12 ..... Revision UMSS-00L
6.6-1 ..... Revision UMSS-00L
6.6.1-1 ..... Revision UMSS-00L
6.6.1-2 ..... Revision UMSS-00L
6.6.1-3 ..... Revision UMSS-00L
6.6.1-4 ..... Revision UMSS-00L
6.6.1-5 ..... Revision UMSS-00L
6.6.1-6 ..... Revision UMSS-00L
6.6.1-7 ..... Revision UMSS-00L
6.6.1-8 ..... Revision UMSS-00L
6.6.1-9 ..... Revision UMSS-00L
6.6.1-10 ..... Revision UMSS-00L
6.6.1-11 ..... Revision UMSS-00L
6.6.1-12 ..... Revision UMSS-00L
6.6.1-13 ..... Revision UMSS-00L
6.6.1-14 ..... Revision UMSS-00L
6.6.1-15 ..... Revision UMSS-00L
6.6.1-16 ..... Revision UMSS-00L
6.6.1-17 ..... Revision UMSS-00L
6.6.1-18 ..... Revision UMSS-00L
6.6.1-19 ..... Revision UMSS-00L
6.6.1-20..... Revision UMSS-00L
6.6.1-21..... Revision UMSS-00L
6.6.1-22..... Revision UMSS-00L
6.6.1-23..... Revision UMSS-00L
6.6.1-24..... Revision UMSS-00L
6.6.1-25..... Revision UMSS-00L
6.6.1-26..... Revision UMSS-00L
6.6.1-27..... Revision UMSS-00L
6.6.1-28..... Revision UMSS-00L
6.6.1-29..... Revision UMSS-00L
6.6.1-30..... Revision UMSS-00L
6.6.1-31..... Revision UMSS-00L
6.6.1-32..... Revision UMSS-00L
6.6.1-33..... Revision UMSS-00L
6.6.1-34..... Revision UMSS-00L
6.6.1-35..... Revision UMSS-00L
6.6.1-36..... Revision UMSS-00L
6.6.1-37..... Revision UMSS-00L
6.6.1-38..... Revision UMSS-00L
6.6.1-39..... Revision UMSS-00L
6.6.1-40..... Revision UMSS-00L
6.6.1-41..... Revision UMSS-00L
6.6.1-42..... Revision UMSS-00L
6.6.1-43..... Revision UMSS-00L
6.6.1-44..... Revision UMSS-00L
6.6.1-45..... Revision UMSS-00L
6.6.1-46..... Revision UMSS-00L
6.7-1.....Revision 1
6.7-2.....Revision 1
6.8-1.....Revision 1
6.8-2.....Revision 1
6.8-3.....Revision 1
6.8-4.....Revision 1
6.8-5.....Revision 1
6.8-6.....Revision 1

List of Effective Pages (continued)

6.8-7 ..... Revision 1
6.8-8 ..... Revision 1
6.8-9 ..... Revision 1
6.8-10 ..... Revision 1
6.8-11 ..... Revision 1
6.8-12 ..... Revision 1
6.8-13 ..... Revision 1
6.8-14 ..... Revision 1
6.8-15 ..... Revision 1
6.8-16 ..... Revision 1
6.8-17 ..... Revision 1
6.8-18 ..... Revision 1
6.8-19 ..... Revision 1
6.8-20 ..... Revision 1
6.8-21 ..... Revision 1
6.8-22 ..... Revision 1
6.8-23 ..... Revision 1
6.8-24 ..... Revision 1
6.8-25 ..... Revision 1
6.8-26 ..... Revision 1
6.8-27 ..... Revision 1
6.8-28 ..... Revision 1
6.8-29 ..... Revision 1
6.8-30 ..... Revision 1
6.8-31 ..... Revision 1
6.8-32 ..... Revision 1
6.8-33 ..... Revision 1
6.8-34 ..... Revision 1
6.8-35 ..... Revision 1
6.8-36 ..... Revision 1
6.8-37 ..... Revision 1
6.8-38 ..... Revision 1
6.8-39 ..... Revision 1
6.8-40 ..... Revision 1
6.8-41 ..... Revision 1
6.8-42 ..... Revision 1
6.8-43 ..... Revision 1
6.8-44 ..... Revision 1
6.8-45 ..... Revision 1
6.8-46 ..... Revision 1
6.8-47 ..... Revision 1
6.8-48 ..... Revision 1
6.8-49 ..... Revision 1
6.8-50 ..... Revision 1
6.8-51 ..... Revision 1

Chapter 7

7-i ..... Revision 5
7-ii ..... Revision 1
7.1-1 ..... Revision 1
7.1-2 ..... Revision 1
7.1-3 ..... Revision 1
7.1-4 ..... Revision 1
7.1-5 ..... Revision 1
7.1-6 ..... Revision 1
7.1-7 ..... Revision 1
7.1-8 ..... Revision 1
7.1-9 ..... Revision 1
7.1-10 ..... Revision 1
7.1-11 ..... Revision 1
7.2-1 ..... Revision 1
7.2-2 ..... Revision 1
7.3-1 ..... Revision 1
7.4-1 ..... Revision 5
7.5-1 ..... Revision 1

Chapter 8

8-i ..... Revision 5
8-ii ..... Revision 5
8-1 ..... Revision 5

List of Effective Pages (continued)

8-2 ..... Revision 5
8.1-1 ..... Revision 5
8.1.1-1 ..... Revision 5
8.1.1-2 ..... Revision 5
8.1.1-3 ..... Revision 5
8.1.1-4 ..... Revision 5
8.1.1-5 ..... Revision 5
8.1.1-6 ..... Revision 5
8.1.1-7 ..... Revision 5
8.1.1-8 ..... Revision 5
8.1.2-1 ..... Revision 5
8.1.2-2 ..... Revision 5
8.1.3-1 ..... Revision 5
8.1.3-2 ..... Revision 5
8.2-1 ..... Revision 5
8.2-2 ..... Revision 1
8.3-1 ..... Revision 5
8.3-2 ..... Revision 3
8.3-3 ..... Revision 1
8.3-4 ..... Revision 1
8.3-5 ..... Revision 1
8.4-1 ..... Revision 1

Chapter 9

9-i ..... Revision UMSS-01D
9.1-1 ..... Revision 5
9.1-2 ..... Revision 1
9.1-3 ..... Revision 1
9.1-4 ..... Revision 1
9.1-5 ..... Revision 1
9.1-6 ..... Revision 1
9.1-7 ..... Revision 1
9.1-8 ..... Revision 1
9.1-9 ..... Revision 1
9.1-10 ..... Revision 1
9.2-1 ..... Revision UMSS-00L
9.2-2 ..... Revision UMSS-01D
9.3-1 ..... Revision 1

Chapter 10

10-i ..... Revision 5
10-ii ..... Revision 1
10.1-1 ..... Revision 1
10.1-2 ..... Revision 1
10.2-1 ..... Revision 1
10.2-2 ..... Revision 1
10.3-1 ..... Revision 1
10.3-2 ..... Revision UMSS-00L
10.3-3 ..... Revision 1
10.3-4 ..... Revision 1
10.3-5 ..... Revision 1
10.3-6 ..... Revision 1
10.3-7 ..... Revision 1
10.3-8 ..... Revision 1
10.3-9 ..... Revision 1
10.4-1 ..... Revision 1
10.4-2 ..... Revision 1
10.4-3 ..... Revision 1
10.4-4 ..... Revision 1
10.4-5 ..... Revision 1
10.5-1 ..... Revision 5
10.6-1 ..... Revision 1

Chapter 11

11-i ..... Revision 5
11-ii ..... Revision 5
11-iii ..... Revision 5
11-iv ..... Revision UMSS-00L
11-v ..... Revision 1
11-vi ..... Revision UMSS-00L

List of Effective Pages (continued)

11-vii ..... Revision 1
11-viii ..... Revision 1
11-ix ..... Revision 1
11-x ..... Revision 5
11-1 ..... Revision 1
11.1.1-1 ..... Revision 1
11.1.1-2 ..... Revision 1
11.1.1-3 ..... Revision 1
11.1.1-4 ..... Revision 1
11.1.1-5 ..... Revision 1
11.1.1-6 ..... Revision 1
11.1.2-1 ..... Revision 1
11.1.2-2 ..... Revision 1
11.1.2-3 ..... Revision 1
11.1.3-1 ..... Revision 1
11.1.3-2 ..... Revision 1
11.1.3-3 ..... Revision 1
11.1.3-4 ..... Revision 1
11.1.3-5 ..... Revision 1
11.1.3-6 ..... Revision 1
11.1.3-7 ..... Revision 1
11.1.3-8 ..... Revision 1
11.1.3-9 ..... Revision 1
11.1.3-10 ..... Revision 1
11.1.3-11 ..... Revision 1
11.1.3-12 ..... Revision 1
11.1.3-13 ..... Revision 1
11.1.3-14 ..... Revision 1
11.1.3-15 ..... Revision 1
11.1.3-16 ..... Revision 1
11.1.4-1 ..... Revision 5
11.1.4-2 ..... Revision 1
11.1.5-1 ..... Revision 1
11.1.5-2 ..... Revision 1
11.1.6-1 ..... Revision 5
11.2-1 ..... Revision 5
11.2.1-1 ..... Revision 1
11.2.1-2 ..... Revision 1
11.2.1-3 ..... Revision 1
11.2.1-4 ..... Revision 1
11.2.1-5 ..... Revision 1
11.2.1-6 ..... Revision 1
11.2.1-7 ..... Revision 1
11.2.1-8 ..... Revision 1
11.2.2-1 ..... Revision 1
11.2.3-1 ..... Revision 1
11.2.3-2 ..... Revision 1
11.2.4-1 ..... Revision 1
11.2.4-2 ..... Revision 1
11.2.4-3 ..... Revision 1
11.2.4-4 ..... Revision 1
11.2.4-5 ..... Revision 1
11.2.4-6 ..... Revision 1
11.2.4-7 ..... Revision 1
11.2.4-8 ..... Revision 1
11.2.4-9 ..... Revision 1
11.2.4-10 ..... Revision 1
11.2.4-11 ..... Revision 1
11.2.4-12 ..... Revision 1
11.2.4-13 ..... Revision 1
11.2.4-14 ..... Revision 1
11.2.4-15 ..... Revision 1
11.2.4-16 ..... Revision 1
11.2.4-17 ..... Revision 1
11.2.4-18 ..... Revision 1
11.2.4-19 ..... Revision 1
11.2.4-20 ..... Revision 1
11.2.4-21 ..... Revision 1
11.2.4-22 ..... Revision 1
11.2.4-23 ..... Revision 5

