71-6206

FRAMATOME ANP

An AREVA and Siemens Company

FRAMATOME ANP, Inc.

Mr. John D. Monninger
Chief, Licensing Section
Spent Fuel Project Office – NMSS
U.S. Nuclear Regulatory Commission
One White Flint North
1155 Rockville Pike
Rockville, MD 20852-2738

July 25, 2003

Subject: **Request for Amendment to the Certificate of Compliance No. 71-6206 for the Model B Shipping Package**

Dear Mr. Monninger,

Framatome ANP requests an amendment to the Certificate of Compliance (C of C) for the above referenced shipping package. Section 5. (b)(1) of the current certificate allows the use of Zr-4 as the fuel rod tube material. Framatome ANP requests the nomenclature for the tube material be amended to allow the material to be categorized as zirconium alloy.

Framatome ANP routinely uses a trademark material (M5) for its fuel cladding that deviates slightly from the ASTM recognized Zr-4 material. Although the base zirconium level is consistent with that of standard Zr-4 and Zr-2 at greater than 98 wt%, differences reside within the makeup of the alloy agent(s) and the impurity regime.

Previous nuclear criticality safety analyses in support of this certificate were conservatively performed using pure zirconium cladding. Since the alloy materials that are present within Zr-2, Zr-4 , and (M5) are larger in cross section than the base zirconium metal, these alloys are slightly more conservative.

The effect of the alloy agents, or impurities is difficult to quantify accurately using statistical Monte Carlo code packages such as SCALE 4.4a due to their very small contribution to the overall system reactivity. However, in support of this amendment request, additional calculations were performed to demonstrate the relativity of each material type, i.e., Zr, Zr-2, Zr-4, and M5. The uncollapsed 238 group cross section set was used along with a significant increase in the number of neutron histories tracked in order to improve the statistical confidence.

Table 1 outlines the reactivity results for the various material types for two of the assembly designs typically shipped in the Model B package. The Mark B-11 assembly type outlined in Table 1 is representative of the most reactive case from the base application. The results of the analysis demonstrate that the difference in material properties in the zirconium alloys examined provide statistically equivalent results with a small reduction in reactivity associated with the materials added to pure zirconium. Based on the results presented, the changes do not reduce the safety of the package.

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In order to support upcoming shipments for the Crystal River reactor, Framatome ANP requests approval of the changes as soon as possible. If you have any questions concerning this submittal, please call me at (434) 832-5268.

Sincerely,

Robert S. Freeman
Site/Operations Manager

EHS&L-03-048

Table 1
Reactivity Results For The Various Material Types
(~10,000,000 Histories Tracked)

Case ID	K-effective	Sigma	Description
Mark BW 17x17 assembly design			
modacc.out:	0.92390	0.00027	Pure Zirconium
modaccm5l.out:	0.92340	0.00026	Minimum M5 alloy wt%
modaccm5a.out:	0.92339	0.00027	Average M5 alloy wt%
modaccm5m.out:	0.92311	0.00026	Maximum M5 alloy wt%
modacczr2.out:	0.92306	0.00026	Standard Zr-2
modacczr4.out:	0.92320	0.00027	Standard Zr-4
Mark B-11 15x15 assembly Design			
modaccb11.out:	0.93515	0.00026	Pure Zirconium
modaccb11m5l.out:	0.93448	0.00025	Minimum M5 alloy wt%
modaccb11m5a.out:	0.93543	0.00026	Average M5 alloy wt%
modaccb11m5m.out:	0.93506	0.00026	Maximum M5 alloy wt%
modaccb11zr2.out:	0.93425	0.00032	Standard Zr-2
modaccb11zr4.out:	0.93473	0.00026	Standard Zr-4

Conclusions:

1) The use of pure zirconium in the original approved calculations is slightly conservative relative to including the M5 alloying agent(s).
2) The use of pure zirconium in the original approved calculations is slightly conservative relative to using Zr-2 or Zr-4 material.
3) Reactivity differences related to the variations in cladding are not statistically significantly relative to other assumptions used in the base analyses, such as maximum pellet diameter, % theoretical density, and fuel rod pitch.