



**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

SEM-09-004

June 18, 2009

U.S. Nuclear Regulatory Commission
Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Pierre Saverot, Project Manager
Licensing Branch

Subject: Request for Amendment of Certificate of Compliance No. 71-9319 for the Model No. MAP-12
and MAP-13 Packages

Dear Mr. Saverot,

Ref. 1: Letter, S.E. Miller (AREVA NP Inc.) to Director, Spent Fuel Project Office (NRC),
"Request for Amendment of Certificate of Compliance No. 71-9319 for the Model
No. MAP-12 and MAP-13 Packages," June 8, 2009, SEM-09-003.

AREVA NP Inc. formally requested an amendment to the Certificate of Compliance No. 71-9319 for the Model No. MAP-12 and MAP-13 packages in Reference 1 to support modifications to the door hinge and latch design, pictorial modifications, and editorial changes. These modifications were requested as a result of an extensive review being performed by AREVA NP and external consultants to determine changes made to fabrication drawings that affected the approved licensing drawings. The evaluation has now been completed and resulted in further identification of changes made that affect the approved licensing drawings and associated Safety Analysis Report. Primarily, these changes involve differences in certain welds and references to the BORAL[®] plate thickness. This formal request of an amendment to the noted Certificate of Compliance is to address these noted differences.

An expedited review of this amendment by the NRC is requested to support future shipments of fresh fuel from the Mount Athos Road Fuel Fabrication Facility in Lynchburg, Va. to Crystal River 3 beginning on July 20, 2009 and shipments to Millstone 2 beginning on August 10, 2009. AREVA appreciates the continued discussions and thorough review given to the Safety Analysis Report.

Included within this submittal are the following documents:

- Three (3) paper copies of the updated information for the Safety Analysis Report (SAR) for the MAP-12/MAP-13 Packages (Attachment A).
- Three (3) paper copies of Drawing Mark-ups and Explanation of Changes (Attachment B).

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- Three (3) paper copies of an Evaluation of Change #4 (Attachment C).

Revised sections and/or page changes that make up Revision 5 to the MAP SAR are provided with revision bars in the right side margin. In addition, a summary description of the nature of changes is provided with a further description of the sections and/or page changes to update the MAP SAR to Revision 5 status.

If you or your staff have any questions, require additional information, or wish to discuss the matter further, please contact me at 434-832-5205. Please reference the unique document identification number in any correspondence concerning this letter.

Sincerely,



S. E. Miller
Manager, Environmental, Health Safety, and Licensing

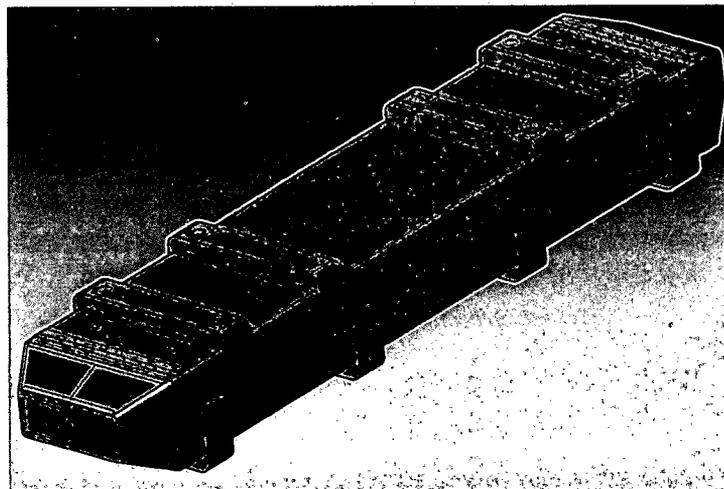
cc: Document Control Desk
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attachment A

Paper Copy
MAP-12/MAP-13 Package
Safety Analysis Report (SAR) Page Changes



AREVA NP Inc.



**Document Identification No.
51-9026593-006**

**Application for Certificate of
Compliance for the
MAP Series of PWR Fuel
Shipping Packages**

**NRC Certificate of Compliance
USA/9319/B(U)F-96
Docket 71-9319**

**Revision 5
June 2009**

Safety Analysis Report
AREVA NP Inc.
MAP PWR Fuel Shipping Package

Certificate of Compliance No: USA/9319/B(U)F-96

Docket No: 71-9319

Record of Revisions

Revision 0 – March 2007
 Revision 1 – October 2007
 Revision 2 – December 2007
 Revision 3 – April 2008, Supplemented October 2008
 Revision 4 – June 2009
 Revision 5 – June 2009

**Nature of Changes
 Revision 5**

Item	Paragraph or Page(s)	Description and Justification
1	Page 1-9, Section 1.2.2	Changed “In additional..” to “In addition..” in first sentence of third paragraph.
2	Section 1.3.1	Licensing drawings 9045401, 9045402, 9045403, 9045404, and 9045405 revised to address welds to assure consistency with as-tested units. Licensing drawing 9045393 revised to add note #25.
3	Page 6-24, Section 6.4.3.1	Omitted reference to BORAL [®] plate thickness. The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.
4	Page 7-4, Section 7.2.2	Changed sequence of steps to address process improvements.
5	Page 8-4, Section 8.1.5.2.1	Omitted reference to BORAL [®] plate thickness. The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.
6	Page 8-5, Section 8.1.5.2.1	Omitted reference to BORAL [®] plate thickness. The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.