List of Effective Pages (continued)

11.2.4-24 ..... Revision 2
11.2.4-25 ..... Revision 5
11.2.4-26 ..... Revision 1
11.2.4-27 ..... Revision 1
11.2.4-28 ..... Revision 1
11.2.4-29 ..... Revision 1
11.2.4-30 ..... Revision 1
11.2.5-1 ..... Revision 1
11.2.6-1 ..... Revision 1
11.2.6-2 ..... Revision 1
11.2.6-3 ..... Revision 1
11.2.6-4 ..... Revision 1
11.2.6-5 ..... Revision 1
11.2.7-1 ..... Revision 1
11.2.7-2 ..... Revision 1
11.2.8-1 ..... Revision 1
11.2.8-2 ..... Revision 1
11.2.8-3 ..... Revision 1
11.2.8-4 ..... Revision 1
11.2.8-5 ..... Revision 1
11.2.8-6 ..... Revision 1
11.2.8-7 ..... Revision 1
11.2.8-8 ..... Revision 1
11.2.9-1 ..... Revision 1
11.2.9-2 ..... Revision 1
11.2.9-3 ..... Revision 1
11.2.9-4 ..... Revision 1
11.2.9-5 ..... Revision 1
11.2.9-6 ..... Revision 1
11.2.9-7 ..... Revision 1
11.2.10-1 ..... Revision 1
11.2.10-2 ..... Revision 1
11.2.10-3 ..... Revision 1
11.2.10-4 ..... Revision 1
11.2.11-1 ..... Revision 1
11.2.11-2 ..... Revision 1
11.2.11-3 ..... Revision 1
11.2.11-4 ..... Revision 1
11.2.11-5 ..... Revision 1
11.2.11-6 ..... Revision 1
11.2.11-7 ..... Revision 1
11.2.11-8 ..... Revision 1
11.2.11-9 ..... Revision 1
11.2.11-10 ..... Revision 1
11.2.11-11 ..... Revision 1
11.2.11-12 ..... Revision 1
11.2.11-13 ..... Revision 1
11.2.11-14 ..... Revision 1
11.2.12-1 ..... Revision 1
11.2.12-2 ..... Revision 3
11.2.12-3 ..... Revision 3
11.2.12-4 ..... Revision 3
11.2.12-5 ..... Revision 3
11.2.12-6 ..... Revision 3
11.2.12-7 ..... Revision 3
11.2.12-8 ..... Revision 3
11.2.12-9 ..... Revision 3
11.2.12-10 ..... Revision 1
11.2.12-11 ..... Revision 1
11.2.12-12 ..... Revision 1
11.2.12-13 ..... Revision 1
11.2.12-14 ..... Revision 1
11.2.12-15 ..... Revision 1
11.2.12-16 ..... Revision 1
11.2.12-17 ..... Revision 1
11.2.12-18 ..... Revision 1
11.2.12-19 ..... Revision 1
11.2.12-20 ..... Revision 1
11.2.12-21 ..... Revision 1
11.2.12-22 ..... Revision 1

List of Effective Pages (continued)

11.2.12-23 ..... Revision 1
11.2.12-24 ..... Revision 1
11.2.12-25 ..... Revision 1
11.2.12-26 ..... Revision 1
11.2.12-27 ..... Revision 1
11.2.12-28 ..... Revision 1
11.2.12-29 ..... Revision 1
11.2.12-30 ..... Revision 1
11.2.12-31 ..... Revision 1
11.2.12-32 ..... Revision 1
11.2.12-33 ..... Revision 1
11.2.12-34 ..... Revision 1
11.2.12-35 ..... Revision 1
11.2.12-36 ..... Revision 1
11.2.12-37 ..... Revision 1
11.2.12-38 ..... Revision 1
11.2.12-39 ..... Revision 1
11.2.12-40 ..... Revision 1
11.2.12-41 ..... Revision 1
11.2.12-42 ..... Revision 1
11.2.12-43 ..... Revision 1
11.2.12-44 ..... Revision 1
11.2.12-45 ..... Revision 1
11.2.12-46 ..... Revision 1
11.2.12-47 ..... Revision 1
11.2.12-48 ..... Revision 1
11.2.12-49 ..... Revision 1
11.2.12-50 ..... Revision 1
11.2.12-51 ..... Revision 1
11.2.12-52 ..... Revision 1
11.2.12-53 ..... Revision 1
11.2.12-54 ..... Revision 1
11.2.12-55 ..... Revision 1
11.2.12-56 ..... Revision 1
11.2.12-57 ..... Revision 1
11.2.12-58 ..... Revision 1
11.2.12-59 ..... Revision 1
11.2.12-60 ..... Revision 1
11.2.12-61 ..... Revision 1
11.2.12-62 ..... Revision 1
11.2.12-63 ..... Revision 1
11.2.12-64 ..... Revision 1
11.2.12-65 ..... Revision 1
11.2.12-66 ..... Revision 1
11.2.12-67 ..... Revision 1
11.2.12-68 ..... Revision 1
11.2.12-69 ..... Revision 1
11.2.13-1 ..... Revision 1
11.2.13-2 ..... Revision 1
11.2.13-3 ..... Revision 1
11.2.14-1 ..... Revision 1
11.2.14-2 ..... Revision 1
11.2.15-1 ..... Revision 5
11.2.15-2 ..... Revision 5
11.2.15-3 ..... Revision 5
11.2.15-4 ..... Revision 5
11.2.15-5 ..... Revision 5
11.2.15-6 ..... Revision 5
11.2.15-7 ..... Revision 5
11.2.15-8 ..... Revision 5
11.2.15-9 ..... Revision 5
11.2.15-10 ..... Revision 5
11.2.15-11 ..... Revision 5
11.2.15-12 ..... Revision 5
11.2.15-13 ..... Revision 5
11.2.15-14 ..... Revision 5
11.2.15-15 ..... Revision 5
11.2.15-16 ..... Revision 5
11.2.15-17 ..... Revision 5
11.2.15-18 ..... Revision 5

List of Effective Pages (continued)

11.2.15-19 ..... Revision 5
11.2.15-20 ..... Revision 5
11.2.15-21 ..... Revision 5
11.2.15-22 ..... Revision 5
11.2.15-23 ..... Revision UMSS-00L
11.2.15-24 ..... Revision UMSS-00L
11.2.15-25 ..... Revision UMSS-00L
11.2.15-26 ..... Revision UMSS-00L
11.2.15-27 ..... Revision 5
11.2.15-28 ..... Revision UMSS-00L
11.2.15-29 ..... Revision UMSS-00L
11.2.15-30 ..... Revision UMSS-00L
11.2.15-31 ..... Revision UMSS-00L
11.2.15-32 ..... Revision UMSS-00L
11.2.15-33 ..... Revision UMSS-00L
11.2.15-34 ..... Revision UMSS-00L
11.2.15-35 ..... Revision UMSS-00L
11.2.15-36 ..... Revision UMSS-00L
11.3-1 ..... Revision 1
11.3-2 ..... Revision 1
11.3-3 ..... Revision 1
11.3-4 ..... Revision 5

Chapter 12

12-i ..... Revision 5
12-ii ..... Revision 5
12-1 ..... Revision 5
12-2 ..... Revision 5
12-3 ..... Revision UMSS-01D
12-4 ..... Revision 5
12A-1 ..... Revision 1
12A-2 ..... Revision UMSS-01D
12A-3 ..... Revision UMSS-01D
12A1-1 ..... Revision 5
12A1-2 ..... Revision 5
12A1-3 ..... Revision 2
12A1-4 ..... Revision UMSS-01D
12A1-5 ..... Revision UMSS-01D
12A1-6 ..... Revision UMSS-01D
12A1-7 ..... Revision 5
12A1-8 ..... Revision 5
12A1-9 ..... Revision 5
12A1-10 ..... Revision 5
12A1-11 ..... Revision 5
12A1-12 ..... Revision 5
12A1-13 ..... Revision 5
12A1-14 ..... Revision 5
12A1-15 ..... Revision 5
12A1-16 ..... Revision 5
12A1-17 ..... Revision 5
12A2-1 ..... Revision 1
12A3-1 ..... Revision 1
12A3-2 ..... Revision 1
12A3-3 ..... Revision 1
12A3-4 ..... Revision 5
12A3-5 ..... Revision 5
12A3-6 ..... Revision 5
12A3-7 ..... Revision 5
12A3-8 ..... Revision 5
12A3-9 ..... Revision 5
12A3-10 ..... Revision 5
12A3-11 ..... Revision UMSS-00L
12A3-12 ..... Revision UMSS-00L
12A3-13 ..... Revision 3
12A3-14 ..... Revision 3
12A3-15 ..... Revision 3
12A3-16 ..... Revision 3
12A3-17 ..... Revision UMSS-00L
12A3-18 ..... Revision 3
12A3-19 ..... Revision 3

List of Effective Pages (continued)

