



**INMM Spent Fuel Seminar, January 23-25, 2018
Dual Purpose Canisters and Shipment Preparation**

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Topics

- For an NRC approved transportation package, what are the content requirements for the transport of a loaded canister and where are they located?
- For a canister that was previously loaded and used in dry storage, what are some of the “non-shipment” activities that have to take place before transport?
- Besides the obvious, which is safety and compliance, why should anyone really care?

Content Requirements

- License drawings
 - The transportation package shall be constructed and assembled in accordance with these drawings
 - Current certification process lists these license drawings and their current revision level
- Type and form of materials
 - Detailed content descriptions of the irradiated and non-irradiated material for the package
 - Descriptions include references to tables detailing the fissile material burnup limits, enrichments, and associated minimum cool times before shipment

Content Requirements (cont'd)

- Maximum quantity of material per package
 - Detailed list of the maximum quantity, including total number of and maximum weights, for those materials described by their type and form
 - Direct references to the type and form of materials are made for each maximum quantity of material described

Content Requirements (cont'd)

- So where is all this information located?
 - Per 10 CFR Part 71, the NRC issues a Certificate of Compliance (CoC) for each approved package
 - The approved license drawings and revision levels are provided in the front of the CoC
 - Typically, this is located in CoC Section 5.(a)(3)
 - With regards to the package contents, these drawings detail the canisters, baskets, and any other equipment with a safety function within the loaded canister (e.g., spacers, etc.)

Content Requirements (cont'd)

- So where is all this information located? (cont'd)
 - Type and form of materials is typically found in CoC Section 5.(b)(1)
 - This section will detail the authorized undamaged and damaged fissile material
 - Some packages are also authorized for shipment of non-fissile material (i.e., greater than Class C waste, medical isotopes, etc.)
 - This section will refer to tables, and sometimes figures or equations, detailing the minimum cool time for the material relative to burnup and enrichments
 - It will also refer to specific characteristics of the important to safety materials (i.e., enrichments, dimensions, alloy type, etc.)

Content Requirements (cont'd)

- So where is all this information located? (cont'd)
 - The maximum quantity of material per package is typically found in CoC Section 5.(b)(2)
 - It will refer back to the specific type and form of material sections (i.e., Section 5.(b)(1)) in order to describe the maximum quantity of material
 - This section will give maximum weights and decay heat loads (i.e., maximum weight for a full payload shipment and maximum heat load per fuel basket location or per container, etc.)

Non-Shipment Activities

- So what is the point of outlining these details?
 - Before a shipment can take place, each one of these items must be verified
 - The canister to be shipped must be verified to be in compliance with the license drawings in the CoC
 - These drawings may be at higher revision levels than when the canister was constructed and put into dry cask storage (i.e., shared license drawings b/w Part 72 and Part 71)
 - Canisters may have been modified via 10 CFR 72.48 changes that are not reflected in the CoC license drawings
 - The vendor will issue a final documentation package as part of canister delivery to a customer for use in dry storage that outlines the fabrication drawings the canister was built to and list all nonconformances that may have been resolved via 72.48 changes
 - In other words, someone will have to go through the final documentation package for each canister as part of verification which can be over a thousand pages long each

Non-Shipment Activities (cont'd)

- So what is the point of outlining these details? (cont'd)
 - The type and form of material and maximum material quantities must be verified to be in compliance with the CoC
 - Just because something is in dry cask storage does not mean it automatically meets the requirements for transport
 - Heat loads and cool times are different
 - Definitions and requirements for damaged and undamaged fuel, including associated configurations, are typically different (i.e., high burnup fuel)
 - The site will have detailed records for each canister loaded into dry cask storage showing the loading patterns, heat loads, burnups, fuel characterization, etc.
 - Some CoCs have additional specific conditions that must be validated prior to transport (i.e., special fuel inspection methods)
 - In other words, someone will have to go through each one of these records for each canister to verify they meet the requirements for shipment

Why Care?

- Priority No. 1 is safety and compliance
 - The details in the CoC are the minimum set of requirements for public health and safety and must be met
 - Prior to shipment, someone must verify these requirements
 - This verification is not a trivial exercise
 - There are hundreds of canisters in storage and documents to be reviewed can be a thousand or more pages long (i.e., time consuming activity)
 - There are legacy issues where knowledge of the procurement and loading documentation may be lacking (i.e., time consuming verification process)
 - Documentation may be in legacy formats not accessible in an efficient manner (i.e., microfiche)
 - Revisions to the NRC CoC may be required due to acceptability differences between Part 72 and Part 71 (i.e., additional time delays)

Conclusion

- Don't put the cart before the horse
- There is a significant amount of up front work required to verify the as-built and as-used in dry storage canister meets the current CoC requirements for the transportation cask
- There is the potential for a significant amount of regulatory review and approval time should a revision of the transportation cask CoC be required to authorize shipment of a canister used in dry storage
- Why care?... time, money, and most importantly is safety and regulatory compliance

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