**Nature of Changes
 Revision 4**

Item	Paragraph or Page(s)	Description and Justification
1	Cover Page	Updated to reflect current pictorial view of MAP series shipping package.
2	Page 1-5, Figure 1-1	Updated to remove "Lift Lid Only" (2 places) to reflect new lifting device on shipping container. Changed "FORWARD" to "FWD" to allow for larger lettering and viewing improvement.
3	Page 1-6, Figure 1-2 and Figure 1-3	Updated to reflect current door hinge and latch configuration.
4	Page 1-7, Figure 1-4 and Figure 1-5	Updated to reflect improved pictorial views.
5	Page 1-8, Figure 1-6 and Figure 1-7	Updated to reflect improved pictorial views.
6	Section 1.3.1	License Drawings revised to reflect current door hinge and latch configuration and rubber thickness. Updated all to reflect improved pictorial views. Updated all to Pro-E CAD system.
7	Page 2-10, Section 2.5.1	Removed "The lifting features are clearly labeled for use in lifting the Lid only." from first paragraph to reflect new lifting device on shipping container. Changed "In additional.." to "In addition.." in first sentence of second paragraph.
8	Page 6-4, Figure 6-1	Updated to remove "Lift Lid Only" (2 places) to reflect new lifting device on shipping container. Changed "FORWARD" to "FWD" to allow for larger lettering and viewing improvement.
9	Page 6-5, Figure 6-2	Updated to reflect current door hinge and latch configuration.
10	Page 6-11, Figure 6-4	Updated to reflect current door hinge and latch configuration.

**Nature of Changes
 Revision 3**

Item	Paragraph or Page(s)	Description and Justification
1	Section 1.2.1.1	Changed “Insert” to “Shim” in third paragraph for consistency with Section 7.1.2 description. Added detail regarding the purpose of shim use. (RAI 7-1, dated 09/11/08)
2	Section 1.2.1.5	Added “Maximum” to describe the Nominal Fuel Length for both MAP-12 and MAP-13 packages. Consistency with wording in Table 1-3, page 1-13
3	Section 1.3.1	License Drawing 9045393, Sheets 1 and 2, revision 2, revised to add note 22 to sheet 2 identify the use of shims consistent with Sections 1.2.1.1 and 7.1.2. (RAI 7-1, dated 9/11/08)
4	Section 6.3.1	Changed basis from Maximum Guide Tube and Instrument Tube IDs in Table 6-3, Fuel Assembly Parameters for Certificate of Compliance, to Minimum Guide Tube and Instrument Tube wall Thicknesses. Changed corresponding IDs of 0.500 and 0.443 to Wall thickness values of 0.0140 and 0.0240 for Guide and Instrument Tubes, respectively. Consistency with wording on pages 6-17, 6-38 and 6-39 and further consistent with criticality models on pages 6-101 and 6-150
5	Section 6.4	Changed basis from Maximum Guide Tube and Instrument Tube IDs in Table 6-4, Conservative Modeling Parameters for the 15 Type 1a Fuel Assembly Model, to Minimum Guide Tube and Instrument Tube wall Thicknesses. Changed corresponding IDs of 0.500 in (1.27000 cm) and 0.443 in (1.12522 cm) to Wall thickness values of 0.0140 in (0.03556 cm) and 0.0240 in (0.06096 cm) for Guide and Instrument Tubes, respectively. Consistency with wording on pages 6-17, 6-38 and 6-39 and further consistent with criticality models on pages 6-101 and 6-150. Further consistency with revised Table 6-3
6	Section 6.9	Changed basis from Maximum Guide Tube and Instrument Tube IDs in Table 6-30, Design Parameters for the 15 Type 1a Assembly, to Minimum Guide Tube and Instrument Tube wall Thicknesses. Changed corresponding Nominal, Tolerance, and Bounding (Modeled) ID values of ≤ 0.498 , 0.002, and 0.500 to 0.0160, 0.0016, and 0.0144 (0.0140) for the Guide Tube and ≤ 0.441 , 0.002, and 0.443 to 0.044, minimum, and 0.044 (0.0240) for Instrument Tube, respectively. Consistency with wording on pages 6-17, 6-38 and 6-39 and further consistent with criticality models on pages 6-101 and 6-150. Further consistency with revised Table 6-3
7	Section 6.9	Reinstated \leq and \geq symbols in Tables 6-30 and 6-31 and added footnote to state the purpose of symbol use. Symbols are used to denote trends in the multiplication factor. (RAI 6-1, dated 09/11/08)