12A3-20 ..... Revision 3
12A3-21 ..... Revision 5
12A4-1 ..... Revision 1
12A5-1 ..... Revision 2
12A5-2 ..... Revision UMSS-01D
12A5-3 ..... Revision UMSS-01D
12A5-4 ..... Revision UMSS-01D
12A5-5 ..... Revision UMSS-01D
12B-1 ..... Revision 1
12B-2 ..... Revision UMSS-00L
12B-3 ..... Revision 5
12B1-1 ..... Revision 5
12B2-1 ..... Revision 5
12B2-2 ..... Revision 5
12B2-3 ..... Revision 5
12B2-4 ..... Revision UMSS-01D
12B2-5 ..... Revision UMSS-01D
12B2-6 ..... Revision UMSS-00L
12B2-7 ..... Revision UMSS-00L
12B2-8 ..... Revision UMSS-00L
12B2-9 ..... Revision UMSS-00L
12B2-10 ..... Revision UMSS-00L
12B2-11 ..... Revision UMSS-00L
12B2-12 ..... Revision UMSS-00L
12B2-13 ..... Revision UMSS-00L
12B2-14 ..... Revision UMSS-01D
12B2-15 ..... Revision UMSS-01D
12B2-16 ..... Revision UMSS-01D
12B2-17 ..... Revision UMSS-01D
12B2-18 ..... Revision UMSS-00L
12B2-19 ..... Revision UMSS-00L
12B2-20 ..... Revision UMSS-00L
12B3-1 ..... Revision 2
12B3-2 ..... Revision 1
12B3-3 ..... Revision 1
12B3-4 ..... Revision 2
12B3-5 ..... Revision 2
12B3-6 ..... Revision 1
12B3-7 ..... Revision 5
12B3-8 ..... Revision 5
12B3-9 ..... Revision 5
12B3-10 ..... Revision 5
12B3-11 ..... Revision 5
12B3-12 ..... Revision 5
12B3-13 ..... Revision 5
12C-1 ..... Revision 1
12C-2 ..... Revision 3
12C1-1 ..... Revision 1
12C2-1 ..... Revision 5
12C2-2 ..... Revision 1
12C3-1 ..... Revision 1
12C3-2 ..... Revision 1
12C3-3 ..... Revision 1
12C3-4 ..... Revision 1
12C3-5 ..... Revision 1
12C3-6 ..... Revision 1
12C3-7 ..... Revision 1
12C3-8 ..... Revision 1
12C3-9 ..... Revision 5
12C3-10 ..... Revision 5
12C3-11 ..... Revision 5
12C3-12 ..... Revision 1
12C3-13 ..... Revision 1
12C3-14 ..... Revision 1
12C3-15 ..... Revision 1
12C3-16 ..... Revision 1
12C3-17 ..... Revision 1
12C3-18 ..... Revision 1
12C3-19 ..... Revision 1
12C3-20 ..... Revision 5

List of Effective Pages (continued)

12C3-21 ..... Revision 1
12C3-22 ..... Revision 1
12C3-23 ..... Revision 1
12C3-24 ..... Revision 1
12C3-25 ..... Revision 1
12C3-26 ..... Revision 1
12C3-27 ..... Revision 3
12C3-28 ..... Revision 3
12C3-29 ..... Revision 3
12C3-30 ..... Revision 3
12C3-31 ..... Revision 3
12C3-32 ..... Revision 3
12C3-33 ..... Revision 3
12C3-34 ..... Revision 3
12C3-35 ..... Revision 3
12C3-36 ..... Revision 3
12C3-37 ..... Revision 3
12C3-38 ..... Revision 3
12C3-39 ..... Revision 3
12C3-40 ..... Revision 3
12C3-41 ..... Revision 3
12C3-42 ..... Revision 3

Chapter 13

13-i ..... Revision 1
13-ii ..... Revision 1
13.1-1 ..... Revision 1
13.1-2 ..... Revision 1
13.2-1 ..... Revision 1
13.2-2 ..... Revision 1
13.2-3 ..... Revision 1
13.2-4 ..... Revision 1
13.2-5 ..... Revision 1
13.2-6 ..... Revision 1
13.2-7 ..... Revision 1
13.2-8 ..... Revision 1
13.3-1 ..... Revision 1

Master Table of Contents (Continued)

9.2 Maintenance Program 9.2-1
9.2.1 UMS® Storage System Maintenance 9.2-1
9.2.2 Transfer Cask Maintenance 9.2-2
9.2.3 Required Surveillance of First Storage System Placed in Service 9.2-2

9.3 References 9.3-1

10.0 RADIATION PROTECTION 10.1-1

10.1 Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA) 10.1-1
10.1.1 Policy Considerations 10.1-1
10.1.2 Design Considerations 10.1-1
10.1.3 Operational Considerations 10.1-2

10.2 Radiation Protection Design Features 10.2-1
10.2.1 Design Basis for Normal Storage Conditions 10.2-1
10.2.2 Design Basis for Accident Conditions 10.2-2

10.3 Estimated On-Site Collective Dose Assessment 10.3-1
10.3.1 Estimated Collective Dose for Loading a Single Universal Storage System 10.3-1
10.3.2 Estimated Annual Dose Due to Routine Operations 10.3-2

10.4 Exposure to the Public 10.4-1

10.5 Radiation Protection Evaluation for Site Specific Spent Fuel 10.5-1
10.5.1 Radiation Protection Evaluation for Maine Yankee Site Specific Spent Fuel 10.5-1

10.6 References 10.6-1

Master Table of Contents (Continued)

11.0 ACCIDENT ANALYSES 11-1

11.1 Off-Normal Events 11.1.1-1
11.1.1 Severe Ambient Temperature Conditions (106°F and -40°F) 11.1.1-1
11.1.1.1 Cause of Severe Ambient Temperature Event 11.1.1-1
11.1.1.2 Detection of Severe Ambient Temperature Event 11.1.1-1
11.1.1.3 Analysis of Severe Ambient Temperature Event 11.1.1-1
11.1.1.4 Corrective Actions 11.1.1-2
11.1.1.5 Radiological Impact 11.1.1-2
11.1.2 Blockage of Half of the Air Inlets 11.1.2-1
11.1.2.1 Cause of the Blockage Event 11.1.2-1
11.1.2.2 Detection of the Blockage Event 11.1.2-1
11.1.2.3 Analysis of the Blockage Event 11.1.2-1
11.1.2.4 Corrective Actions 11.1.2-2
11.1.2.5 Radiological Impact 11.1.2-2
11.1.3 Off-Normal Canister Handling Load 11.1.3-1
11.1.3.1 Cause of the Off-Normal Canister Handling Load Event 11.1.3-1
11.1.3.2 Detection of the Off-Normal Canister Handling Load Event 11.1.3-1
11.1.3.3 Analysis of the Off-Normal Canister Handling Load Event 11.1.3-1
11.1.3.4 Corrective Actions 11.1.3-3
11.1.3.5 Radiological Impact 11.1.3-3
11.1.4 Failure of Instrumentation 11.1.4-1
11.1.4.1 Cause of Instrumentation Failure Event 11.1.4-1
11.1.4.2 Detection of Instrumentation Failure Event 11.1.4-1
11.1.4.3 Analysis of Instrumentation Failure Event 11.1.4-1
11.1.4.4 Corrective Actions 11.1.4-2
11.1.4.5 Radiological Impact 11.1.4-2
11.1.5 Small Release of Radioactive Particulate From the Canister Exterior 11.1.5-1
11.1.5.1 Cause of Radioactive Particulate Release Event 11.1.5-1
11.1.5.2 Detection of Radioactive Particulate Release Event 11.1.5-1
11.1.5.3 Analysis of Radioactive Particulate Release Event 11.1.5-1
11.1.5.4 Corrective Actions 11.1.5-2
11.1.5.5 Radiological Impact 11.1.5-2

Table 1-1 Terminology

Universal Storage System	The storage component of the Universal MPC System (UMS®) designed by NAC for the storage and transportation of spent nuclear fuel.
Universal Transport Cask	The packaging consisting of a Universal Transport Cask body with a closure lid and energy-absorbing impact limiters. The Universal Transport Cask is used to transport a Transportable Storage Canister containing spent fuel. The cask body provides the primary containment boundary during transport.
Confinement System	The components of the Transportable Storage Canister intended to retain the radioactive material during storage.
Contents	Twenty-four PWR fuel assemblies, or fifty-six BWR fuel assemblies. The fuel assemblies may be configured as Site Specific Fuel. The fuel assemblies are contained in a Transportable Storage Canister.
Standard Fuel	Irradiated fuel assemblies with a burnup less than, or equal to, 45,000 MWD/MTU and having the same configuration as when originally fabricated consisting generally of the end fittings, fuel rods, guide tubes, and integral hardware. For BWR fuel, the channel is considered to be integral hardware. The design basis fuel characteristics and analysis are based on the standard fuel configuration.
Consolidated Fuel	A nonstandard fuel configuration in which the individual intact fuel rods from one or more fuel assemblies are placed in a single container or a lattice structure that is dimensionally similar to a fuel assembly. Consolidated Fuel is stored in a Maine Yankee Fuel Can.
Intact Fuel (Assembly or Rod) (Undamaged Fuel)	A fuel assembly or fuel rod with no fuel rod cladding defects, or with known or suspected fuel rod cladding defects not greater than pinhole leaks or hairline cracks.

