



Global Nuclear Fuel

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US Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

Subject: 10 CFR 71.95 – 60 Day Report – RAJ-II Certificate Condition Not Followed

Reference: 1) NRC Certificate of Compliance (CoC) USA/9309/B(U)F-96, Rev 12 - Docket 71-9309

Dear Sir or Madam:

Global Nuclear Fuel – Americas, L.L.C. (GNF-A) in Wilmington, NC hereby submits a report pursuant to 10 CFR 71.95(a)(3) for a discovery involving use of the RAJ-II package in which a condition of approval in USNRC Certificate of Compliance (CoC) (Reference 1) was not observed. Specifically, GNF-A owned RAJ-II packages were potentially shipped with a condition that failed to meet the requirements for a packaging component (container bolt torque) as required in the package safety analysis report.

An evaluation has determined that this event was of very low safety significance and there was no release of material while using the RAJ-II packages with this condition. All other requirements of the CoC were met. An internal condition report was opened to track and remedy the cause of the event.

I am the individual knowledgeable about this event and can provide additional information as needed. If there are any questions regarding this report, please contact me at (910) 819-5950.

Sincerely,


Scott P. Murray, Manager
Facility Licensing

Attachment

Cc: NRC Region II Administrator, Atlanta, GA
T. D. Naquin, NRC NMSS Washington, DC
T. Grice, NRC RII Atlanta, GA
SPM 19-014

Attachment

Abstract

GNF-A has determined it potentially shipped RAJ-II packages containing unirradiated fuel assemblies to customer reactor sites without the required bolt torques for possibly as long as 12 months. There were no incidents or accident conditions during the use of the affected packages and no components or systems of the package failed.

Details

The RAJ-II package is a rectangular box used to transport a maximum of two unirradiated boiling water reactor (BWR) finished fuel assemblies. It is comprised of one inner container and one outer container, both made of stainless steel. The inner container is composed of a double wall stainless steel structure with an alumina silicate thermal insulator filling the gap between the two walls. The inner has a removable end cap to allow loading of the fuel assembly that is reinstalled and secured with four bolts prior to shipment. Internal procedures require these bolts to be securely tightened to a torque of 15 ft-lbs.

On April 29, 2019 it was determined that a bolt torque limiter used during the package loading process had a mechanical failure and provided a torque of only 8.8 ft-lbs. An engineering analysis concluded that the condition was not within the existing licensing basis and as a result failed to meet the requirements for a packaging component as prescribed in the NRC Certificate of Compliance (CoC).

The out-of-tolerance (OOT) torque limiter was discovered during a routine calibration cycle. This specific torque limiter is used for final torquing of bolts for the RAJ-II inner container end cap. An extent-of-condition review of other torque limiters found two (2) other OOT limiters used in bundle packing for torquing the inner container hold down clamp bolts and one for torquing the outer container lid bolts.

An internal condition report (CR 31338) was opened to track and remedy the cause of the event.

Assessment of Safety Consequences

The risk presented by having significantly under-torqued bolts used on the inner container end cap, inner container hold down clamp, and/or outer container lid is that the package may not perform as evaluated/tested during a Hypothetical Accident Condition (HAC) drop event. The bolts for each component could potentially not be properly engaged or come loose during transport. This could potentially result in an unanalyzed condition inconsistent with the RAJ-II licensing basis.

The bolts that were torqued using the OOT limiters are defined to be torqued to "as-torqued" values for the purpose of the analysis. In order to determine the effect of not meeting the required torque values, the following test was conducted.

1. The bolts were torqued to the “as-torqued” value. This test was performed for all four (4) inner container end lid bolts, two (2) of the inner container hold-down clamp lid bolts, and four (4) of the outer container lid bolts.
2. The bolts were then torqued to the “requirement” value. The additional amount of wrench turning to obtain this value was observed and documented. It was observed that in all cases for all bolts, the extra amount of wrench turns to torque the bolts from “as-torqued” to “requirement” values was essentially zero. It was concluded that there is essentially no difference between torquing the bolts to the actual torqued (as-torqued) values compared to the packing procedure required torque values. From an engineering perspective, it was inferred that the as-torqued values were sufficient to meet the intended function of the mechanical interface.

The test results showed that the under-torqued bolts essentially achieved the same level of thread engagement as if they were torqued to the procedural required values. As the application of the bolts do not require a preload for its intended function, the applied torque is to ensure that the bolts remain secured. The bolt thread engagement was the same in both situations (under-torqued and fully-torqued). The under-torqued bolts would have performed the same as bolts torqued to the required values during an HAC drop event. The as-torqued values are sufficient to meet the intended function of the mechanical interface.

A 10 CFR 21 reportability review also determined if there was a concern that a condition with a component may have the potential to create a substantial safety hazard or Technical Specification violation. Since the as-torqued values were sufficient to meet the intended function of the mechanical interface, no substantial safety hazard or Technical Specification violation exists as a result of the condition. As a result, no 10 CFR 21 evaluation was required.

Additional torque limiters were available and used during the loading process and these provided the required torque. An investigation determined that some RA-J II packages shipped between April 2018 and April 2019 had the potential to have under torqued bolts depending on which torque limiter was used. The inner container end cap, the inner container hold down clamp bolts, and the outer container lid bolts only become a functioning component of the package protective system in the event of an accident and there were no incidents or accident conditions during the use of the affected packages.

The safety significance of this event is also considered very low due to the type and form of the package contents (finished fuel assemblies containing solid uranium oxide fuel pellets). The fuel rod cladding and ceramic nature of the fuel pellets provide primary containment of the radioactive material.

All other requirements of the CoC were met including the other inner and outer packaging construction requirements. No components or systems of the package failed, and the integrity of the package was not compromised. In addition, there was no exposure of individuals to radiation or to radioactive materials as a result of this event.

Immediate and Short-Term Actions

- 1) An immediate action was to remove all similar torque limiters used in the package loading process and verify if they are within tolerance. Two (2) other limiters used in bundle packing were OOT: a limiter for torquing the inner container hold down clamp bolts, and a limiter for torquing the outer container lid bolts. All torque limiters were returned to service with verified calibrations.

Complete: April 30, 2019

- 2) RAJ-II packages prepared for shipment prior to April 30, 2019 and still onsite were released for shipment by the responsible quality function based on the analysis that concluded the as-torqued values were sufficient to meet the intended function of the mechanical interface.

Complete: May 28, 2019

Longer Term Actions

- 1) Additional actions are being evaluated as a part of the corrective action program.

Similar Events

None