



Global Nuclear Fuel

A Joint Venture of GE, Toshiba, & Hitachi

Global Nuclear Fuel

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~~Proprietary Information Notice~~

~~Attachments 2 and 3 to this letter contain GNF-A Company proprietary information which is to be withheld from public disclosure in accordance with 10 CFR 2.390 and RIS 2005-31. Upon removal of Attachments 2 and 3, the balance of this letter may be made public.~~

M170183
SPM 17-031

July 28, 2017

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

Attention: Document Control Desk

Subject: GNF-A Request for Letter Authorization to Use the RAJ-II Package for GNF FeCrAl Lead Test Assemblies

- References:
- 1) NEDE-33869P Revision 9, Global Nuclear Fuel - Americas, LLC, September 2016.
 - 2) Letter from B. R. Moore (GNF) to Director, Division of Spent Fuel Management (US NRC), Subject: GNF Responses to the NRC Request for Supplemental Information on the RAJ-II Transportation Package, November 28, 2016, MFN 16-088.
 - 3) Letter from B. R. Moore (GNF) to Director, Division of Spent Fuel Management (US NRC), Subject: GNF Responses to the NRC Requests for Additional Information for Review of the Model No. RAJ-II, April 7, 2017, M170059.
 - 4) Model RAJ-II – Certification Number 9309 Revision 10, Docket Number 71-9309, Package Identification USA/9309/B(U)F-96, August 8, 2014
 - 5) Model RAJ-II - Certification Number 9309 Revision 11, Docket Number 71-9309, Package Identification USA/9309/B(U)F-96. (To Be Issued)
 - 6) NRC/GNF-A Model No. RAJ-II Letter Authorization Pre-Application Meeting, June 21, 2017.

Dear Sir or Madam:

As discussed with NRC Spent Fuel Management staff on June 21, 2017 (Reference 6), Global Nuclear Fuel - Americas LLC (GNF-A) hereby submits a request for a letter authorization (LA) to use the RAJ-II package for shipment of accident tolerant fuel (ATF) GNF FeCrAl fuel rods installed in a standard GNF2 BWR 10x10 fuel assembly. GNF-A has partnered with a BWR utility to deliver approximately four lead test assemblies (LTAs) containing lead test rods (LTRs) with GNF FeCrAl cladding and end plugs. This LA is being requested because the timeframe for the delivery of these LTAs is not supported by the time required to revise the Certificate of Compliance (CoC) to add the GNF FeCrAl fuel rods as authorized content in the RAJ-II package.

GNF-A is requesting an expedited review for this request to support the early installation of the ATF GNF FeCrAl LTRs such that in-reactor experience can be gained for future qualification of the GNF FeCrAl cladding material. The accumulation of this experience is important for the industry's efforts to establish an advanced cladding that offers improved safety.

The first LTA shipment is scheduled for December 5, 2017. Allowing for time to prepare the necessary shipping documentation and with consideration of the Thanksgiving holiday disruption, GNF-A requests NRC review and approval of the attached submittal by November 17, 2017. GNF-A may also establish

agreements with other utilities to install GNF FeCrAl LTRs. It is estimated that an additional shipment may occur once during fall 2018 and then in the spring and fall 2019. Each shipment shall contain a maximum of 4 LTAs. To support these additional shipments, it is requested that the LA be valid through the end of 2019.

SUMMARY

GNF-A is requesting a LA to use CoC No. 9309, Revision 10 (Reference 4) for the Model RAJ-II transportation package for the shipment of ATF GNF FeCrAl LTRs installed in a standard GNF2 10x10 fuel assembly. GNF-A has partnered with a utility to deliver approximately four GNF2 fuel assemblies containing lead test rods (LTR) using GNF FeCrAl cladding. Based on the current business need, this LA only focuses on the GNF2 fuel design. The GNF2 design is GNF's production BWR fuel assembly and part of the currently approved GNF 10x10 contents included in the CoC, but not specifically named. The GNF2 fuel design consists of a 10x10 arrangement of fuel rods with water rods and part length rods that use a zirconium alloy cladding material.

The Model RAJ-II package is currently authorized to transport unirradiated fuel rods and fuel assemblies and shall not be modified for this request. The GNF FeCrAl fuel design, while similar to the currently approved GNF BWR 10x10 fuel assembly content, has up to 8 full length fuel rods which do not meet certain fuel parameters in RAJ-II CoC Revision 10 (Reference 4) and has reduced radionuclide maximum concentrations consistent with Type A(F) radioactive material within those fuel rods. All other requirements of Revision 10 (Reference 4) of the CoC remain applicable. Attachment 2 to this letter provides supplemental evaluations that demonstrate that the GNF2 assembly containing LTRs with GNF FeCrAl cladding and end plugs does not affect the ability of the package to meet the requirements of 10 CFR 71 and can be approved.

