71-9319

AREVA

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RDM-08-002
April 11, 2008

ATTN: Jessica Glenny, Project Scientist
Division of Spent Fuel Storage and Transportation,
Office of Nuclear Material Safety and Safeguards,
Washington, DC 20555-0001

Subject: **Amendment Request for Model No. MAP-12 and MAP-13 Packages, Docket No. 71-9319.**

Reference: **NRC Certificate of Compliance for Model No. MAP-12 and MAP-13 Packages, USA/9319/B(U)F-96, Revision 0.**

Ms. Glenny:

AREVA NP Inc. hereby submits the attached amendment request to Revision 0 of the Certificate of Compliance for Model № MAP-12 and MAP-13 Packages, USA/9319/B(U)F-96. The amendment request has two objectives:

- Clarify the maximum nominal fuel lengths for the MAP-12 and MAP-13 shipping packages [Condition 5.(a)(2)]. The SAR refers to the allowed fuel lengths for each package as a maximum nominal length. However, "maximum" was inadvertently omitted from the fuel length descriptions in Section 1.2.1.5 which was further used as the basis for the noted condition.

- Change the Guide Tube and Instrument Tube basis for the 15 x 15 Type 1a fuel design from their respective maximum inner diameters to corresponding minimum wall thicknesses. The proposed change is consistent with the criticality model currently provided in Section 6. Table 6-3 in Section 6.3.1 has been modified for consistency which will also require corresponding changes to Table 1 under Condition 5.(b)(1).

Included with this submittal are the following documents:

- Three (3) paper copies of updated information for the Safety Analysis Report (SAR) for the MAP-12/MAP-13 Packages (Attachment A),

- Three (3) electronic copies are provided in PDF format of the updated SAR (Attachment B).

The electronic copies are contained on CDs in three separate envelopes labeled, "MAP-12/MAP-13 Docket 71-9319, Revision 3".

One copy of each (paper copy and CD) is also being sent to the NRC Document Control Desk.

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An AREVA and Siemens company

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NMSS01

Revised sections and/or page changes that make up revision 3 to the MAP SAR in support of the amendment request are provided with revision bars in the right page margin. In addition, a summary description of the nature of page changes is provided with a further description of the sections and/or page changes to update revision 2 of the MAP SAR to revision 3.

AREVA NP Inc. has a potential need date of September 31, 2008.

If you or your staff have any questions, require additional information, or wish to discuss the matter further, please contact me at 434-832-5172. Please reference the unique document identification number in any correspondence concerning this letter.

Sincerely,

Richard D. Montgomery

Richard D. Montgomery, Advisory Engineer
Nuclear Criticality Safety & Shipping Containers

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)

AREVA NP INC.
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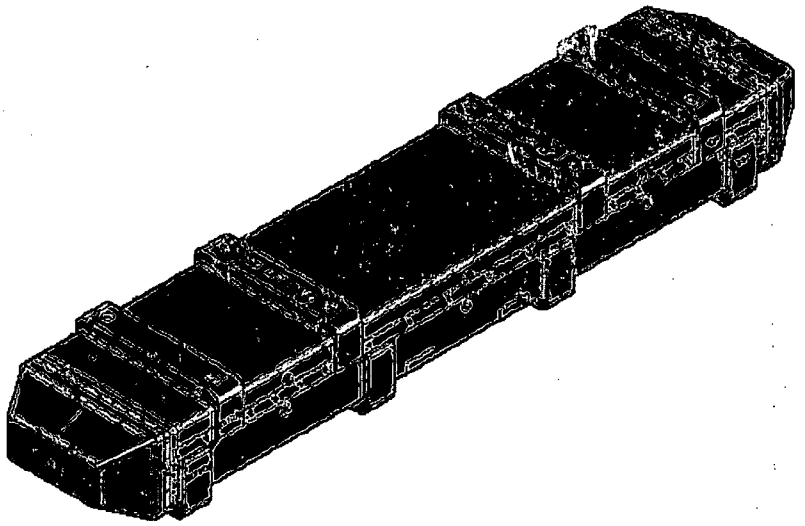
AREVA

