

USED FUEL STORAGE AND TRANSPORTATION ISSUE SCREENING FORM

Issue Number: I-10-01

Title: PWR Fuel Top Nozzle Stress Corrosion Cracking

I. a. Problem Statement (Provide a clear, concise description of the issue.)

Certain Westinghouse PWR fuel assemblies are susceptible to stress corrosion cracking (SCC) of the top nozzle guide tube sleeves. A 2008 letter from the NRC to a single licensee, which states that the NRC wishes to review and approve analyses associated with modifications to these assemblies for transportation, has created confusion within the industry. It is industry's position that a physical modification to these assemblies does not automatically necessitate a license/CoC amendment prior to storage or transportation.

1. In order to resolve the confusion, industry wishes to present information to NRC to establish a consensus on whether license/CoC amendments are required for the four variants of fuel assemblies listed below.
2. It is not clear what the specific technical aspects are that must be addressed in the supporting analyses and evaluations, and what form the potential analyses/evaluations should take.

b. Background Information (Summarize industry events, licensing actions, inspection information, correspondence, and other documents germane to the issue. Attach documents as appropriate)

Certain Westinghouse PWR fuel assemblies are susceptible to stress corrosion cracking (SCC) of the top nozzle guide tube sleeves. This SCC can result in the top nozzle separating from the fuel assembly when lifted or possibly when subjected to other loads. It is industry's responsibility to classify these fuel assemblies when selected for dry cask storage and transportation as intact, undamaged, failed, or damaged, in order to comply with the applicable definitions in, and requirements of the Part 72 specific license and/or the 10 CFR 71 and 72 Certificates of Compliance (CoCs). It is also industry's responsibility to determine if a license or CoC amendment is necessary to store and/or transport these fuel assemblies. A significant number of SCC-susceptible fuel assemblies have been loaded into casks for ISFSI storage to date. As a general matter, licensees have not submitted documentation (including analyses) associated with classification of these assemblies to the NRC for review and approval unless a license or CoC amendment was requested. The documentation used for fuel assembly classification is subject to NRC inspection.

NRC inspectors at Catawba plant in 2007 informed Duke Energy that fuel assemblies potentially affected by the SCC phenomenon and selected for loading into the Part 71/72 dual purpose canisters as "intact" fuel assemblies may not be qualified for transportation as intact fuel assemblies (Reference 1). Duke chose not to load the SCC-susceptible fuel assemblies for storage at Catawba based on this feedback from the NRC inspectors. However, Duke informed the inspectors that SCC-susceptible fuel assemblies (without physical modifications to address the SCC issue) had been previously loaded into the same design dual-purpose canisters at the McGuire plant as intact fuel using essentially the same fuel selection and classification process as that used at Catawba.

In a subsequent letter to Duke (Reference 2) regarding McGuire plant's loading of SCC-susceptible fuel assemblies into dual-purpose canisters as intact fuel, the NRC states, *"If the assembly is placed in a transportation system using a permanent modification of the assembly or a lifting system that does not permanently remain with the assembly, the utility must evaluate the ability of the assembly to meet all normal and accident transportation regulations under 10 CFR 71. Until such analysis is reviewed and approved by the NRC, the loaded system is not qualified for transport since an unanswered safety issue, i.e., potential for criticality due to an undefined configuration not in a damaged fuel can exists."*

There are currently four variants of SCC-susceptible fuel assemblies, based on physical configuration and handling techniques:

1. SCC-susceptible fuel assemblies without any physical modifications loaded using a standard grapple after visual inspections of guide tubes were performed.
2. SCC-susceptible fuel assemblies without any physical modifications loaded using a handling tool (e.g., the "thimble grip" handling tool) that does not utilize the top nozzle for lifting, thus removing the lifting load from the SCC-susceptible guide tube joints.

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3. SCC-susceptible fuel assemblies modified with permanently installed anchors in the guide tubes. These assemblies are loaded using a standard grapple. The anchors ensure there is no lifting load transmitted through the SCC-susceptible guide tube joints.
4. SCC-susceptible fuel assemblies with a permanently installed instrument tube tie rod (ITTR). These assemblies are loaded using a standard grapple. The ITTR ensures there is no lifting load transmitted through the SCC-susceptible guide tube joints.

References:

1. NRC Inspection Report 07200045/20007001 dated September 11, 2007 (Accession No. ML072540589)
2. NRC letter from B.J. Davis to B. Hamilton Duke, Dated August 8, 2008 (Accession No. ML081690351)
3. NRC Information Notice 2002-09, "Potential for Top Nozzle Separation and Dropping of a Certain Type of Westinghouse Fuel Assembly."
4. NRC Information Notice 99-29, "Authorized Contents of Spent Fuel Casks."

II. Screening Criteria (Provide an explanation as to how the issue meets each of the screening criteria to be considered for generic issue resolution.)

- 1. Does the proposed issue involve spent fuel storage or transportation and affect multiple 10 CFR 71 and/or 10 CFR 72 regulated entities (provide basis)?**
Yes. There are well over 10,000 fuel assemblies in wet storage at numerous plant sites that are susceptible to SCC and need to be moved to dry storage under 10 CFR 72 and ultimately transported under 10 CFR 71.
- 2. Does the proposed issue warrant generic resolution (provide basis)?**
Yes. Part 71 and 72 licensees and CoC holders wish to address this fuel with a consistent acceptable regulatory approach.
- 3. Does the issue warrant engagement between the industry and NRC (provide basis)?**
Yes. Different licensees and CoC holders have used different approaches for dealing with this fuel and the NRC staff's and inspectors' positions are not well documented.
- 4. Will generic resolution of the issue produce tangible benefits (provide basis)?**
Yes. A consistent, stable, and predictable licensee, CoC holder, and NRC approach to addressing this issue will allow this fuel to be placed into dry storage and ultimately transported without compliance or safety issues arising during or after fuel loading. The ability to load this older-vintage fuel into dry storage provides ALARA benefits by reducing dose for loading campaigns.
- 5. Is the issue already adequately covered by another process (provide basis)?**
No. This issue has unique characteristics that are not addressed in any existing NRC staff review guidance, inspection procedure, regulatory guide, or generic communication.

POC: Are all screening criteria satisfied ("Yes" responses to questions 1-4 and "No" to question 5)?

Yes No

III. Success Criteria (Describe the criteria to be used to define success for resolving this issue.)

1. Industry and NRC decide if storage and transportation license/CoC amendments are required for the four variants of SCC-susceptible fuel assemblies listed above under 10 CFR 71 and 72.
2. Industry and NRC agree on the technical aspects that must be addressed in the supporting analyses and evaluations, and what form the potential analyses/evaluations should take.

Date: 8/26/10