Table 1-1 Terminology (Continued)

Damaged Fuel (Failed Fuel)	A fuel assembly or fuel rod with known or suspected cladding defects greater than pinhole leaks or hairline cracks. Damaged Fuel must be placed in a Maine Yankee Fuel Can.
High Burnup Fuel	A fuel assembly having a burnup between 45,000 and 50,000 MWD/MTU, which must be preferentially loaded in periphery positions of the basket. An intact HIGH BURNUP FUEL assembly in which no more than 1% of the fuel rods in the assembly have a peak cladding oxide thickness greater than 80 microns, and in which no more than 3% of the fuel rods in the assembly have a peak oxide layer thickness greater than 70 microns, as determined by measurement and statistical analysis, may be stored as INTACT FUEL. HIGH BURNUP FUEL assemblies not meeting the cladding oxide thickness criteria for INTACT FUEL or that have an oxide layer that has become detached or spalled from the cladding are stored as DAMAGED FUEL in a MAINE YANKEE FUEL CAN.

Table 1-1 Terminology (Continued)

Site Specific Fuel	Spent fuel configurations that are unique to a site or reactor due to the addition of other components or reconfiguration of the fuel assembly at the site. It includes fuel assemblies, which hold nonfuel-bearing components, such as control components or instrument and plug thimbles, or which are modified as required by expediency in reactor operations, research and development or testing. Modification may consist of individual fuel rod removal, fuel rod replacement of similar or dissimilar material or enrichment, the installation, removal or replacement of burnable poison rods, or containerizing damaged (failed) fuel. Site specific fuel includes irradiated fuel assemblies designed with variable enrichments and/or axial blankets, fuel that is consolidated and fuel that exceeds design basis fuel parameters.
Maine Yankee Fuel Can	A specially designed stainless steel screened can sized to hold an intact fuel assembly, consolidated fuel, or damaged fuel. The can screens permit draining and drying, while precluding the release of gross particulates into the canister cavity. The Maine Yankee Fuel Can may only be loaded in a Class 1 Canister.
Transportable Storage Canister (Canister)	The stainless steel cylindrical shell, bottom end plate, shield lid, and structural lid that contain the fuel basket structure and the contents.
Shield Lid	A thick stainless steel disk that is located directly above the fuel basket. The shield lid comprises the first part of a double-welded closure system for the Transportable Storage Canister. The shield lid provides a containment/confinement boundary for storage and shielding for the contents.
- Drain Port	A penetration located in the shield lid to permit draining of the canister cavity.
- Vent Port	A penetration located in the shield lid to aid in draining and in vacuum drying and backfilling the canister with helium.

Table 1-1 Terminology (Continued)

- Port Cover	The stainless steel covers that close the vent and drain ports, and that are welded in place following draining, drying, and backfilling operations.
- Quick Disconnect	The valved nipple used in the vent and drain ports to facilitate operations.
Structural Lid	A thick stainless steel disk that is positioned on top of the shield lid and welded to the canister. The structural lid is the second part of a double-welded closure system for the Transportable Storage Canister. The structural lid provides a confinement boundary for storage, shielding for the contents, and canister lifting/handling capability.
Fuel Basket (Basket)	The structure located within the Transportable Storage Canister that provides structural support, criticality control, and primary heat transfer paths for the fuel assemblies.
- Support Disk	The primary lateral load-bearing component of the fuel basket. The PWR support disk is a circular stainless steel plate with 24 square holes machined in a symmetrical pattern. The BWR support disk is a circular carbon steel plate with 56 square holes machined in a symmetrical pattern. Each square hole is a location for a fuel tube.
- Heat Transfer Disk	A circular aluminum plate with 24 (PWR basket) or 56 (BWR basket) square holes machined in a symmetrical pattern. The heat transfer disk enhances heat transfer in the fuel basket.
- Fuel Tube	A stainless steel tube having a square cross-section with enclosed BORAL neutron poison material on its exterior surfaces. One fuel tube is inserted through each square hole in the support disks and heat transfer disks. Fuel assemblies are loaded into the fuel tube.

Table 1-1 Terminology (Continued)

- Tie Rod	A stainless steel rod used to align, retain, and support the support disks and the heat transfer disks in the fuel basket structure. The tie rods extend from the top weldment to the bottom weldment.
- Spacer	Installed on the tie rod between the support disks (BWR only) or between the support disks and top and bottom weldments (BWR and PWR) to properly position the disks and provide axial support for the support disks.
- Split Spacer	Spacers installed on the tie rod between the support disks and the heat transfer disks to properly position the disks and provide axial support for the support disks and the heat transfer disks.
Vertical Concrete Cask (Concrete Cask)	A concrete cylinder that contains the Transportable Storage Canister during storage. The Vertical Concrete Cask is formed around a steel inner liner and base and is closed by a shield plug and lid.
- Shield Plug	A thick carbon steel plug installed in the top end of the Vertical Concrete Cask to reduce skyshine radiation. The shield plug contains a 1-inch thick neutron shield.
- Lid	A thick carbon steel plate that serves as the bolted closure for the Vertical Concrete Cask. The lid precludes access to the canister and provides additional radiation shielding.
- Liner	A thick carbon steel shell that forms the annulus of the concrete cask. The liner serves as the inner form during concrete pouring and provides radiation shielding of the canister contents.
- Base	A carbon steel weldment that contains the air inlets, the concrete cask jacking points and the pedestal that supports the canister inside of the concrete cask.

Table 1-1 Terminology (Continued)

Transfer Cask	A shielded lifting device for handling of the Transportable Storage Canister during loading of spent fuel, canister closure operations, and transfer of the canister into or out of the Vertical Concrete Cask during storage, or into or out of the Universal Transport Cask during transportation. The transfer cask incorporates bottom doors that permit the vertical loading of the storage and transport casks.
- Transfer Cask Lifting Trunnions	Four low alloy steel trunnions used to lift and move the transfer cask.
Adapter Plate	A carbon steel plate assembly that attaches to the top of the transport or concrete cask to facilitate installation and alignment of the transfer cask. It also provides the operating mechanism for the transfer cask bottom doors.
NS-4-FR	A solid, borated, hydrogenous, synthetic, polymer material with neutron absorption capabilities, similar to those of borated water. Developed by BISCO Products, Inc., NS-4-FR is now supplied by Japan Atomic Power Company and its product licensees.
Air Pad Rig Set (Air Pallet)	A device used to lift the Vertical Concrete Cask by using high volume air.
Heavy Haul Trailer	The trailer used to transport the empty or loaded Vertical Concrete Cask.
Margin of Safety	An analytically determined value defined as the "factor of safety" minus 1. Factor of safety is also analytically determined, and is defined as the allowable stress or displacement of a material divided by its actual (calculated) value.

Table of Contents

9.0 ACCEPTANCE CRITERIA AND MAINTENANCE PROGRAM 9.1-1

9.1 Acceptance Criteria 9.1-1
- 9.1.1 Visual and Nondestructive Examination Inspection 9.1-1
  - 9.1.1.1 Nondestructive Weld Examination 9.1-3
  - 9.1.1.2 Fabrication Inspections 9.1-4
  - 9.1.1.3 Construction Inspections 9.1-4
- 9.1.2 Structural and Pressure Test 9.1-5
- 9.1.3 Leak Tests 9.1-6
- 9.1.4 Component Tests 9.1-7
  - 9.1.4.1 Valves, Rupture Disks and Fluid Transport Devices 9.1-7
  - 9.1.4.2 Gaskets 9.1-7
- 9.1.5 Shielding Tests 9.1-7
- 9.1.6 Neutron-Absorber Tests 9.1-7
- 9.1.7 Thermal Tests 9.1-9
- 9.1.8 Cask Identification 9.1-10

9.2 Maintenance Program 9.2-1
- 9.2.1 UMS® Storage System Maintenance 9.2-1
- 9.2.2 Transfer Cask Maintenance 9.2-2
- 9.2.3 Required Surveillance of First Storage System Placed in Service 9.2-2

9.3 References 9.3-1

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9.2 Maintenance Program

This section presents the maintenance requirements for the UMS® Universal Storage System and for the transfer cask.

9.2.1 UMS® Storage System Maintenance

The UMS® Universal Storage System is a passive system. No active components or systems are incorporated in the design. Consequently, only a minimal amount of maintenance is required over its lifetime.

The UMS®-Universal Storage System has no valves, gaskets, rupture discs, seals, or accessible penetrations. Consequently, there is no maintenance associated with these types of features.

The routine surveillance requirements are described in Technical Specification LCO 3.1.6 in Appendix 12A of Chapter 12. It is not necessary to inspect the concrete cask or canister during the storage period as long as the thermal performance is normal, based on daily temperature verification.

The ambient air temperature and air outlet temperature of each Vertical Concrete Cask must be recorded upon placement in service. Thereafter, the temperatures shall be recorded on a daily basis to verify the continuing thermal performance of the system.

In the event of a decline in thermal performance, the heat removal system must be restored to acceptable operation. The user should perform a visual inspection of air inlets and outlets for evidence of blockage and verify that the inlet and outlet screens are whole, secure and in place.

The user must also visually inspect the Vertical Concrete Cask within 4 hours of any off-normal, accident or natural phenomena event, such as an earthquake.

An annual inspection of the Vertical Concrete Cask exterior is required, to include:

- Visual inspection of concrete surfaces for chipping, spalling or other surface defects. Any defects larger than one inch in diameter (or width) and deeper than one inch shall be regrouted, according to the grout manufacturer's recommendations.
- Reapplication of corrosion-inhibiting (external) coatings on accessible surfaces, including concrete cask lifting lugs, if present.

9.2.2 Transfer Cask Maintenance

The transfer cask trunnions and shield door assemblies shall be visually inspected for gross damage and proper function prior to each use. Annually, the lifting trunnions, shield doors and shield door rails shall be either dye penetrant or magnetic particle examined, using the examination method appropriate to the material. The examination method shall be in accordance with Section V of the ASME Code. The acceptance criteria shall be in accordance with Section III, Subsection NF, Article NF-5350 or NF-5340 as appropriate to the examination method, as required by ANSI N14.6.