**Nature of Changes
 Revision 2**

Item	Paragraph or Page(s)	Description and Justification
1	Section 1.1	Add discussion for modeled package array and justification for calculated CSI value of 2.8 (RAI 1-3)
2	Section 1.3.1	Changed description of neutron absorber plates as borated aluminum to metal matrix composite – Boral, on License Drawing 9045393, Sheets 1 and 2 (RAI 6-2)
3	Section 2.12.1.5	Added more detail regarding the inspection, testing, and time interval between the conduct of HAC tests and final rod inspections to demonstrate that rod containment (cladding) was maintained (RAI 4-2).
4	Section 2.12.1.5	Changed last sentence in section to identify that the pellet-clad gap is modeled as flooded to meet the regulatory requirement without exemption as opposed to for added conservatism (RAI 6-4)
5	Section 4.2.3	Changed leakage rate from 3E-08 to 1E-07 ref-cc/sec for consistency with Section 8 (RAI 4-1).
6	Section 6.2.1.4.2	Clarified Nylon 6,6 properties important to the design, the design basis for Nylon 6,6 in the MAP package, and provided reference to Nylon 6,6 properties (RAI 6-3)
7	Section 6.4.5.1.3	Clarified the criticality assessment relative to the dimensional and density studies and that the density has a negligible effect. Clarified the Nylon 6,6 design basis for use in the MAP package and that the modeled design configuration is very conservative with respect to the HAC test. Further clarified that the criticality evaluation considers the most reactive credible configuration consistent with the damaged condition of the package and the chemical and physical form of the contents and meets the requirements of 10 CFR 71.55 (RAI 6-3)
8	Section 8.1.4	Changed leakage rate from 1E-07 atm-cm ³ /sec to 1E-07 ref-cc/sec for consistency with Section 4 (RAI 4-1).
9	Section 8.2	Changed Section headers 8.1.8 through 8.1.14 to 8.2.1 through 8.2.6 to correctly correspond to Section 8.2

**Nature of Changes
 Revision 1**

Item	Paragraph or Page(s)	Description and Justification
1	Section 1.1	Add discussion and footnote for modeled package array and justification for calculated CSI value of 2.8 (RAI 1-3)
2	All	Changed description of neutron absorber plates as borated aluminum to either Boral or borated metal matrix composite (RAI 6-2)
3	All	Deleted reference to shipment of loose rods and use of loose rod container (RAI 1-2). Deleted Sections 1.2.1.4,
4	Sections 1.2.2 and 1.2.2.2	Change reference from ²³⁴ U to ²³⁶ U with regard to Type B material designation (RAI 1-1)
5	Table 1-1	Changed use of Gadolinia to Absorbers
6	Table 1-3	Add entry for typical rod pressures of 145 to 450 psig (RAI 4-5)
7	Section 2.11	Corrected cited references to Sections 2.12.1 and 4.0 (RAI 4-2)
8	Section 2.12.1	Minor format changes for consistency
9	Table 2.12.1-3	Add further details regarding testing of CTU3 in regards to thermal test duration, condition of assembly and moderator after tests (RAI 2-1)
10	Sections 2.12.1.4.1, 2.12.1.4.2, 2.12.1.4.4	Add further details including figures and discussion regarding fuel assembly geometry, fuel cavity geometry and condition of rod cladding after HAC testing (RAI 4-2)
11	Section 2.12.1.4.4	Provide further clarification of thermal test and results with added discussion and figures. Provided summary table and figures for all moderator segments post HAC testing. Changed reporting basis for moderator from volume to mass for consistency between pre test calculated and post test measured results. Clarified 85% credit assumed for Lid moderator (RAI 2-1, 3-4, and 3-7)
12	Section 2.12.1.5	Add further clarification regarding fuel assembly geometry, fuel cavity geometry, condition of rod cladding, and condition of moderator after HAC testing (RAI 2-1, 3-4, 3-7, and 4-2)
13	Section 2.12.1.6.2	Add further clarification regarding fuel rod pressure for simulate payload (RAI 4-5)
14	Section 3	Revised identified pages to incorporate omitted references (RAI 3-1)
15	Sections 3.3, 3.3.1.1, and 3.5.2	Modified sections and added new Figure 3-2 to present enlarged view of transient shown in Figure 3-1 (RAI 3-2)
16	Sections 3.2.1 and 3.5.2	Modified sections to describe how the solar absorptivity values listed in Table 3-6 of the SAR were applied to the thermal model (RAI 3-3)
17	Section 3.4.2	Modified section to clarify the sequence of events related to the fire test of the MAP (RAI 3-4)
18	Section 3.4.2	Modified section to include justification for the heat input ratio between the regulatory and fire test results (RAI 3-5)
19	Section 3.2.2 and 3.4.3	Modified Sections 3.2.2 and 3.4.3 to provide clarification of the basis for the estimated temperatures reached during the fire (RAI 3-6)
20	Section 3.4.3.1	Add more detailed discussion as further provided in Section 2.12.1 (RAI 3-7)
21	Section 3.5.3	Modified Section 3.5.3 (RAI 3-8, 3-10, and 3-11)
22	Section 4.2.3	Leakage rate change to be consistent with Section 8.1.4 (RAI 4-1)
23	Section 4	Revised section discussion to indicate that test results are documented in Section 2.12.1 (RAI 4-2)
24	Section 4.2.1.2	Add discussion of weight of fuel equivalent to an A quantity (RAI 4-4)
25	Section 4 and 2.12.1	Add discussion of initial pressure for fuel rods (RAI 4-5)

