

## **FUEL ASSEMBLIES SUSCEPTIBLE TO TOP NOZZLE STRESS CORROSION CRACKING**

### **I. 10 CFR 72 Storage Systems**

#### **Ia. Fuel Assemblies with No Physical Modifications – Standard Grapple**

This category of fuel assemblies includes unmodified, SCC-susceptible fuel assemblies that are loaded into a storage system using a standard grapple, after visual inspections of the bulge joints are performed. Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for storage under the licensee's process for classifying fuel in accordance with the definitions in the applicable Part 72 specific license or storage system Certificate of Compliance (CoC). These fuel assemblies will not be canned.

These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 72 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection. All license/CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

No Part 72 license or CoC amendment is required for storage of these fuel assemblies at an ISFSI provided the licensee demonstrates and documents that all storage system functional criteria and regulatory requirements are met.

#### **Ib. Fuel Assemblies with No Physical Modifications – Handling Tool**

This category of fuel assemblies includes unmodified, SCC-susceptible fuel assemblies that are loaded into the storage system using a "thimble grip" handling tool, or similar device that does not utilize the fuel assembly top nozzle for lifting. The handling tool lifts the assembly by gripping the inside surfaces of the guide tubes below the bulge joint area, thus allowing the lifting load to bypass the potentially degraded bulge joint area. Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for storage under the licensee's process for classifying fuel in accordance with the definitions in the applicable Part 72 specific license or storage system CoC. These fuel assemblies will not be canned.

These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 72 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection. All license/CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

The difference between Category 'Ia' fuel and Category 'Ib' fuel is that the licensee chooses to use a handling tool designed to not subject the potentially degraded guide tube bulge joints to loads during fuel movement.

No Part 72 license or CoC amendment is required for storage of these fuel assemblies at an ISFSI provided the licensee demonstrates and documents that all storage system functional criteria and regulatory requirements are met.

### **Ic. Fuel Assemblies Modified with Guide Tube Anchors**

This category of fuel assemblies includes SCC-susceptible fuel assemblies permanently modified with anchors in the guide tubes or functionally similar devices with a different name. These assemblies will be loaded using a standard grapple. The guide tube anchors transfer the lifting loads from the top nozzle (engaged with the grapple) to the fuel assembly structure below the bulge joints, which removes load from the potentially degraded bulge joint area. The anchors will remain permanently in the fuel assembly guide tubes.

Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for storage with the anchors in place, under the licensee's process for classifying fuel in accordance with the definitions in the applicable Part 72 specific license or storage system CoC. These fuel assemblies will not be canned. These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 72 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection.

The licensing basis calculations and the ISFSI or storage system FSAR will be evaluated for impact due to the presence of fuel assemblies containing guide tube anchors and revised as required. If information in the FSAR requires revision, a review under 10 CFR 72.48 will be performed to determine whether prior NRC review and approval of the FSAR change is required.

The guide tube anchors will not be considered "contents" in the context of the license/CoC because the specific structural hardware in the fuel assembly is not discussed in the contents section of the Part 72 license or CoC. Further, fuel assemblies containing guide tube anchors will not be used in the reactor after the anchors are installed. Thus, the guide tube anchors will not have experienced reactor operating conditions and related neutron activation. Guide tube anchors also do not interact with the fuel or fuel cladding. For these reasons, the guide tube anchors have no significant effect on the storage cask dose rate, decay heat load, confinement, structural stability, or criticality safety and do not rise to the level of non-fuel hardware required to be licensed as cask contents like other inserts typically licensed as contents (e.g., Burnable Poison Rod Assemblies (BPRAs), Rod Cluster Control Assemblies (RCCAs), and Thimble Plug Devices (TPDs)). All license/CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

No Part 72 license or CoC amendment will be required to store these fuel assemblies at an ISFSI provided the licensee demonstrates and documents that all storage system functional criteria and regulatory requirements are met, unless a 10 CFR 72.48 evaluation of an FSAR change to add discussion of the guide tube anchors results in a determination that an amendment is required.