AREVA NP Inc.,



Document Identification No.
51-9026593-004

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 3
April 2008

AREVA NP Inc.,

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
51-9026593-004

Revision 3, April 2008

AREVA NP Inc.,

Document Identification No.
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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 3
April 2008

Record of Revisions

Revision 0 – March 2007
Revision 1 – October 2007
Revision 2 – December 2007
Revision 3 – April 2008

Nature of Changes
Revision 3

Item	Paragraph or Page(s)	Description and Justification
1	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
2	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
3	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
3	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 $\leq$ 0.498, 0.002, and 0.500 to 0.0160, 0.0016, and 0.0144 (0.0140) for the Guide Tube and $\leq$ 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
4	Section 6.9	Removed $\leq$ and $\geq$ symbols in Tables 6-30 and 6-31. Purpose of symbol use not stated

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)

Item	Paragraph or Page(s)	Description and Justification
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)

Item	Paragraph or Page(s)	Description and Justification
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)
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 3

Section or Page Removed	Section or Page Inserted	Basis for Change
Cover Page, Record of Revisions, pages *i* through *iv*, revision 2	Replace with Cover Page, Record of Revisions, pages *i* through *iv*, and add page *v*, revision 3	Identify changes to Sections 1 and 6
Section 1, page 1-4, revision 2	Replace with Section 1, page 1-4, revision 3	Consistency with discussions in Table 1-3
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

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* and *ii*, revision 1	Replace with Cover Page, Record of Revisions, pages *i* and *ii*, and add pages *iii* and *iv*, revision 2	Response to RAI
Section 1, pages 1-*i*, and 1-1 through 1-4, revision 1	Replace with Section 1, revision 2 pages 1-*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-*ii*, 2.12.1-41 through 2.12.1-43, revision 1	Section 2.12.1-*ii*, 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*, 8-6 and 8-7, revision 0	Replace with Section 8, pages 8-*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 2.12.1, 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

thermal barrier between the exterior shell and the strong-back. The neutron absorber consists of a borated metal matrix composite in the form of a thin plate. Blocks of Nylon 6,6 are used as a neutron moderator. This thermoplastic is self-extinguishing and has a relatively high melting point. The neutron moderator and absorber are significant components used for criticality safety. Further discussion is presented in Section 6, Criticality Evaluation, and Section 8, Acceptance Tests and Maintenance Program.

1.2.1.4 Containment System

The Containment System for the MAP is the fuel rod cladding. Requirements for containment are described in Section 4.

1.2.1.5 Package Weights and Dimensions

MAP-12 (144-in Maximum Nominal Fuel Length)

• Maximum Gross Weight	8,630 pounds (3,923 kg)
• Maximum Payload Weight	3,400 pounds (1,545 kg)
• Overall Outer Dimensions	208" x 45" x 31" high (5,283 mm x 1,143 mm x 787 mm)

MAP-13 (150-in Maximum Nominal Fuel Length)

• Maximum Gross Weight	8,630 pounds (3,923 kg)
• Maximum Payload Weight	3,400 pounds (1,545 kg)
• Overall Outer Dimensions	221" x 45" x 31" high (5,613 mm x 1,143 mm x 787 mm)

Minimum Guide Tube Wall Thickness (inches)	**N/A**	**N/A**	**0.0140**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Minimum Guide Tube OD (inches)	**N/A**	**N/A**	**0.528**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Number of Guide Tubes per Assembly	**N/A**	**N/A**	**16**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Minimum Instrument Tube Wall Thickness (inches)	**N/A**	**N/A**	**0.0240**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Minimum Instrument Tube OD (inches)	**N/A**	**N/A**	**0.491**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Number of Instrument Tubes per Assembly	**N/A**	**N/A**	**1**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Max ^{235}U Loading (kg)	**25.44**	**24.14**	**27.14**	**28.43**	**28.97**	**28.11**	**27.51**	**25.28**	**27.77**	**27.43**
Clad/Tube Material Type	**Zr Alloy**	**Zr Alloy**	**Zr Alloy**			**Zr Alloy**	**Zr Alloy**	**Zr Alloy**	**Zr Alloy**	**Zr Alloy**
Maximum Active Length (inches)	**160**	**160**	**160**			**160**	**160**	**160**	**160**	**160**