Item	Paragraph or Page(s)	Description and Justification
26	Section 6.2.1.3.2.1	Revised description and allowed form of borated-aluminum neutron absorber to Boral or borated metal matrix composite (RAI 6-1 and 6-2)
27	Sections 6.2.1.4.2, 6.4.5.1.3	Add details and reference for Nylon 6,6 moderator including credit for 90% for the moderator block and 100% for theoretical density (RAI 6-3)
28	Sections 6.3.1, 6.4.2.1, and 6.4.5	Revised Table 6-3 and applicable sections to include summary parameters and calculation results for flooded-gap calculations (RAI 6-4 and 6-5)
29	Section 6.7.7	Revised section and Figure 6-29 to explain the keff curves (RAI 6-6)
30	Section 8	Revised page 8-3, upper limit of thermal conductivity acceptance criteria for foam from 0.25 to 0.30 for consistency with General Plastics reported range. The thermal protection offered by the foam is primarily a function of its density, which determines how much energy is required to char the foam. A relatively small change (0.05 BTU-in/hr-ft ² -°F) to the thermal conductivity of un-charred foam would have little to no perceptible change on the package temperatures for NCT or HAC.

**Description of Section/Page Changes
 Revision 5**

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, pages <i>i</i> through <i>viii</i> , Revision 4	Replace with Cover Page, Record of Revisions, pages <i>i</i> through <i>viii</i> , and add pages <i>ix</i> and <i>x</i> , Revision 5.	Identify changes to Sections 1, 6, 7 and 8.
Page 1-9, Section 1.2.2, Revision 1	Replace with Page 1-9, Section 1.2.2, Revision 5.	Changed “In additional..” to “In addition..” in first sentence of third paragraph.
Section 1.3.1, License Drawings 9045393 Revision 3, Sheet 1 of 1, 9045401 Revision 1, 9045402 Revision 1, 9045403 Revision 1, Sheet 1 of 2 and Sheet 2 of 2, 9045404 Revision 1, 9045405 Revision 1	Replace with Section 1.3.1, License Drawings 9045393 Revision 4, 9045401 Revision 2, 9045402 Revision 2, 9045403 Revision 2, Sheet 1 of 2 and Sheet 2 of 2, 9045404 Revision 2 and 9045405 Revision 2.	Licensing drawings 9045401, 9045402, 9045403, 9045404, and 9045405 revised to address welds to assure consistency with as-tested units. Licensing drawing 9045393 revised to add note #25.
Page 6-24, Section 6.4.3.1, Revision 1	Replace with Page 6-24, Section 6.4.3.1, Revision 5.	The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.
Page 7-4, Section 7.2.2, Revision 0	Replace with Page 7-4, Section 7.2.2, Revision 5.	Changed to address process improvements.
Page 8-4, Section 8.1.5.2.1, Revision 0	Replace with Page 8-4, Section 8.1.5.2.1, Revision 5.	The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.
Page 8-5, Section 8.1.5.2.1, Revision 0	Replace with Page 8-5, Section 8.1.5.2.1, Revision 5.	The BORAL [®] plates that are in service have been reviewed and meet the areal density specification of 0.024 g/cm ² . The content of ¹⁰ B in the absorber plates is the critical aspect of the absorber and not the thickness of the sheet.