The annual examination may be omitted in periods of nonuse of the transfer cask, provided that the transfer cask examination is performed prior to the next use of the transfer cask.

Annually, the coating applied to the carbon steel surfaces of the transfer cask shall be inspected, and any chips, cracks or other defects in the coating shall be repaired.

9.2.3 Required Surveillance of First Storage System Placed in Service

For the first Universal Storage System placed in service with a heat load equal to or greater than 10 kW, the canister is loaded with spent fuel assemblies and the decay heat load calculated for that canister. The canister is then loaded into the vertical concrete cask, and the cask's thermal performance is evaluated by measuring the ambient and air outlet temperatures for normal air flow. The purpose of the surveillance is to measure the heat removal performance of the Universal Storage System and to establish baseline data. In accordance with 10 CFR 72.4, a letter report summarizing the results of the surveillance and evaluation will be submitted to the NRC within 30 days of placing the loaded cask on the ISFSI pad.

Should the first canister not be loaded with spent fuel that has a heat load ≥ 10 kW, the user may use a lesser heat load for the test. However, a calculation of the temperature difference between the inlet and outlet temperatures must be performed using the same methodology and inputs documented in the Safety Analysis Report.

Spent fuel having a burnup from 45,000 to 50,000 MWD/MTU is assigned to peripheral locations, and based on a cladding oxide layer thickness determination, may require loading in a Maine Yankee fuel can. The interior locations must be loaded with fuel that has lower burnup and/or longer cool times in order to maintain the design basis heat load and component temperature limits for the basket and canister.

The Fuel Assembly Limits for the Maine Yankee SITE SPECIFIC FUEL are shown in Table 12B2-7. Part A of the table lists the STANDARD, INTACT FUEL ASSEMBLY and SITE SPECIFIC FUEL that does not require preferential loading except as required by Section B 2.1.2 to assure that short-term fuel cladding temperature limits are not exceeded.

Part B of the table lists the SITE SPECIFIC FUEL configurations that require preferential loading due to the criticality, shielding or thermal evaluation. The loading pattern for Maine Yankee SITE SPECIFIC FUEL that must be preferentially loaded is presented in Section B 2.1.3. The preferential loading controls take advantage of design features of the UMS® Storage System to allow the loading of fuel configurations that may have higher burnup or additional hardware or fuel source material that is not specifically considered in the design basis fuel evaluation. The preferential loading required by Part B must also consider the preferential loading requirements of Section B 2.1.2 for short-term cladding temperature limits.

Fuel assemblies with a Control Element Assembly (CEA) or a CEA plug inserted are loaded in a Class 2 canister and basket due to the increased length of the assembly with either of these components installed. However, these assemblies are not restricted as to loading position within the basket.

The Transportable Storage Canister loading procedures for Maine Yankee SITE SPECIFIC FUEL will indicate that the loading of a fuel configuration with removed fuel or poison rods, or a MAINE YANKEE FUEL CAN, or fuel with burnup between 45,000 MWD/MTU and 50,000 MWD/MTU, is administratively controlled in accordance with the requirements of Section B 2.1.3.

Table 12-1 NAC-UMS® System Controls and Limits

Control or Limit	Applicable Technical Specification	Condition or Item Controlled
1. Fuel Characteristics	Table 12B2-1	Type and Condition
	Table 12B2-2	Class, Dimensions and Weight for PWR
	Table 12B2-3	Class, Dimensions and Weight for BWR
	Table 12B2-4	Minimum Cooling Time for PWR Fuel
	Table 12B2-5	Minimum Cooling Time for BWR Fuel
	Table 12B2-7	Maine Yankee SITE SPECIFIC Loading
	Table 12B2-8	Minimum Cooling Time for Maine Yankee Fuel – No CEA
	Table 12B2-9	Minimum Cooling Time for Maine Yankee Fuel – With CEA
2. Canister	LCO 3.1.4	Time in Transfer Cask (fuel loading)
Fuel Loading	Table 12B2-1	Weight and Number of Assemblies
	Table 12B2-7	Maine Yankee Site Specific Fuel Loading
	Table 12B2-4	Minimum Cooling Time for PWR Fuel
	Table 12B2-5	Minimum Cooling Time for BWR Fuel
Drying	LCO 3.1.2	Vacuum Drying Pressure
Backfilling	LCO 3.1.3	Helium Backfill Pressure
Sealing	LCO 3.1.5	Helium Leak Rate
Vacuum	LCO 3.1.1	Time in Vacuum Drying
External Surface	LCO 3.2.1	Level of Contamination
Unloading	Note 1	Fuel Cooldown Requirement
3. Concrete Cask	LCO 3.2.2	Surface Dose Rates
	Note 1	Cask Spacing
	Note 2	Cask Handling Height
4. Surveillance	LCO 3.1.6	Heat Removal System
5. Transfer Cask	12B 3.4(8)	Minimum Temperature
	LCO 3.1.7	Canister Removal from the CONCRETE Cask
6. ISFSI Concrete Pad	B3.4.1(6) B3.4.2(7)	Seismic Event Performance

1. Limits are presented in the Operating Procedures of Chapter 8.
2. Lifting height and handling restrictions are provided in Section A5.1.1 of Appendix 12A.

APPENDIX 12A

TECHNICAL SPECIFICATIONS FOR THE NAC-UMS® SYSTEM

Table of Contents

A 1.0 USE AND APPLICATION 12A1-1
A 1.1 Definitions 12A1-1
A 1.2 Logical Connectors 12A1-7
A 1.3 Completion Times 12A1-10
A 1.4 Frequency 12A1-15

A 2.0 [Reserved] 12A2-1

A 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY 12A3-1
SURVEILLANCE REQUIREMENT (SR) APPLICABILITY 12A3-2
A 3.1 NAC-UMS® SYSTEM Integrity 12A3-4
A 3.1.1 CANISTER Maximum Time in Vacuum Drying 12A3-4
A 3.1.2 CANISTER Vacuum Drying Pressure 12A3-6
A 3.1.3 CANISTER Helium Backfill Pressure 12A3-7
A 3.1.4 CANISTER Maximum Time in TRANSFER CASK 12A3-8
A 3.1.5 CANISTER Helium Leak Rate 12A3-10
A 3.1.6 CONCRETE CASK Heat Removal System 12A3-11
A 3.1.7 CANISTER Removal from the CONCRETE CASK 12A3-13
A 3.2 NAC-UMS® SYSTEM Radiation Protection 12A3-16
A 3.2.1 CANISTER Surface Contamination 12A3-16
A 3.2.2 CONCRETE CASK Average Surface Dose Rate 12A3-18

Figure 12A3-1 CONCRETE CASK Surface Dose Rate Measurement 12A3-20

A 4.0 [Reserved] 12A4-1

A 5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS 12A5-1
A 5.1 Training Program 12A5-1
A 5.2 Pre-Operational Testing and Training Exercises 12A5-1
A 5.3 Special Requirements for the First System Placed in Service 12A5-2
A 5.4 Surveillance After an Off-Normal, Accident, or Natural Phenomena Event 12A5-2

Table of Contents (Continued)

A 5.5 Radioactive Effluent Control Program 12A5-3
A 5.6 NAC-UMS® SYSTEM Transport Evaluation Program 12A5-3
A 5.7 Verification of Oxide Layer Thickness on High Burnup Fuel 12A5-4

Table 12A5-1 TRANSFER CASK and CONCRETE CASK Lifting Requirements 12A5-5

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STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI, while an NAC-UMS® SYSTEM containing spent fuel is located on the storage pad within the ISFSI perimeter.
TRANSFER CASK	TRANSFER CASK is a shielded lifting device that holds the CANISTER during LOADING and UNLOADING OPERATIONS and during closure welding, vacuum drying, leak testing, and non-destructive examination of the CANISTER closure welds. The TRANSFER CASK is also used to transfer the CANISTER into and from the CONCRETE CASK and into the transport cask.
TRANSPORT OPERATIONS	TRANSPORT OPERATIONS include all licensed activities involved in moving a loaded NAC-UMS® CONCRETE CASK and CANISTER to and from the ISFSI. TRANSPORT OPERATIONS begin when the NAC-UMS® SYSTEM is first secured on the transporter and end when the NAC-UMS® SYSTEM is at its destination and no longer secured on the transporter.
TRANSPORTABLE STORAGE CANISTER (CANISTER)	TRANSPORTABLE STORAGE CANISTER is the sealed container that consists of a tube and disk fuel basket in a cylindrical canister shell that is welded to a baseplate, shield lid with welded port covers, and structural lid. The CANISTER provides the confinement boundary for the confined spent fuel.
TRANSFER OPERATIONS	TRANSFER OPERATIONS include all licensed activities involved in transferring a loaded CANISTER from a CONCRETE CASK to another CONCRETE CASK or to a TRANSPORT CASK.

(continued)

UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on a NAC-UMS® SYSTEM to be unloaded of the contained fuel assemblies. UNLOADING OPERATIONS begin when the NAC-UMS® SYSTEM is no longer secured on the transporter and end when the last fuel assembly is removed from the NAC-UMS® SYSTEM.
VERTICAL CONCRETE CASK (CONCRETE CASK)	VERTICAL CONCRETE CASK is the cask that receives and holds the sealed CANISTER. It provides the gamma and neutron shielding and convective cooling of the spent fuel confined in the CANISTER.
STANDARD FUEL	Irradiated fuel assemblies having the same configuration as when originally fabricated consisting generally of the end fittings, fuel rods, guide tubes, and integral hardware. For BWR fuel, the channel is considered to be integral hardware. The design basis fuel characteristics and analysis are based on the STANDARD FUEL configuration.
DAMAGED FUEL	A fuel assembly or fuel rod with known or suspected cladding defects greater than pinhole leaks or hairline cracks. DAMAGED FUEL must be placed in a MAINE YANKEE FUEL CAN.