6.4 MODELING CONSIDERATIONS

The models developed for these calculations are conservative representations of the package that include all of the physical features that are important to criticality safety. This section describes the packaging with contents models.

presented in Section 2.12.1 as further discussed in Section 6.4.5.4. However, in the HAC array size calculations of Section 6.7.7.2, the fuel-clad gap was assumed flooded, and therefore the CSI is conservatively based on the assumption of flooded fuel-clad gap.

As mentioned in Section 6.7.1, the single container sensitivity studies include minimum GT/IT tube thicknesses in the water holes. However, for the licensing evaluations, the tubes are not modeled, with the exception of the HAC array size licensing evaluations for the most reactive assembly (Section 6.7.7.2), which is due to the fact that the fuel-clad gap was assumed flooded for these evaluations. In addition, these evaluations minimized the pellet diameter since this approach maximizes reactivity when the fuel-clad gap is flooded. Therefore, the pertinent GT/IT parameters as well as the minimum pellet diameter are included here.

Table 6-4 summarizes the most conservative parameters for the 15 Type 1a fuel assembly model used in the evaluation. As in all models for the evaluation, the fuel is modeled at an enrichment of 5.0 wt% ^{235}U and pellet (UO_2) density at 100% Theoretical Density (TD), or 10.96 g/cc.

Table 6-4 Conservative modeling parameters for the 15 Type 1a fuel assembly model

Parameter	Conservative Value (Maximum Tolerances Included)
Maximum Pellet Diameter	0.3622 in (0.91999 cm)
Minimum Pellet Diameter	0.3608 in (0.91643 cm)
Fuel Rod Pitch	0.568 in (1.44272 cm)
Minimum Fuel Rod Clad Outer Diameter	0.414 in (1.05156 cm)
Maximum Fuel Rod Clad Inner Diameter	0.370 in (0.93980 cm)
Minimum Guide Tube Outer Diameter	0.528 in (1.34112 cm)
Minimum Guide Tube Wall Thickness	0.0140 in (0.3556 cm)
Minimum Instrument Tube Outer Diameter	0.491 in (1.24714 cm)
Minimum Instrument Tube Wall Thickness	0.0240 in (0.06096 cm)
Fuel Rod Clad Material	Zr (bounds any zirconium alloy)
Fuel Rod Active Length	163 inches (414.02 cm)

Table 6-30 Design parameters for the 15 Type 1a assembly

Dimension	Lengths in inches		
	Nominal	Tolerance	Bounding (Modeled)
Pellet OD	0.3615	0.0007	0.3622
Minimum Pellet OD	N/A	N/A	0.3608
Clad ID	0.368	0.002	0.37
Clad OD	0.416	0.002	0.414
Guide Tube Wall Thickness	0.0160	0.0016	0.0144 (0.0140)
Guide Tube OD	0.530	0.002	0.528
Instrument Tube Wall Thickness	0.044	Minimum	0.044 (0.0240)
Instrument Tube OD	0.493	0.002	0.491
Pitch	0.568	-	0.568
Active Fuel Length	144	-	163

Table 6-31 Design parameters for the 15 Type 1b assembly

Dimension	Lengths in inches		
	Nominal	Tolerance	Bounding (Modeled)
Pellet OD	0.3700	0.0007	0.3707
Minimum Pellet OD	N/A	N/A	0.3693
Clad ID	0.377	0.002	0.379
Clad OD	0.430	0.002	0.428
Pitch	0.568	-	0.568
Active Fuel Length	144	-	163

Attachment B

CD Electronic Copy
MAP-12/MAP-13 Package
Safety Analysis Report (SAR)

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