## **Id. Fuel Assemblies Modified with Instrument Tube Tie Rods**

This category of fuel assemblies includes SCC-susceptible fuel assemblies permanently modified with an instrument tube tie rod (ITTR) or functionally similar device with a different name. The ITTR is inserted through the center instrument tube at the top of the fuel assembly and traverses the full length of the assembly, “tying” the top of the assembly to the bottom of the assembly for structural support. These assemblies will be loaded using a standard grapple. The lifting load is transferred from the top nozzle (engaged with the grapple) to the fuel assembly bottom nozzle through the ITTR rather than through the guide tubes, which removes lifting load from the potentially degraded bulge joint area. The ITTR remains permanently in the fuel assembly center instrument tube.

Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for storage with the ITTR in place, under the licensee’s process for classifying fuel in accordance with the definitions in the applicable Part 72 specific license or storage system CoC. These fuel assemblies will not be canned. These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 72 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection.

The licensing basis calculations and the ISFSI or storage system FSAR will be evaluated for impact due to the presence of fuel assemblies containing ITTRs and revised as required. If information in the FSAR is affected, a review under 10 CFR 72.48 will be performed to determine whether prior NRC review and approval of the FSAR change is required.

The ITTRs will not be considered “contents” in the context of the license/CoC because the specific structural hardware in the fuel assembly top nozzle is not discussed in the contents section of the Part 72 license or CoC. Further, fuel assemblies containing ITTRs will not be used in the reactor after the ITTRs are installed. Thus, the ITTRs will not have experienced reactor operating conditions and related neutron activation. The ITTRs do not affect the fuel or fuel cladding and displace only a small amount of borated water in the instrument tube during cask loading and unloading that can be easily evaluated for their effect on system reactivity. For these reasons, the ITTRs have no significant effect on the storage cask dose rate, decay heat load, confinement, structural stability, or criticality safety and do not rise to the level of non-fuel hardware required to be licensed as cask contents like other inserts typically licensed as contents (e.g., BPRAs, RCCAs, and TPDs). All license/CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

No Part 72 license or CoC amendment will be required to store these fuel assemblies at an ISFSI provided the licensee demonstrates and documents that all storage system functional criteria and regulatory requirements are met, unless a 10 CFR 72.48 evaluation of an FSAR change to add discussion of the ITTRs results in a determination that an amendment is required.

## **II. 10 CFR 71 Transportation Packages**

### **IIa. Fuel Assemblies with No Physical Modifications – Standard Grapple**

This category of fuel assemblies includes unmodified, SCC-susceptible fuel assemblies that are loaded into a transportation package using a standard grapple after visual inspections of the bulge joints are performed. Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for transportation under the licensee's process for classifying fuel in accordance with the definitions in the applicable transportation package CoC. These fuel assemblies will not be canned.

These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 71 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection. All CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

No Part 71 CoC amendment is required to transport these fuel assemblies provided the licensee demonstrates and documents that all transportation package functional criteria and regulatory requirements are met.

### **IIb. Fuel Assemblies with No Physical Modifications – Handling Tool**

This category of fuel assemblies includes unmodified, SCC-susceptible fuel assemblies that are loaded into the transportation package using a "thimble grip" handling tool or similar device that does not utilize the fuel assembly top nozzle for lifting. The handling tool lifts the assembly by gripping the inside surfaces of the guide tubes below the bulge joint area, thus allowing the lifting load to bypass the potentially degraded bulge joint area. Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for transportation under the licensee's process for classifying fuel in accordance with the definitions in the applicable transportation package CoC. These fuel assemblies will not be canned.

These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 71 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection. All CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

The difference between Category 'IIa' fuel and Category 'IIb' fuel is that the licensee chooses to use a handling tool designed to not subject the potentially degraded guide tube bulge joints to loads during fuel movement.

No Part 71 CoC amendment is required to transport these fuel assemblies provided the licensee demonstrates and documents that all transportation package functional criteria and regulatory requirements are met.

## **Iic. Fuel Assemblies Modified with Guide Tube Anchors**

This category of fuel assemblies includes SCC-susceptible fuel assemblies permanently modified with anchors in the guide tubes or functionally similar devices with a different name. These assemblies are loaded using a standard grapple. The guide tube anchors transfer the lifting loads from the top nozzle (engaged with the grapple) to the fuel assembly structure below the bulge joints, which removes load from the potentially degraded bulge joint area. The anchors will remain permanently in the fuel assembly guide tubes.

Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for transportation with the anchors in place under the licensee's process for classifying fuel in accordance with the definitions in the applicable transportation package CoC. These fuel assemblies will not be canned. These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 71 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection.

The licensing basis calculations and the transportation package SAR will be evaluated to determine if changes are required due to the presence of fuel assemblies containing the guide tube anchors. If information in the transportation SAR requires revision, a transport CoC amendment will be required because the Part 71 CoC refers to a specific revision of the SAR and there is no regulatory process for a licensee or CoC holder to modify the transportation SAR of record without prior NRC approval (similar to 10 CFR 72.48 for storage).

The guide tube anchors are not considered "contents" in the context of the CoC because specific structural hardware in the fuel assembly is not discussed in the contents section of the Part 71 CoC. Further, fuel assemblies containing guide tube anchors will not be used in the reactor after the anchors are installed. Thus, the guide tube anchors will not have experienced reactor operating conditions and related neutron activation. Guide tube anchors also do not interact with the fuel or fuel cladding. For these reasons, the guide tube anchors have no significant effect on the transportation package dose rate, decay heat load, containment, structural stability, or criticality safety and do not rise to the level of non-fuel hardware required to be licensed as package contents like other inserts typically licensed as contents (e.g., BPRAs, RCCAs, and TPDs). All CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

A Part 71 CoC amendment will be required to transport SCC-susceptible fuel assemblies modified with guide tube anchors only if the CoC holder decides that the transportation SAR requires revision to add discussion of the anchors.

## **IId. Fuel Assemblies Modified with Instrument Tube Tie Rods**

This category of fuel assemblies includes SCC-susceptible fuel assemblies permanently modified with an instrument tube tie rod (ITTR) or functionally similar device with a different name. The ITTR is inserted through the center instrument tube at the top of the fuel assembly and traverses the full length of the assembly, “tying” the top of the assembly to the bottom of the assembly for structural support. These assemblies are loaded using a standard grapple. The lifting load is transferred from the top nozzle (engaged with the grapple) to the fuel assembly bottom nozzle through the ITTR rather than through the guide tubes themselves, which removes load from the potentially degraded bulge joint area. The ITTR remains permanently in the fuel assembly center instrument tube.

Barring other physical issues that may affect classification, this type of fuel assembly will be classified as intact (or undamaged) fuel for transportation with the ITTR in place, under the licensee’s process for classifying fuel in accordance with the definitions in the applicable transportation package CoC. These fuel assemblies will not be canned. These fuel assemblies will be verified by analysis or evaluation to meet their 10 CFR 71 fuel-specific and system-related requirements. This analysis or evaluation will be documented and retained as a quality record, available for NRC inspection.

The licensing basis calculations and the transportation package SAR will be evaluated to determine if changes are required due to the presence of fuel assemblies containing the ITTRs and revised as required. If information in the transportation SAR requires revision, a transport CoC amendment will be required because the Part 71 CoC refers to a specific revision of the SAR and there is no regulatory process for a licensee or CoC holder to modify the transportation SAR of record without prior NRC approval (similar to 10 CFR 72.48 for storage).

The ITTRs will not be considered “contents” in the context of the CoC because the specific structural hardware in the fuel assembly is not discussed in the contents section of the Part 71 CoC. Further, fuel assemblies containing ITTRs will not be used in the reactor after the ITTRs are installed. Thus, the ITTRs will not have experienced reactor operating conditions and related neutron activation. Also, the ITTRs do not interact with the fuel or fuel cladding and displace only a small amount of borated water in the instrument tube during cask loading and unloading that can be easily evaluated for their effect on system reactivity. For these reasons, the ITTRs have no significant effect on the transportation package dose rate, decay heat load, containment, structural stability, or criticality safety and do not rise to the level of non-fuel hardware required to be licensed as package contents like other inserts typically licensed as contents (e.g., BPRAs, RCCAs, and TPDs). All CoC requirements for fuel assembly and non-fuel hardware contents (i.e., type of fuel or hardware, dimensions, burnup, cooling time, enrichment, etc.) will be met.

A Part 71 CoC amendment will be required to transport SCC-susceptible fuel assemblies modified with ITTRs only if the CoC holder decides that the transportation SAR requires revision to add discussion of the ITTRs.