(continued)

HIGH BURNUP FUEL	A fuel assembly having a burnup between 45,000 and 50,000 MWD/MTU, which must be preferentially loaded in periphery positions of the basket. An intact HIGH BURNUP FUEL assembly in which no more than 1% of the fuel rods in the assembly have a peak cladding oxide thickness greater than 80 microns, and in which no more than 3% of the fuel rods in the assembly have a peak oxide layer thickness greater than 70 microns, as determined by measurement and statistical analysis, may be stored as INTACT FUEL. HIGH BURNUP FUEL assemblies not meeting the cladding oxide thickness criteria for INTACT FUEL or that have an oxide layer that has become detached or spalled from the cladding are stored as DAMAGED FUEL in a MAINE YANKEE FUEL CAN.
FUEL DEBRIS	An intact or a partial fuel rod or an individual intact or partial fuel pellet not contained in a fuel rod. Fuel debris is inserted into a 9 x 9 array of tubes in a lattice that has approximately the same dimensions as a standard fuel assembly. FUEL DEBRIS is stored in a MAINE YANKEE FUEL CAN.
CONSOLIDATED FUEL	A nonstandard fuel configuration in which the individual fuel rods from one or more fuel assemblies are placed in a single container or a lattice structure that is similar to a fuel assembly. CONSOLIDATED FUEL is stored in a MAINE YANKEE FUEL CAN.

(continued)

SITE SPECIFIC FUEL	Spent fuel configurations that are unique to a site or reactor due to the addition of other components or reconfiguration of the fuel assembly at the site. It includes fuel assemblies, which hold nonfuel-bearing components, such as control components or instrument and plug thimbles, or which are modified as required by expediency in reactor operations, research and development or testing. Modification may consist of individual fuel rod removal, fuel rod replacement of similar or dissimilar material or enrichment, the installation, removal or replacement of burnable poison rods, or containerizing damaged fuel. Site specific fuel includes irradiated fuel assemblies designed with variable enrichments and/or axial blankets, fuel that is consolidated and fuel that exceeds design basis fuel parameters.
MAINE YANKEE FUEL CAN	A specially designed stainless steel screened can sized to hold INTACT FUEL, CONSOLIDATED FUEL, DAMAGED FUEL and FUEL DEBRIS. The screens preclude the release of gross particulate from the can into the canister cavity. The MAINE YANKEE FUEL CAN may only be loaded in a Class 1 canister.

A 5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS

A 5.1 Training Program

A training program for the NAC-UMS® Universal Storage System shall be developed under the general licensee's systematic approach to training (SAT). Training modules shall include comprehensive instructions for the operation and maintenance of the NAC-UMS® Universal Storage System and the independent spent fuel storage installation (ISFSI).

A 5.2 Pre-Operational Testing and Training Exercises

A dry run training exercise on loading, closure, handling, unloading, and transfer of the NAC-UMS® Storage System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the CANISTER. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:

a. Moving the CONCRETE CASK into its designated loading area
b. Moving the TRANSFER CASK containing the empty CANISTER into the spent fuel pool
c. Loading one or more dummy fuel assemblies into the CANISTER, including independent verification
d. Selection and verification of fuel assemblies requiring preferential loading
e. Installing the shield lid
f. Removal of the TRANSFER CASK from the spent fuel pool
g. Closing and sealing of the CANISTER to demonstrate pressure testing, vacuum drying, helium backfilling, welding, weld inspection and documentation, and leak testing
h. TRANSFER CASK movement through the designated load path
i. TRANSFER CASK installation on the CONCRETE CASK
j. Transfer of the CANISTER to the CONCRETE CASK

(continued)

A 5.2 Pre-Operational Testing and Training Exercises (continued)

k. CONCRETE CASK shield plug and lid installation
l. Transport of the CONCRETE CASK to the ISFSI
m. CANISTER unloading, including reflooding and weld removal or cutting
n. CANISTER removal from the CONCRETE CASK

Appropriate mockup fixtures may be used to demonstrate and/or to qualify procedures, processes or personnel in welding, weld inspection, vacuum drying, helium backfilling, leak testing and weld removal or cutting.

A 5.3 Special Requirements for the First System Placed in Service

The heat transfer characteristics and performance of the NAC-UMS® SYSTEM will be recorded by air inlet and outlet temperature measurements of the first system placed in service with a heat load equal to or greater than 10 kW. A letter report summarizing the results of the measurements will be submitted to the NRC in accordance with 10 CFR 72.4 within 30 days of placing the loaded cask on the ISFSI pad. The report will include a comparison of the calculated temperatures of the NAC-UMS® SYSTEM heat load to the measured temperatures. Should the first canister not be loaded with spent fuel that has a heat load ≥ 10 kW, the user may use a lesser heat load for the test. However, a calculation of the temperature difference between the inlet and outlet temperatures must be performed using the same methodology and inputs documented in the Safety Analysis Report.

A 5.4 Surveillance After an Off-Normal, Accident, or Natural Phenomena Event

A Response Surveillance is required following off-normal, accident or natural phenomena events. The NAC-UMS® SYSTEMs in use at an ISFSI shall be inspected within 4 hours after the occurrence of an off-normal, accident or natural phenomena event in the area of the ISFSI. This inspection must specifically verify that all the CONCRETE CASK inlets and outlets are not blocked or obstructed. At least one-half of the inlets and outlets on each CONCRETE CASK must be cleared of blockage or debris within 24 hours to restore air circulation.

The CONCRETE CASK and CANISTER shall be inspected if they experience a drop or a tipover.

(continued)

A 5.5 Radioactive Effluent Control Program

The program implements the requirements of 10 CFR 72.44(d).

a. The NAC-UMS® SYSTEM does not create any radioactive materials or have any radioactive waste treatment systems. Therefore, specific operating procedures for the control of radioactive effluents are not required. LCO 3.1.5, CANISTER Helium Leak Rate, provides assurance that there are no radioactive effluents from the NAC-UMS® SYSTEM.

b. This program includes an environmental monitoring program. Each general license user may incorporate NAC-UMS® SYSTEM operations into their environmental monitoring program for 10 CFR Part 50 operations.

c. An annual report shall be submitted pursuant to 10 CFR 72.44(d)(3).

A 5.6 NAC-UMS® SYSTEM Transport Evaluation Program

This program provides a means for evaluating various transport configurations and transport route conditions to ensure that the design basis drop limits are met. For lifting of the loaded TRANSFER CASK or CONCRETE CASK using devices, which are integral to a structure governed by 10 CFR Part 50 regulations, 10 CFR 50 requirements apply. This program is not applicable when the TRANSFER CASK or CONCRETE CASK is in the fuel building or is being handled by a device providing support from underneath (i.e., on a rail car, heavy haul trailer, air pads, etc.).

Pursuant to 10 CFR 72.212, this program shall evaluate the site specific transport route conditions.

a. The lift height above the transport surface prescribed in Section B3.4.6 of Appendix B to Certificate of Compliance (CoC) No. 1015 shall not exceed the limits in Table 12A5-1. Also, the program shall ensure that the transport route conditions (i.e., surface hardness and pad thickness) are equivalent to or less limiting than those prescribed for the reference pad surface which forms the basis for the values cited in Section B3.4.6 of Appendix B to CoC No. 1015.

(continued)

A 5.6 NAC-UMS® SYSTEM Transport Evaluation Program (continued)

b. For site specific transport conditions which are not bounded by the surface characteristics in Section B3.4.6 of Appendix B to CoC No. 1015, the program may evaluate the site specific conditions to ensure that the impact loading due to design basis drop events does not exceed 60g. This alternative analysis shall be commensurate with the drop analyses described in the Safety Analysis Report for the NAC-UMS® SYSTEM. The program shall ensure that these alternative analyses are documented and controlled.

c. The TRANSFER CASK and CONCRETE CASK may be lifted to those heights necessary to perform cask handling operations, including CANISTER transfer, provided the lifts are made with structures and components designed in accordance with the criteria specified in Section B3.5 of Appendix B to CoC No. 1015, as applicable.

A 5.7 Verification of Oxide Layer Thickness on High Burnup Fuel

A verification program is required to determine the oxide layer thickness on high burnup fuel by measurement or by statistical analysis. A fuel assembly having a burnup between 45,000 MWD/MTU and 50,000 MWD/MTU is classified as high burnup. The verification program shall be capable of classifying high burnup fuel as INTACT FUEL or DAMAGED FUEL based on the following criteria:

1. A HIGH BURNUP FUEL assembly may be stored as INTACT FUEL provided that no more than 1% of the fuel rods in the assembly have a peak cladding oxide thickness greater than 80 microns, and that no more than 3% of the fuel rods in the assembly have a peak oxide layer thickness greater than 70 microns, and that the fuel assembly is otherwise INTACT FUEL.

2. A HIGH BURNUP FUEL assembly not meeting the cladding oxide thickness criteria for INTACT FUEL or that has an oxide layer that is detached or spalled from the cladding is classified as DAMAGED FUEL.

A fuel assembly, having a burnup between 45,000 and 50,000 MWD/MTU, must be preferentially loaded in periphery positions of the basket.

Table 12A5-1 TRANSFER CASK and CONCRETE CASK Lifting Requirements

Item	Orientation	Lifting Height Limit
TRANSFER CASK	Horizontal	None Established
TRANSFER CASK	Vertical	None Established[1]
CONCRETE CASK	Horizontal	Not Permitted
CONCRETE CASK	Vertical	< 24 inches

Note:

1. See Technical Specification A5.6(c).

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For the PWR fuel basket configuration, shown in Figure 12B2-1, fuel positions are numbered using the drain line as the reference point. Fuel positions 9, 10, 15 and 16 are considered to be basket center positions for the purpose of meeting the preferential loading requirement. The fuel with the shortest cooling times from among the fuel designated for loading in the CANISTER will be placed in the center positions. A single fuel assembly having the shortest cooling time may be loaded in any of these four positions. Fuel positions 1, 2, 3, 6, 7, 12, 13, 18, 19, 22, 23 and 24 are periphery positions, where fuel with the longest cooling times will be placed. Fuel with the longest cooling times may be loaded in any of these 12 positions. Similarly, designated fuel assemblies with cooling times in the midrange of the shortest and longest cooling times will be loaded in the intermediate fuel positions – 4, 5, 8, 11, 14, 17, 20 and 21.