**Description of Section/Page Changes
 Revision 4**

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, pages <i>i</i> through <i>iv</i> , Revision 2	Replace with Cover Page, Record of Revisions, pages <i>i</i> through <i>iv</i> , and add pages <i>v</i> - <i>viii</i> , Revision 4.	Identify changes to Sections 1, 2 and 6.
Page 1-5, Figure 1-1, Revision 1	Replace with Page 1-5, Figure 1-1, Revision 4.	Updated to remove "Lift Lid Only" (2 places) to reflect new lifting device on shipping container. Changed "FORWARD" to "FWD" to allow for larger lettering and viewing improvement.
Page 1-6, Figures 1-2 and 1-3, Revision 1	Replace with Page 1-6, Figures 1-2 and 1-3, Revision 4.	Updated to reflect current door hinge and latch configuration.
Page 1-7, Figures 1-4 and 1-5, Revision 1	Replace with Page 1-7, Figures 1-4 and 1-5, Revision 4.	Updated to reflect improved pictorial views.
Page 1-8, Figures 1-6 and 1-7, Revision 1	Replace with Page 1-8, Figures 1-6 and 1-7, Revision 4.	Updated to reflect improved pictorial views.
Section 1.3.1, License Drawings 9045393 Revision 2, Sheet 1 of 2 and Sheet 2 of 2, 9045397 Revision 0, 9045399 Revision 0, 9045401 Revision 0, 9045402 Revision 0, 9045403 Revision 0, Sheet 1 of 2 and Sheet 2 of 2, 9045404 Revision 0, 9045405 Revision 0	Replace with Section 1.3.1, License Drawings 9045393 Revision 3, Sheet 1 of 1, 9045397 Revision 1, 9045399 Revision 1, 9045401 Revision 1, 9045402 Revision 1, 9045403 Revision 1, Sheet 1 of 2 and Sheet 2 of 2, 9045404 Revision 1, 9045405 Revision 1.	Update to reflect current door hinge and latch configuration and to reflect improved pictorial views. All licensing drawings were updated to Pro-E CAD system.
Page 2-10, Section 2.5.1, Revision 1	Replace with Page 2-10, Section 2.5.1, Revision 4.	Removed "The lifting features are clearly labeled for use in lifting the Lid only." from first paragraph to reflect new lifting device on shipping container. Changed "In additional.." to "In addition.." in first sentence of second paragraph.
Page 6-4, Figure 6-1, Revision 1	Replace with Page 6-4, Figure 6-1, Revision 4.	Updated to remove "Lift Lid Only" (2 places) to reflect new lifting device on shipping container. Changed "FORWARD" to "FWD" to allow for larger lettering and viewing improvement.
Page 6-5, Figure 6-2, Revision 1	Replace with Page 6-5, Figure 6-2, Revision 4.	Updated to reflect current door hinge and latch configuration.
Page 6-11, Figure 6-4, Revision 1	Replace with Page 6-11, Figure 6-4, Revision 4.	Updated to reflect current door hinge and latch configuration.

**Description of Section/Page Changes
 Revision 3**

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, pages <i>i</i> through <i>iv</i> , revision 2	Replace with Cover Page, Record of Revisions, pages <i>i</i> through <i>iv</i> , and add page <i>v</i> , revision 3	Identify changes to Sections 1 and 6 – note additional change pages in following entry
Record of Revisions, pages <i>i</i> through <i>v</i> , revision 3 – Submittal dated April 2008	Record of Revisions, pages <i>i</i> through <i>v</i> , revision 3 – Supplement dated October 2008	Response to RAI dated 9/11/08
Section 1.3.1, License Drawings 9045393, Sheets 1 and 2, revision 1	Replace with Section 1.3.1, License Drawings 9045393, Sheets 1 and 2, revision 2	Response to RAI dated 9/11/08
Section 1, page 1-4, revision 2	Replace with Section 1, page 1-4, revision 3	Consistency with discussions in Table 1-3 – note additional change pages in following entry
Section 1, pages 1-2 and 1-3, revision 2 and page 1-4 revision 3 – Submittal dated April 2008	Replace with Section 1, pages 1-2 through 1-4, revision 3 – Supplement dated October 2008	Response to RAI dated 9/11/08
Section 6, page 6-15, revision 2	Replace with Section 6, page 6-15, revision 3	Consistency with modeled fuel configuration
Section 6, page 6-17, revision 2	Replace with Section 6, page 6-17, revision 3	Consistency with modeled fuel configuration
Section 6, page 6-89, revision 1	Replace with Section 6, page 6-89, revision 3	Consistency with modeled fuel configuration – note additional change pages in following entry
Section 6, page 6-89, revision 3 – Submittal dated April 2008	Replace with Section 6, page 6-89, revision 3 – Supplement dated October 2008	Response to RAI dated 9/11/08