Attachment 3 to this letter provides a test report with the available data demonstrating that a GNF FeCrAl alloy variant is capable of meeting the requirements necessary to ensure compliance with the evaluations. Each GNF FeCrAl alloy variant to be installed in a LTA configuration and loaded in the RAJ-II package shall have supporting evaluations based on data to show compliance with the requirements in Attachment 2.

EVALUATION

The GNF2 BWR 10x10 fuel assembly design containing LTRs with GNF FeCrAl fuel rods and end plugs is described in Attachment 2 to this letter. The parameters of the GNF2 design with LTRs using GNF FeCrAl fuel rods that are not within RAJ-II CoC Revision 10 (Reference 4) Table 3 Fuel Assembly Parameters are highlighted in Table 1-1 of Attachment 2 to this letter.

Attachment 2 of this letter provides the LA request and technical basis for NRC staff review based on Revision 9 of the Model RAJ-II Radioactive Material Transport Package Safety Analysis Report (Reference 1) as supplemented by References 2 and 3. The Attachment 2 information has been formatted consistent with NRC Regulatory Guide 7.9 "Standard Format and Content of Part 71 Packages for Radioactive Material" to aid NRC staff review and approval. Sections that are not affected by the addition of GNF FeCrAl LTRs are so noted in Attachment 2.

GNF-A has performed specific structural, thermal, and criticality evaluations to support the LA. A structural evaluation of the RAJ-II package containing the GNF2 fuel assembly with GNF FeCrAl LTRs demonstrates that all the structural requirements of 10 CFR 71.71 and 10 CFR 71.73 are met and is bounded by the package testing performed for the currently authorized GNF 10x10 contents. An assessment of the GNF FeCrAl fuel rod thermal response during Hypothetical Accident Conditions (HAC) demonstrates that the GNF fuel rods with FeCrAl cladding do not rupture. Criticality safety evaluations demonstrate that the RAJ-II package design has sufficient reactivity margin under HAC to safely transport the GNF2 10x10 fuel assembly containing GNF FeCrAl LTRs. These evaluations are provided in

Attachment 2, Chapter 2.0 (Structural Evaluation), Chapter 3.0 (Thermal Evaluation), and Chapter 6.0 (Criticality Evaluation).

Except for certain fuel parameters and radionuclide maximum concentrations shown in Revision 10 of the RAJ-II CoC, all other requirements of CoC No. 9309 (Reference 4) remain applicable. Additionally, the requirements of CoC Revision 11 (Reference 5) which is currently under review for approval will be applicable upon issuance.

CONDITIONS

For the shipments of GNF2 10x10 LTAs containing GNF FeCrAl LTRs, the following conditions will apply and have been incorporated into the GNF-A specific evaluations:

1. The criticality safety index (CSI) is conservatively increased for combined shipments of GNF2 and GNF FeCrAl LTAs.
2. The GNF FeCrAl LTRs shall be restricted to containing commercial grade uranium and meet Type A radioactive material contents, while adjacent zirconium alloy fuel rods shall contain radioactive material consistent with the radionuclide maximum concentrations of Reference 4.
3. The fuel assemblies shall be shipped unchanneled.
4. There shall be a maximum of two RAJ-II packages on a single truck, each containing a maximum of two LTAs.
5. RAJ-II packages with GNF FeCrAl LTAs shall comingle only with other RAJ-II packages transporting GNF2 fuel currently approved per Reference 4.
6. A test data report shall be produced for each GNF FeCrAl alloy variant to be included in LTRs. The test data report shall demonstrate that the material meets the requirements necessary to ensure compliance with the Attachment 2 evaluations, as defined in Section 2.2.

CONCLUSION

Based on the statements and representations contained in this letter authorization request and the conditions listed above, GNF-A concludes that the GNF2 fuel assembly design containing GNF FeCrAl LTRs has been adequately described and evaluated, meets the requirements of 10 CFR Part 71, and can be safely transported in the Model RAJ-II package. Attachment 3 is provided to demonstrate an example of how GNF-A shall document compliance with Condition 6 of this request. Subsequent testing shall be documented in a similar fashion and is available upon NRC request.

Please contact me if there are questions regarding this request.

Sincerely,

Scott P. Murray, Manager
Facility Licensing

Document Components:

001 M170183 Cover Letter.pdf
002 M170183 Attachment 1 Affidavit.pdf
003 M170183 Attachment 2 Proprietary.pdf
004 M170183 Attachment 3 Proprietary.pdf

Commitments: As described above (1-6)

Attachments:

1. Affidavit
2. GNF FeCrAl Lead Test Assemblies, RAJ-II Letter Authorization Request and Technical Basis – GNF Proprietary Information - Class II (Internal)
3. RAJ-II Letter Authorization Supplemental Report: GNF FeCrAl Material Property Testing Results, 004N3910, July 2017, – GNF Proprietary Information - Class II (Internal)

cc: N Garcia Santos – USNRC SFM
PLM Specification 004N1937 R0