For the BWR fuel basket configuration, shown in Figure 12B2-2, fuel positions are also numbered using the drain line as the reference point. Fuel positions 23, 24, 25, 32, 33 and 34 are considered to be basket center positions for the purpose of meeting the preferential loading requirement. The fuel with the shortest cooling times from among the fuel designated for loading in the CANISTER will be placed in the center positions. However, the single fuel assembly having the shortest cooling time will be loaded in either position 24 or position 33. Fuel positions 1, 2, 3, 4, 5, 6, 12, 13, 19, 20, 28, 29, 37, 38, 44, 45, 51, 52, 53, 54, 55 and 56 are periphery positions, where fuel with the longest cooling times will be placed. Fuel with the longest cooling times may be loaded in any of these 23 positions. Designated fuel assemblies with cooling times in the midrange of the shortest and longest cooling times will be divided into two tiers. The fuel assemblies with the shorter cooling times in the midrange will be loaded in the inner intermediate fuel positions - 15, 16, 17, 22, 26, 31, 35, 40, 41, and 42. Fuel assemblies with the longer cooling times in the midrange will be loaded in the outer intermediate fuel positions - 7, 8, 9, 10, 11, 14, 18, 21, 27, 30, 36, 39, 43, 46, 47, 48, 49 and 50.

These loading patterns result in the placement of fuel such that the shortest-cooled fuel is in the center of the basket and the longest-cooled fuel is on the periphery. Based on engineering evaluations, this loading pattern ensures that fuel assembly allowable cladding temperatures are satisfied.

(continued)

B 2.1.3 Maine Yankee SITE SPECIFIC FUEL Preferential Loading

The estimated Maine Yankee SITE SPECIFIC FUEL inventory is shown in Table 12B2-6. As shown in this table, certain of the Maine Yankee fuel configurations must be preferentially loaded in specific basket fuel tube positions.

Corner positions are used for CONSOLIDATED FUEL, certain HIGH BURNUP FUEL and DAMAGED FUEL or FUEL DEBRIS loaded in a MAINE YANKEE FUEL CAN, for fuel assemblies with missing fuel rods, burnable poison rods or fuel assemblies with fuel rods that have been replaced by hollow Zircaloy rods. Designation for placement in corner positions results primarily from shielding or criticality evaluations of these fuel configurations. CONSOLIDATED FUEL is conservatively designated for a corner position, even though analysis shows that these lattices could be loaded in any basket position. Corner positions are positions 3, 6, 19, and 22 in Figure 12B2-1.

Preferential loading is also used for HIGH BURNUP fuel not loaded in the MAINE YANKEE FUEL CAN. This fuel is assigned to peripheral locations, positions 1, 2, 3, 6, 7, 12, 13, 18, 19, 22, 23, and 24 in Figure 12B2-1. The interior locations must be loaded with fuel that has lower burnup and/or longer cool times to maintain the design basis heat load and component temperature limits for the basket and canister, and the spent fuel short-term temperature limits, as described in Section B 2.1.2.

One of the three loading patterns (Standard, 1.05 kW (periphery), or 0.958 kW (periphery)) shown in Table 12B2-8 must be used to load each canister. Once selected, all of the spent fuel in that canister must be loaded in accordance with that pattern. Within a pattern, mixing of enrichment and cool time is allowed, but no mixing of loading patterns is permitted. For example, choosing a Perf (1.05) pattern restricts the interior fuel to the cool times shown in the Perf (1.05i) column, and the peripherial fuel to the cool times shown in the Perf (1.05p) column.

Fuel assemblies with a control element assembly (CEA) inserted will be loaded in a Class 2 canister and basket due to the increased length of the assembly with the CEA installed. However, these assemblies are not restricted as to loading position within the basket. Fuel assemblies with non-fuel items installed in corner guide tubes of the fuel assembly must also have a CEA plug installed and must be loaded in a basket corner fuel position in a Class 2 canister.

(continued)

The Transportable Storage Canister loading procedures indicate that loading of a fuel configuration with removed fuel or poison rods, CONSOLIDATED FUEL, or a MAINE YANKEE FUEL CAN with DAMAGED FUEL, FUEL DEBRIS or HIGH BURNUP FUEL, is administratively controlled in accordance with Section B 2.1.

Figure 12B2-1 PWR Basket Fuel Loading Positions

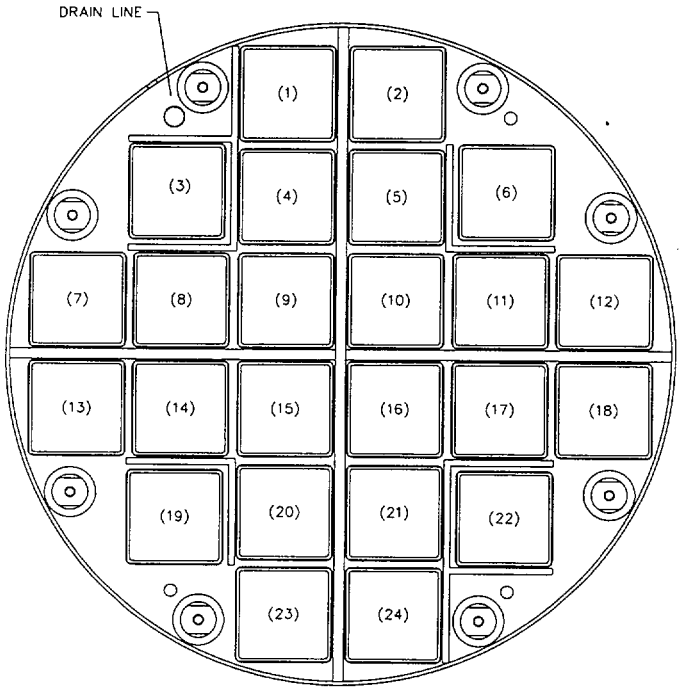

Figure 12B2-2 BWR Basket Fuel Loading Positions

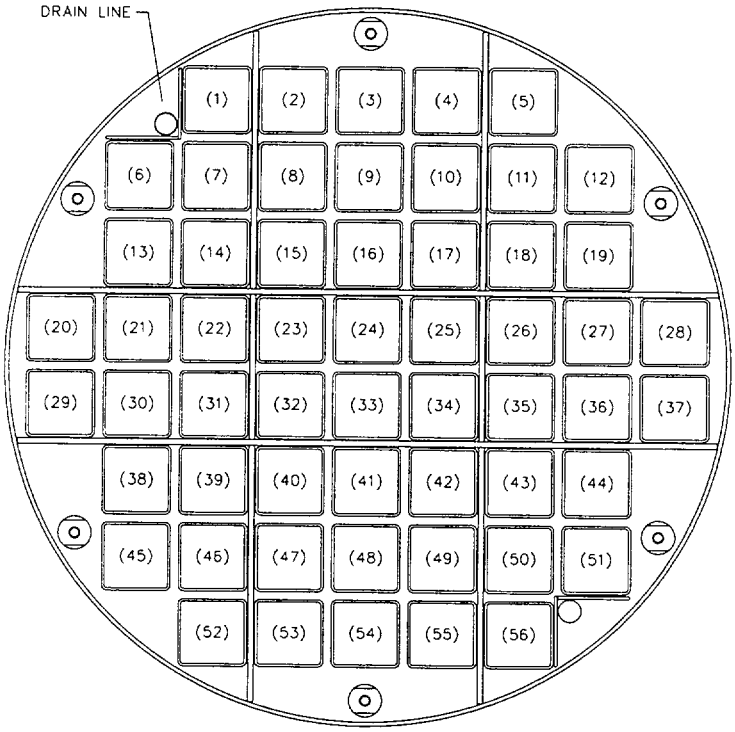

Table 12B2-5 Minimum Cooling Time Versus Burnup/Initial Enrichment for BWR Fuel

Minimum Initial Enrichment wt % ^{235}U (E)	Burnup ≤30 GWD/MTU Minimum Cooling Time [years]			30< Burnup ≤35 GWD/MTU Minimum Cooling Time [years]		
	7x7	8x8	9x9	7x7	8x8	9x9
1.9 ≤ E < 2.1	5	5	5	8	7	7
2.1 ≤ E < 2.3	5	5	5	6	6	6
2.3 ≤ E < 2.5	5	5	5	5	5	5
2.5 ≤ E < 2.7	5	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5	5
3.7 ≤ E ≤ 4.0	5	5	5	5	5	5

Minimum Initial Enrichment wt % ^{235}U (E)	35< Burnup ≤40 GWD/MTU Minimum Cooling Time [years]			40< Burnup ≤45 GWD/MTU Minimum Cooling Time [years]		
	7x7	8x8	9x9	7x7	8x8	9x9
1.9 ≤ E < 2.1	16	14	15	26	24	25
2.1 ≤ E < 2.3	13	12	12	23	21	22
2.3 ≤ E < 2.5	9	8	8	18	16	17
2.5 ≤ E < 2.7	8	7	7	15	14	14
2.7 ≤ E < 2.9	7	6	6	13	11	12
2.9 ≤ E < 3.1	6	6	6	11	10	10
3.1 ≤ E < 3.3	6	5	6	9	8	9
3.3 ≤ E < 3.5	6	5	6	8	7	8
3.5 ≤ E < 3.7	6	5	6	7	7	7
3.7 ≤ E ≤ 4.0	6	5	5	7	6	7