**Description of Section/Page Changes
 Revision 2**

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, pages <i>i</i> and <i>ii</i> , revision 1	Replace with Cover Page, Record of Revisions, pages <i>i</i> and <i>ii</i> , and add pages <i>iii</i> and <i>iv</i> , revision 2	Response to RAI
Section 1, pages 1- <i>i</i> , and 1-1 through 1-4, revision 1	Replace with Section 1, revision 2 pages 1- <i>i</i> , and 1-1 through 1-4	Response to RAI
Section 1.3.1, License Drawings 9045393, Sheets 1 and 2, revision 0	Replace with Section 1.3.1, License Drawings 9045393, Sheets 1 and 2, revision 1	Response to RAI
Section 2.12.1- <i>ii</i> , 2.12.1-41 through 2.12.1-43, revision 1	Section 2.12.1- <i>ii</i> , 2.12.1-41 through 2.12.1-43, and add 2.12.1.44, revision 2	Response to RAI
Section 4, page 4-3, revision 1	Replace with Section 4, page 4-3, revision 2	Response to RAI
Section 6.2.1.4.2, page 6-9 and 6-10, revision 1	Replace with Section 6.2.1.4.2, pages 6-9 and 6-10, revision 2	Response to RAI
Section 6.4.5.1.3, page 6-28 and 6-29, revision 1	Replace with Section 6.4.5.1.3, pages 6-28 and 6-29, revision 2	Response to RAI
Section 8, page 8-2, revision 0	Replace with Section 8, page 8-2, revision 2	Response to RAI
Section 8, pages 8- <i>i</i> , 8-6 and 8-7, revision 0	Replace with Section 8, pages 8- <i>i</i> , 8-6 and 8-7, revision 2	Subsection numbering error

**Description of Section/Page Changes
 Revision 1**

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, revision 0	Replace with Cover Page, Record of Revisions, revision 1	Response to RAI
Section 1, revision 0	Replace with Section 1, revision 1	Response to RAI
Section 2, pages 2-1, 2-3, 2-25, and 2-54, revision 0	Replace with Section 2, pages 2-1, 2-3, 2-25, and 2-54, revision 1	Response to RAI
Section 2.12.1, revision 0	Replace with Section 2.12.1, revision 1	Response to RAI
Section 3, revision 0	Replace with Section 3, revision 1	Response to RAI
Section 4, revision 0	Replace with Section 4, revision 1	Response to RAI
Section 6, revision 0	Replace with Section 6, revision 1	Response to RAI
Section 8, page 8-3, revision 0	Replace with Section 8, page 8-3, revision 1	Consistency with General Plastics reported range

1.2.2 Contents

Table 1-1 provides a listing of the type, form and mass of material that may be shipped in the MAP. Both Type A and Type B materials are allowed for shipment for materials meeting the isotopic requirements listed in Table 1-2. The fuel assemblies may be of various model and type as long as they meet the specified requirements delineated in Section 6.0. Typical dimensions of the main components in the fuel assemblies are listed in Table 1-3.

The chemical and physical form of the Type A and Type B contents are the same and are described in Section 1.2.2.1 and 1.2.2.2. The primary difference between the Type A and a Type B content is the uranium fuel for the Type B content has elevated concentrations of ^{236}U . An example of structural materials of the fuel assembly is provided in Table 1-4. Zirconium alloy, stainless steel and Ni-Cr-Fe alloy are chemically stable materials, and are stable to temperatures above 1,475°F.

In addition to the fuel assembly configuration described previously, each fuel assembly may be shipped with an absorber or control rod cluster inserted into the assembly. The absorber and control rods consist of a very strong thermal neutron absorber clad in metal tubes and further clustered for insertion within a fuel assembly for either reactor flux conditioning or reactor control. The clusters are very effective in reducing the multiplication factor for the package and array of packages such that criticality is not possible in any configuration. However, for purposes of this application, such strong neutron absorbers are not credited for criticality control.

The decay heat of the contents is essentially zero. Neutron and gamma shielding is not required or provided.

1.2.2.1 Type A Contents

The Type A content of the packaging is fresh unirradiated low enriched uranium Pressurized Water Reactor (PWR) nuclear fuel assemblies. A maximum of two fuel assemblies are placed in each packaging. The packaging is designed and analyzed to ship fuel configured either in a 14x14, 15x15, 16x16 or 17x17 array and positioned in one or both sides on the strong-back.

9045393

8 7 6 5 4 3 2 1

D

D

C

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A

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Figure Withheld Under 10 CFR 2.390

MAP SAR	AREVA NP INC. AN AREVA AND SIEMENS COMPANY		
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Figure Withheld Under 10 CFR 2.390

MAP SAR		AREVA NP INC. AN AREVA AND SIEMENS COMPANY	
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	<small>AREVA NP INC. IS A WHOLLY OWNED SUBSIDIARY OF AREVA SA, A PUBLIC COMPANY LISTED ON THE NYSE UNDER THE TICKER SYMBOL AREVA. AREVA SA IS A MEMBER OF THE AREVA GROUP. AREVA SA IS A MEMBER OF THE AREVA GROUP. AREVA SA IS A MEMBER OF THE AREVA GROUP. AREVA SA IS A MEMBER OF THE AREVA GROUP.</small>		
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Note that boron is not included in Table 6-7. The model credits 75% of the minimum ^{10}B areal density of 0.0240 g/cm^2 , which equates to 0.0180 g/cm^2 , modeled areal density. The lateral borated plate dimensions were modeled at nominal values. Note that the aluminum in the BORAL[®] absorber material as well as the carbon in B_4C are excluded from the model.

