



nordion
SCIENCE ADVANCING HEALTH

November 16, 2017

Mr. Richard Boyle
Director of Hazardous Materials Technology
PHMSA/Radioactive Materials Branch
U. S. Department of Transport
East Building, 2nd Floor, PHH-23, E21-208
1200 New Jersey Avenue S.E.
Washington, D.C. 20590-0001

Subject: Responses to NRC questions on F-522 transport package.

Dear Mr. Boyle,

I am following up on Michael Conroy's email request from October 24, 2017, where he listed off further questions from the NRC. This is in support of Nordion's request for a transport certificate endorsement for the F-522 package. I have included the NRC question along with our response. Please note that during a conference call between Nordion, DOT and NRC on October 25, 2017, NRC withdrew their last two questions (Q6 and Q7). As such, responses to those questions are not provided within.

I am also appending an affidavit requesting that this information be withheld from the public domain.

If you have any questions or require further information please feel free to contact me by telephone at (613) 592-3400, ext. 2658 or by email at greg.fulford@nordion.com

Sincerely,

Greg Fulford
Nuclear Transportation Specialist
Nordion

Q1 Nordion to provide a summary (paragraph) of the measurements and tolerances of the DU shielding and Stainless Steel cladding around the UK201.

R1. Minimum and maximum tolerance information is provided in the table below for the main material shielding thicknesses of the F-522/UK-201/F248X transport package. The dimensions are for the thickness of individual materials in the radial direction as it provides the least shielding compared to the top and bottom directions as shown in Appendix 4 of the IS/TR 2650 F522 Engineering Assessment.

The following dimensions are ordered from the center of the package to the outer surface.

Component	Dimension	Minimum (mm)	Maximum (mm)	Material
F248X Leakproof Insert	Wall Thickness	█	█	Stainless Steel
UK-201 Shielding Vessel	Inner Sleeve Thickness	█	█	Stainless Steel
	Shielding Thickness	█	█	Depleted Uranium
	Outer Shell Thickness	█	█	Stainless Steel
F-522 Overpack	Inner Shell	█	█	Stainless Steel
	Foam	█	█	Polyurethane Foam
	Outer Shell	█	█	Stainless Steel

Q2. NRC to follow up on Microshield 10.0 capability.

R2. Nordion confirms that the settings in Microshield 10.0 were left in their default state for the flux to dose rate conversion factors.

Q3. Nordion to provide additional information on how we determine I-132 equivalency

R3. As previously discussed, the process for Mo-99 production is currently being developed. As we continue to refine the process further studies will be performed to characterize the impurities within the shipments. The most notable impurities when considering shielding will likely include █ in varying activity levels. Prior to the initial shipments, Nordion will evaluate the content characterization to ensure it is consistent with the approved contents on the transport certificate.

Note: Nordion has previous experience with a similar process as we developed an historic process for Mo-99 production from HEU material that required similar characterization prior to shipment approval.

In terms of A₂ equivalencies, we fully expect the Mo-99 contribution will be by far the largest contribution (█). For labeling and shipping purposes, the dominant isotope will be Mo-99.

To ensure that impurities within the transport package are below the proposed I-132 1850 GBq equivalent dose, a method involving dose measurements will be performed on the container before shipment. See the following process steps:

[REDACTED]

Q4. Nordion to provide a summary of actual data from target irradiations to provide information on Rb target variability.

R4. Please see the table below for activity data for recent shipments of Sr-82/Rb-82 targets as shipped. This data is representative of [REDACTED] targets shipped between November, 2016 and April, 2017.

Please note that the values in the table below do not represent actual shipments but instead show the range of individual isotopes found within separate shipments.

[REDACTED]