Table 12B2-6 Maine Yankee Site Specific Fuel Canister Loading Position Summary

Site Specific Spent Fuel Configurations[1]	Est. Number of Assemblies[2]	Canister Loading Position
Total Number of Fuel Assemblies[3]	1,434	—
Inserted Control Element Assembly (CEA)	168	Any
Inserted In-Core Instrument (ICI) Thimble	138	Any
Consolidated Fuel	2	Corner[4]
Fuel Rod Replaced by Rod Enriched to 1.95 wt %	3	Any
Fuel Rod Replaced by Stainless Steel Rod or Zircaloy Rod	18	Any
Fuel Rods Removed	10	Corner[4]
Variable Enrichment[6]	72	Any
Variable Enrichment and Axial Blanket[6]	68	Any
Burnable Poison Rod Replaced by Hollow Zircaloy Rod	80	Corner[4]
Damaged Fuel in MAINE YANKEE FUEL CAN	12	Corner[4]
Burnup between 45,000 and 50,000 MWD/MTU	90	Periphery[5]
MAINE YANKEE FUEL CAN	As Required	Corner[4]
Inserted Start-up Source	4	Corner[4]
Inserted CEA Fingertip or ICI String Segment	1	Corner[4]

1. All spent fuel, including that held in a Maine Yankee fuel can, must conform to the loading limits presented in Tables 12B2-8 and 12B2-9 for cool time.
2. The number of fuel assemblies in some categories may vary depending on future fuel inspections.
3. Includes these site specific spent fuel configurations and standard fuel assemblies. Standard fuel assemblies may be loaded in any canister position.
4. Basket corner positions are positions 3, 6, 19, and 22 in Figure 12B2-1. Corner positions are also periphery positions.
5. Basket periphery positions are positions 1, 2, 3, 6, 7, 12, 13, 18, 19, 22, 23, and 24 in Figure 12B2-1. Periphery positions include the corner positions.
6. Variably enriched fuel assemblies have a maximum burnup of less than 30,000 MWD/MTU and enrichments greater than 1.9 wt %. The minimum required cool time for these assemblies is 5 years.

Table 12B2-7 Maine Yankee Site Specific Fuel Limits

A. Allowable Contents

1. Combustion Engineering 14 x 14 PWR INTACT FUEL ASSEMBLIES meeting the specifications presented in Tables 12B2-1, 12B2-2 and 12B2-4.
2. PWR INTACT FUEL ASSEMBLIES may contain inserted Control Element Assemblies (CEA), In-Core Instrument (ICI) Thimbles or CEA Plugs. CEAs or CEA Plugs may not be inserted in damaged fuel assemblies, consolidated fuel assemblies or assemblies with irradiated stainless steel replacement rods. Fuel assemblies with a CEA or CEA Plug inserted must be loaded in a Class 2 CANISTER and cannot be loaded in a Class 1 CANISTER. Fuel assemblies without an inserted CEA or CEA Plug, including those with inserted ICI Thimbles, must be loaded in a Class 1 CANISTER.
3. PWR INTACT FUEL ASSEMBLIES with fuel rods replaced with stainless steel or Zircaloy rods or with Uranium oxide rods nominally enriched up to 1.95 wt %.
4. PWR INTACT FUEL ASSEMBLIES with fuel rods having variable enrichments with a maximum fuel rod enrichment up to 4.21 wt % ^{235}U and that also have a maximum planar average enrichment up to 3.99 wt % ^{235}U.
5. PWR INTACT FUEL ASSEMBLIES with annular axial end blankets. The axial end blanket enrichment may be up to 2.6 wt % ^{235}U.
6. PWR INTACT FUEL ASSEMBLIES with solid filler rods or burnable poison rods occupying up to 16 of 176 fuel rod positions.
7. PWR INTACT FUEL ASSEMBLIES with one or more grid spacers missing or damaged such that the unsupported length of the fuel rods does not exceed 60 inches or with end fitting damage, including damaged or missing hold-down springs, as long as the assembly can be handled safely by normal means.

B. Allowable Contents requiring preferential loading based on shielding, criticality or thermal constraints. The preferential loading requirement for these fuel configurations is as described in Table 12B2-6.

1. PWR INTACT FUEL ASSEMBLIES with up to 176 fuel rods missing from the fuel assembly lattice.
2. PWR INTACT FUEL ASSEMBLIES with a burnup between 45,000 and 50,000 MWD/MTU meeting the requirements of Section A 5.7(1).
3. PWR INTACT FUEL ASSEMBLIES with a burnable poison rod replaced by a hollow Zircaloy rod.

Table 12B2-7 Maine Yankee Site Specific Fuel Limits (continued)

4. INTACT FUEL ASSEMBLIES with a start-up source in a center guide tube. The assembly must be loaded in a basket corner position and must be loaded in a Class 1 CANISTER. Only one (1) start-up source may be loaded in any fuel assembly or any CANISTER.
5. PWR INTACT FUEL ASSEMBLIES with CEA ends (fingertips) and/or ICI segment inserted in corner guide tube positions. The assembly must also have a CEA plug installed. The assembly must be loaded in a basket corner position and must be loaded in a Class 2 CANISTER.
6. INTACT FUEL ASSEMBLIES may be loaded in a MAINE YANKEE FUEL CAN.
7. FUEL enclosed in a MAINE YANKEE FUEL CAN. The MAINE YANKEE FUEL CAN can only be loaded in a Class 1 CANISTER. The contents that must be loaded in the MAINE YANKEE FUEL CAN are:
   a) PWR fuel assemblies with up to two INTACT or DAMAGED FUEL rods inserted in each fuel assembly guide tube or with up to two burnable poison rods inserted in each guide tube. The rods inserted in the guide tubes cannot be from a different fuel assembly. The maximum number of rods in the fuel assembly (fuel rods plus inserted rods, including burnable poison rods) is 176.
   b) A DAMAGED FUEL ASSEMBLY with up to 100% of the fuel rods classified as damaged and/or damaged or missing assembly hardware components. A DAMAGED FUEL ASSEMBLY cannot have an inserted CEA or other non-fuel component.
   c) Individual INTACT or DAMAGED FUEL rods in a rod type structure, which may be a guide tube, to maintain configuration control.
   d) FUEL DEBRIS consisting of fuel rods with exposed fuel pellets or individual intact or partial fuel pellets not contained in fuel rods.

Table 12B2-7 Maine Yankee Site Specific Fuel Limits (continued)

e) CONSOLIDATED FUEL lattice structure with a 17 x 17 array formed by grids and top and bottom end fittings connected by four solid stainless steel rods. Maximum contents are 289 fuel rods having a total lattice weight ≤ 2,100 pounds. A CONSOLIDATED FUEL lattice cannot have an inserted CEA or other non-fuel component. Only one CONSOLIDATED FUEL lattice may be stored in any CANISTER.

f) HIGH BURNUP FUEL assemblies not meeting the criteria of Section A 5.7(1).

C. Unenriched fuel assemblies are not authorized for loading.

D. A canister preferentially loaded in accordance with Table 12B2-8 may only contain fuel assemblies selected from the same loading pattern.

Table 12B2-8 Loading Table for Maine Yankee CE 14 x 14 Fuel with No Non-Fuel Material – Required Cool Time in Years Before Assembly is Acceptable

	Burnup ≤ 30 GWD/MTU - Minimum Cool Time [years] for[1]				
Enrichment	**Standard[2]**	**Pref (0.958i)**	**Pref (0.958p)**	**Pref (1.05i)**	**Pref (1.05p)**
1.9 ≤ E < 2.1	5	5	5	5	5
2.1 ≤ E < 2.3	5	5	5	5	5
2.3 ≤ E < 2.5	5	5	5	5	5
2.5 ≤ E < 2.7	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5	5	5
	30 < Burnup ≤ 35 GWD/MTU - Minimum Cool Time [years] for				
Enrichment	**Standard[2]**	**Pref (0.958i)**	**Pref (0.958p)**	**Pref (1.05i)**	**Pref (1.05p)**
1.9 ≤ E < 2.1	5	5	5	5	5
2.1 ≤ E < 2.3	5	5	5	5	5
2.3 ≤ E < 2.5	5	5	5	5	5
2.5 ≤ E < 2.7	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5	5	5
	35 < Burnup ≤ 40 GWD/MTU - Minimum Cool Time [years] for				
Enrichment	**Standard[2]**	**Pref (0.958i)**	**Pref (0.958p)**	**Pref (1.05i)**	**Pref (1.05p)**
1.9 ≤ E < 2.1	7	7	6	15	5
2.1 ≤ E < 2.3	6	6	6	15	5
2.3 ≤ E < 2.5	6	6	5	14	5
2.5 ≤ E < 2.7	5	5	5	14	5
2.7 ≤ E < 2.9	5	5	5	14	5
2.9 ≤ E < 3.1	5	5	5	6	5
3.1 ≤ E < 3.3	5	5	5	6	5
3.3 ≤ E < 3.5	5	5	5	6	5
3.5 ≤ E < 3.7	5	5	5	6	5
3.7 ≤ E ≤ 4.2	5	5	5	6	5

1. Cool times for preferential loading of fuel assemblies with a decay heat of either 0.958 or 1.05 kW per assembly, loaded in either interior (i) or periphery (p) basket positions. All of the fuel assemblies in a canister must be selected using the same preferential loading pattern (Standard, 0.958 kW or 1.05 kW).
2. Fuel assemblies with cool times from 5 to 7 years must be preferentially loaded based on cool time, with fuel with the shortest cool time in the basket interior, in accordance with Section B2.1.2.