Table 6-7 Actual Mass versus Modeled Mass – Packaging

Material	Density	Approx. Modeled Mass		Approx. Actual Mass	Approx. Percent of Actual Mass
SS-304	7.94 g/cc (496 lb/ft ³)	485 kg (1070 lb)		1,635 kg (3605 lb)	30%
Nylon	1.14 g/cc (71.2 lb/ft ³)	<i>Flux Trap – Lid</i>	103 kg (227 lb)	121 kg (267 lb)	85%
		<i>Flux Trap – Base</i>	83.8 kg (185 lb)	92.8 kg (205 lb)	90%
		<i>Flux Trap – Total</i>	187 kg (412 lb)	214 kg (471 lb)	87%
		<i>Spacer Blocks</i>	2.91 kg (6.41 lb)	3.81 kg (8.39 lb)	76%
		<i>Total</i>	190 kg (419 lb)	218 kg (480 lb)	87%

None of the materials in the fuel assembly other than the zirconium (bounds zirconium alloy) cladding and the uranium dioxide pellet stack are included in the model. The uranium dioxide actual mass is less than the model mass because the theoretical density of sintered uranium dioxide is used in the model (10.96 g/cc); however, the actual density is not expected to exceed 98 percent of the theoretical density. Additionally, the fuel rod pellet stack (active length) is modeled much longer than in reality (modeled as 163 inches, whereas actual active lengths do not exceed 150

- Verify that two tamper proof security seals have been properly placed on each package.

7.2 PACKAGE UNLOADING

7.2.1 Receipt of Package from Carrier

- Perform an external inspection of the unopened package and record any significant observations.
- Verify that tamper proof security seals have been properly placed on each package. If seals are missing or damaged, record the damage and follow site procedures for possible security issues.

7.2.2 Removal of Contents

- Remove closure pins.
- Remove package lid.
- Remove top closure and shims.
- Raise shipping package to vertical position using AREVA specific up-ender.
- Open the top door and secure the lifting fixture to fuel assembly.
- Open lower shipping package doors and secure.
- Remove the fuel assembly from the base.
- Secure the doors.
- Lower shipping package.
- Install top closure.
- Check all fasteners for correct configuration.

Rigid Polyurethane Foam or EPA 300.0: Determination of Inorganic Anions by Ion Chromatography.

8.1.5.2 Neutron Absorber Plates

Neutron absorber plates are installed along the inner faces of the lid and beneath the strong-back to meet the requirements specified in Section 6 of this document. The MAP packaging uses BORAL[®], which is a hot-rolled composite aluminum sheet consisting of a core of uniformly distributed boron carbide and aluminum particles which are enclosed within layers of pure aluminum forming a solid barrier against the environment. The BORAL[®] is a standard nuclear grade product with an established pedigree that is certified by the fabricator.

The plates are used to ensure subcriticality during transportation as a neutron absorber and are not relied upon for the conductivity or mechanical properties. The service conditions are not so severe as to promote significant alterations of these plates. Therefore, durability of these neutron absorbing materials is regarded to meet or exceed the service requirements of this application. Sealing the absorber plates in the lid and beneath the strong-back protects them from impact and environmental conditions. There are no significant loads applied to the BORAL[®] plates, therefore no durability problems should arise during normal conditions of transport.

No processing changes are anticipated for the production of BORAL[®] since the well established process will be used to produce the BORAL[®] plates for the production packages.

8.1.5.2.1 ¹⁰Boron Areal Density

The BORAL[®] neutron absorber plate minimum ¹⁰B areal density is 0.024 g/cm². Acceptance testing to ensure that the manufacturing process is operating in a satisfactory manner may be conducted using neutronics transmission or chemical analysis to ensure an effective minimum ¹⁰B areal density of 0.018 gm/cm² (75% credit of ¹⁰B).

Neutron Transmittance is a neutron counting testing technique performed to determine the concentration of an isotope in a material. Testing involves placement of test coupons in a calibrated neutron source beam and measuring the number of neutrons allowed to pass through the test material. Based on the neutron count, the areal density of the coupon can be calculated and

compared to certified standards. Chemical analysis is assay testing performed on a sample taken from test coupons to determine the boron content.

The supplier shall certify that the BORAL[®] neutron absorber plate minimum ¹⁰B areal density is 0.024 g/cm².

8.1.5.2.2 Mechanical Tests

The absorber plates perform a neutronic function in the MAP packages. Thus, no mechanical testing is required.

8.1.5.2.3 Visual Inspection

For all plates, the finished plate shall be free of visual surface cracks, blisters, pores, or foreign inclusions.

