



## **International Isotopes Inc.**

December 20, 2010

Dr. Matthew Bartlett  
U.S. Nuclear Regulatory Commission  
Mail Stop E2C40M  
6003 Executive Blvd.  
Rockville, MD 20852

**Subject: Receipt of Depleted Uranium Tetrafluoride (DUF4) Exhibiting Trace Impurities of Transuranic Isotopes.**

Dear Dr. Bartlett,

International Isotopes Inc. (INIS) is providing this letter to inform you of a shipment of depleted uranium tetrafluoride that was received under NRC License SUB-1597 on December 6, 2010 that may contain trace impurities of transuranic isotopes. This package was received and then stored in our secured warehouse facility and remains unopened with Tamper Indicating Device still attached. During consultations with the shipper, LATA/Parallax LLC (LATA) and further investigation it was discovered that a shipment that had been received in June of 2008 may also contain trace impurities of transuranic isotopes. This June 2008 shipment was not accompanied with shipping documentation that indicated or suggested the presence of transuranic impurities. The 30 gallon drum containing the material received in June 2008 was opened in July 2008 and visually inspected. DUF4 contained in this drum has not been utilized or removed. This drum is stored in a locked depleted uranium handling room that is also located inside the secure warehouse. Both of these shipments are being returned to LATA with a delivery date scheduled to January 5, 2011. The out of specification DUF4 shipment has been placed into our Corrective Action Program. An email sent on December 10, 2010 provided some preliminary information regarding this shipment, additional detail is provided below.

On December 6, 2010 INIS received a shipment containing 4,011 kg of DUF4 (2,575 kg of depleted uranium) from LATA. The inclusion of Pu-239 on the Bill of Lading was noted following a review of the documents that had accompanied the shipment. It was immediately verified that the package containing the shipment had not been opened; the shipper was then contacted to obtain more detail regarding the radionuclidic content of the material that had been shipped.

During the initial investigation LATA indicated that the smaller shipment of DUF4 that had been received back in June 2008 was from the same lot as the material received in December.

---

4137 Commerce Circle, Idaho Falls, Idaho 83401  
Phone: 208-524-5300, 800-699-3108 Fax: 208-424-1411  
Website: [www.intisoid.com](http://www.intisoid.com)

However, the documents that had accompanied the June 2008 shipment did not indicate the presence of Pu-239. When questioned, LATA indicated that the method of determining the radionuclide content had been revised and that radionuclide impurities were based on the Technical Description and Characterization Summary for Lot #4. This summary consists of two tables; a Uranium Products & Services Catalog Table and a USM Ore™ Specification Scoping Table, as attached. It is important to recognize that the values provided in the table are based on conservative assumptions and that actual analytical data for Lot #4 is not yet available.

Currently the DUF4 received in December 2010 is contained in several 30 gallon drums that are packaged in a large metal box that is bolted shut. This metal box was placed in our secure warehouse on the date of receipt and has never been opened, shipper applied Tamper Indicating Device is still attached.

The small shipment of DUF4 from 2008 is contained in a 30 gallon drum stored in a locked DU Handling Room located within the secured warehouse. This 30 gallon drum had been opened in July 2008 to visually verify the DUF4 was in a powdered form. No material has been processed or removed from the 30 gallon drum.

Given the packaging and storage locations, we consider the material from both shipments to be safe and secure, neither of which poses a health or safety risk to our workers or members of the public.

The tables below summarize information contained in the shipper's declaration of dangerous goods and the Nuclear Material Transaction Report Form 741s that accompanied each shipment.

Information Provided on Shipper's Declaration of Dangerous Good		
	June 2008	December 2010
UN Number	UN3321	UN3321
Proper Shipping Name	Radioactive material, low specific activity (LSA-II)	Radioactive material, low specific activity (LSA-II)
Radioisotopes	U-234, Th-234	U(depleted), Pu-239, Th-234
Information Provided on Nuclear Material Transaction Report Form 741		
	June 2008	December 2010
Material Type	DUF4	DUF4
Total Gross Weight	145 kg (DUF4)	4011 kg (DUF4)
Element Weight	87 kg (DU)	2575 kg (DU)
Weight % Isotope	0.1848 (U-235)	0.1400 (U-235)

The mass and activity of the possible impurities were then calculated using the parts per million values in USM Ore™ Specification Scoping (Rev. 6.1) Table for Lot #4. This data is considered

a conservative estimate of the level of impurities that could be present in the DUF4 from Lot #4. It is worth noting that the data contained in the Scoping Table for Lot #4 was derived based on process knowledge and analysis of depleted uranium metals. There is no characterization data available for the DUF4 that makes up Lot #4 at this time.

