

National Aeronautics and  
Space Administration

**John H. Glenn Research Center**  
**Lewis Field**  
Cleveland, OH 44135-3191



May 1, 2012

Reply to Attn of: QS

U.S. Nuclear Regulatory Commission  
Region III  
2443 Warrenville Road, Suite 210  
Lisle, IL 60532-4352

Subject: Inventory Update for License #34-00507-16, Docket #030-05626

This letter addresses inventory updates, specifically, the removal of Americium-241 and addition of Nickel-63; and the potential generation of Hydrogen-3.

The NASA Glenn Research Center (GRC) is requesting to have the following item removed from its listing of allowable byproduct materials as denoted in Amendment 47 (December 8, 2011) of its materials license:

6.G. Americium-241, Foil Sources, five sources not to exceed 1 millicurie each for a total of 5 millicuries.

The GRC had requested to add this item to its license in its February 12, 2004, amendment request. As indicated in this 2004 letter, the eventual procurement of these sources was not a certainty and would depend upon the performance on the smaller Am-241 foils sources identified in that amendment request. Ultimately, the Center did not procure the 1 millicurie foils.

In addition, the GRC is requesting the following sources be added to its inventory:

Nickel-63 (Ni-63): Ni-63 electrodeposited onto a substrate, typically nickel. Activity per individual source can vary, but, the nominal activity density on any source will not exceed 10 millicuries per square centimeter ( $\text{mCi}/\text{cm}^2$ ). The total activity possessed will not exceed 2.5 Curies (Ci).

Potential sources for the Ni-63 include:

1. NRD, Inc. (Grant Island, NY): individual 10mm x 30 mm sources of Ni-63 plated on natural Ni substrate; individual sources are 5, 10, or 15 mCi each.
2. Eckert & Ziegler (Valencia, CA): individual sources of plated natural nickel with various dimensions whose nominal activity densities do not exceed  $10 \text{ mCi}/\text{cm}^2$ .

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3. National Isotope Development Center (ORNL): Various substrate configurations to be plated with Ni-63 with a maximum nominal activity density of 10 mCi/cm<sup>2</sup>.

The materials will be used for a research and development project. The Ni-63 material will be placed into a vessel where it will experience elevated temperatures and pressures and be exposed to various atmospheres, which would include hydrogen and/or deuterium components along with inert gases. None of the atmospheric components are anticipated to cause corrosion or degradation of the plated radioactive material. The Ni-63 material will be handled by individuals trained as radiation workers. When working with the Ni-63 sources, these workers will wear standard disposable laboratory glove (e.g. nitrile, latex, etc.), which are more than adequate to stop this radionuclide's low-energy beta particle emissions. Material not made inaccessible by assembly into a test vessel will be properly secured in a labeled and locked location.

Last, the GRC will be undertaking some research which has the potential of generating low quantities of tritium gas during a batch-type reaction involving hydrogen and/or deuterium gas along with inert gases. Conservatively, the maximum amount of the Hydrogen-3 (H-3) gas that could be produced in a batch is thought to be on the order of 50 microcuries, and most likely orders of magnitude below this estimate, if at all. We estimate that up to 100 batches could be run per calendar year. This particular research activity will be undertaken in a laboratory fume hood housed within a research test cell. Following the experimental run, any remnant gas in the test vessel will either be drawn into an evacuated bottle, or, slowly released into the laboratory fume hood and into the environment through a vertical stack outside the building. Bottles with collected gas will be sent off for analysis and will not be returned. A worst-case exposure scenario for a worker in a test cell whose two ventilation systems have failed and where a batch's worth of H-3 is released provides an air concentration which is less than 2 percent of the Derived Air Concentration provided in Appendix B to 10CFR20.

Based upon a Nuclear Regulatory Commission Region I response to the NASA Langley Research Center dated March 26, 2012, regarding a similar research activity, it is GRC's understanding that the Commission would not consider the small amounts of tritium gas that may be generated to be "byproduct material." Consequently, the Commission would not require that our license be amended to include the Hydrogen-3.

Should you have questions or require additional information, you may contact Mr. Christopher J. Blasio, Radiation Safety Officer at (216) 433-6520.



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