Evidence of foreign material shall be cause for rejection (embedded pieces of B₄C matrix are not considered foreign material). Creases or other surface discontinuities are acceptable on the cladding of the BORAL[®] provided the core is not exposed. If necessary, the plate shall be examined with a 5X glass to determine if a surface indication is a crease or a crack.

8.1.5.3 Neutron Moderator Sheeting

This section establishes the requirements and acceptance criteria for inspection and testing of the Nylon-66 (six-six) sheeting utilized within the MAP packaging. Nylon is a high temperature thermoplastic which is used mainly for its high temperature resistance up to 644 °F. It is also desirable due to its stability, hardness, and abrasion resistance.

8.1.5.3.1 Nylon Composition

The supplier shall certify that the Nylon is unfilled with a density ranging from 1.13 to 1.15 g/cm³ with a melting point of 482 to 509 °F.

8.1.6 Shielding Tests

The MAP package does not contain any biological shielding.

Attachment B

Paper Copy
MAP-12/MAP-13 Package
Drawing Mark-ups and Explanation of Changes

MAP-12 NRC LICENSE DRAWING CHANGES

CHANGE #	LIC. DRAWING #	DESCRIPTION OF CHANGE	EXPLANATION
1	9045401	Remove weld symbol.	Unnecessary weld symbol. This weld is not on test units.
2	9045402	Remove all (3) weld symbols.	Unnecessary weld called out. Originally the purpose of this weld was to facilitate assembly. The stiffener is welded to the "w" section at the slotted welds and center bar, and is welded to the inner cover plate which is also welded to the "w" section. Once the stiffener is captured between the "w" section and the inner cover plate, this weld does not affect the performance of the package during 10 CFR 71 regulatory testing or normal operation.
3	9045402	Remove this weld symbol.	Redundant to the 3/8" weld called out in the same view. This weld is not on test units.
4	9045402	Remove this "all around" callout and add leaders. Add weld size callout. Remove weld symbols from "REAR VIEW"	Elimination of the welds in the restraint bar interface which were not on the test units. Specifying weld size maintains attachment strength greater than bolt strength. See evaluation in Attachment C. Elimination of weld callouts in "REAR VIEW" are consolidated in "DETAIL CJ"
5	9045402	Change weld size callout to "1/8" from 1/4 groove depth	Change is consistent with as-tested units.
6	9045402	Change weld size callout to 3/16". Remove the "grind" callout.	Change is to be consistent with as-tested units. Grind was for clearance only, and does not affect weld strength.
7	9045402	Remove the "flush" callout for this weld symbol.	Flush callout was found to not be necessary for fit-up.
8	9045402	Add bevel callout opposite of arrow	Change is consistent with as-tested units.
9	9045403	Add flag note #25	The controlling strength is the base metal of the tab on the stiffener.
10	9045403	Change weld size callout to 3/16"	Change is consistent with as-tested units.
11	9045403	Change weld size callout to 3/8"	Change is consistent with as-tested units.
12	9045403	Change weld symbol to "staggered" weld callout.	Clarification of the weld callout. Change is consistent with as-tested units.
13	9045403	Remove "all around" callout & add leaders	Change is consistent with as-tested units.
14	9045404	Change weld symbol from "bevel" to "fillet"	Change is consistent with as-tested units.
15	9045405	Move "grind" callout to proper place and add "flush" callout.	Clarification of the weld callout.
16	9045405	Remove "all around" callout & add "BOTH SIDES"	Change is consistent with as-tested units.
17	9045393	Add note #25 "Alternate welds of equivalent strength to double bevel weld may be used"	The controlling strength is the base metal of the tab on the stiffener. See change #9 above.
18	9045403	Add weld symbol to "DETAIL CT"	Addition of this weld symbol is consistent with as-tested units. Addition of the weld symbol clarifies "DETAIL CT"

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DO NOT SCALE USE DIMENSIONS ONLY	SCALE D 02	SHEET NO. 9045405	SHEET 1 OF 1

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Attachment C

Paper Copy
MAP-12/MAP-13 Package
Evaluation of Change #4

Evaluation for Change #4

Evaluation of welds holding the axial restraint blocks:

The bolt is a 1/2-13 ASTM 574 zinc plated bolt. Per ASTM A-574 the minimum proof load for the bolt is 25500 pounds.

Load: $P = 25.5 \text{ kip}$

Weld Length: $L_W = 16.45 \text{ in.}$

Load per inch: $P_{\text{weld}} = \frac{P}{L_W} = 1.55 \frac{\text{kip}}{\text{in.}}$

Material yield strength: $\sigma_y = 30 \text{ ksi}$

Allowable shear stress: $\tau_{\text{wall}} = .4 \sigma_y = 12 \text{ ksi}$

Size of fillet weld leg: $W_L = \frac{P_{\text{weld}}}{\tau_{\text{wall}} \cdot 0.707} = 0.18 \text{ in. } \mathbf{3/16 \text{ fillet weld required}}$