December 2010 Shipment						
	PPM	Mass (mg)	Activity (Bq)	Activity (uCi)	Bg/g	uCi/g
Tc-99	4.00E-03	1.03E+01	6.45E+06	174.27	2.504	6.77E-05
Am-241	6.30E-06	1.62E-02	2.06E+06	55.63	0.799	2.16E-05
Np-237	6.30E-03	1.62E+01	4.23E+05	11.44	0.164	4.44E-06
Pu-238	1.40E-07	3.61E-04	2.29E+05	6.18	0.089	2.40E-06
Pu-239	6.00E-05	1.55E-01	3.55E+05	9.59	0.138	3.73E-06
Pu-241	2.10E-07	5.41E-04	2.06E+06	55.72	0.801	2.16E-05
June 2008 Shipment						
	PPM	Mass (mg)	Activity (Bq)	Activity (uCi)	Bg/g	uCi/g
Tc-99	4.00E-03	3.48E-01	2.18E+05	5.89	0.085	2.29E-06
Am-241	6.30E-06	5.47E-04	6.96E+04	1.88	0.027	7.30E-07
Np-237	6.30E-03	5.47E-01	1.43E+04	0.39	0.006	1.50E-07
Pu-238	1.40E-07	1.22E-05	7.74E+03	0.21	0.003	8.11E-08
Pu-239	6.00E-05	5.24E-03	1.20E+04	0.32	0.005	1.26E-07
Pu-241	2.10E-07	1.83E-05	6.96E+04	1.88	0.027	7.30E-07

#### Corrective Actions:

The following Immediate Corrective Actions have been completed:

- INIS verified package had not been opened and was stored in a safe and secure condition
- INIS contacted shipper (LATA) to determine why Pu-239 was included on the shipper's declaration.

After discussions with LATA, INIS was informed that the shipment received in June 2008 was from the same Lot as the material relieved in December 2010. As a result of this information, the following additional Immediate Corrective Actions have been completed.

- INIS reviewed the shipping paper work from the June 2008 shipment and found that it had not included Pu-239 on the shipper's declaration.
- INIS contacted shipper (LATA) to determine why Pu-239 was included in the December 2010 shipment and not the June 2008 shipment if the material originated from the same lot. INIS was informed that the difference was due to a change in the calculation methodology.

- INIS verified that the June 2008 material was stored in a safe and secure condition.
- INIS verified that the 30 gallon drum containing the June 2008 material had been opened but no material had been removed from the drum.

The following Corrective Actions have not yet been completed:

- Return all the material from both shipments back to LATA. INIS will act as the shipper of this material and INIS Subsidiary, International Isotopes Transportation Services will transport the material back to the LATA facility in Piketon, Ohio. Delivery scheduled for January 5, 2011.
- LATA to provide a detailed inventory of the material that comprises Lot #4, breaking down into sub-lots if necessary.
- LATA/INIS to develop a sampling plan to analyze the material comprising of Lot #4 for radionuclide impurities that had been identified in the Scoping Table.
- INIS to determine path forward based on the analytical data.
  - o If the analytical data concludes that the DUF4 from Lot#4 is free of transuranic elements then INIS will utilize the material as planned under NRC License SUB-1587.
  - o If the analytical data confirms the presence of transuranic impurities then INIS will determine a path forward based on the level of these impurities and how they may affect the fluorine gas products produced from the fluorine extraction process. Utilization of material containing these impurities would require an amendment to SUB-1587.
- LATA/INIS to develop a pre-shipment approval process so that INIS can authorize delivery of material prior to its shipment from the LATA facility.

These corrective actions are being tracked in the INIS Corrective Action Program. Please contact me by phone at 208 524-5300 or email at [jjmiller@intisoid.com](mailto:jjmiller@intisoid.com) if you have any questions regarding this letter or require additional information.

Sincerely,



John J. Miller, CHP  
Radiation Safety Officer

JJM-2010-36  
Enclosure as stated

Technical Description and Characterization Summary

LOT # 4

Lot 4 {Depleted UF4}								
Reusable Uranium Products & Services Catalog (October 2002) stated that the depleted metals were created utilizing similar DUF4. No actual data on the depleted UF4 at Portsmouth.								
Note: Data obtained from Nuclear Fuels Services Report on Depleted Metal. Data is limited but representative of Lot #4.								
Chemical Name	Uranium Products & Services Catalog				USM Ore™ Specification Scoping (Rev. 6.1)			
	Average	Low	High	Units	Units	Average	Low	High
Aluminum					ppm	7		
Antimony								
Arsenic					ppm	0.1		
Barium					ppm	0.1		
Beryllium					ppm	1		
Bismuth								
Equiv. Boron Content					ppm	0.1		
Bromine								
Carbon								
Cadmium					ppm	0.19		
Calcium & Mg								
Calcium					ppm	0.6		
Cesium								
Chloride								
Chromium					ppm	1		
Cobalt								
Copper								
Fluoride					ppm	137		
Hydrogen								
Iron					ppm	164		
Fe + Al								
Lead					ppm	0.1		
Lead 212								
Lithium								
Magnesium					ppm	3		
Manganese					ppm	7		
Mercury								
Molybdenum					ppm	1		
Neptunium-237					ppm	6.3E-03		
Nickel					ppm	62.6		
Niobium								
Nitrogen								

Technical Description and Characterization Summary  
 LOT # 4

Lot 4 {Depleted UF4}								
Reusable Uranium Products & Services Catalog (October 2002) stated that the depleted metals were created utilizing similar DUF4. No actual data on the depleted UF4 at Portsmouth.								
Note: Data obtained from Nuclear Fuels Services Report on Depleted Metal. Data is limited but representative of Lot #4.								
Chemical Name	Uranium Products & Services Catalog				USM Ore™ Specification Scoping (Rev. 6.1)			
	Average	Low	High	Units	Units	Average	Low	High
Phosphorous					ppm	8.6		
Plutonium (Total)								
Plutonium-238					ppm	1.4E-07		
Plutonium-239/240					ppm	6.0E-05		
Plutonium-241					ppm	2.1E-07		
Plutonium-242								
Plutonium-244								
Potassium					ppm	0.1		
Ruthenium								
Radium 224								
Radium 226								
Samarium								
Selenium								
Silicon					ppm	168		
Silver					ppm	0.1		
Sodium					ppm	0.1		
Strontium								
Sulfate								
Tantalum								
Technetium-99	9	4	30	ug/g U	ppb	4		
Thallium 208								
Thorium					ppm	0.1		
Thorium-228								
Thorium-230								
Thorium-231					ppm	8.2E-09		
Thorium-232					ppm	0.00		
Thorium-234					ppm	1.5E-05		
Thorium 234 Gamma								
Tin								
Titanium					ppm	3		
Tungsten								
TOC								

Technical Description and Characterization Summary  
 LOT # 4

Lot 4 {Depleted UF4}								
Reusable Uranium Products & Services Catalog (October 2002) stated that the depleted metals were created utilizing similar DUF4. No actual data on the depleted UF4 at Portsmouth.								
Note: Data obtained from Nuclear Fuels Services Report on Depleted Metal. Data is limited but representative of Lot #4.								
Chemical Name	Uranium Products & Services Catalog				USM Ore™ Specification Scoping (Rev. 6.1)			
	Average	Low	High	Units	Units	Average	Low	High
Total Uranium								
Total Uranium Alpha								
Uranium TIMS								
Uranium-232					ppm	0		
Uranium-233/234					ppm	0		
Uranium-233								
Uranium-233 TIMS								
Uranium-234	7.87	0.057	26.2	ppm	ppm	30		
Uranium 234 Alpha								
Uranium 234 Gamma								
Uranium-234 TIMS								
Uranium 235 Alpha								
Uranium 235 Gamma								
Uranium-235					ppm	1,960		
Uranium-235								
Uranium-235 TIMS								
Uranium 236 Alpha								
Uranium-236	24.14	4.36	64.4	ppm	ppm	127		
Uranium-236 TIMS								
Uranium 238 Alpha								
Uranium 238 Gamma								
Uranium-238								
Uranium-238 TIMS								
Vanadium					ppm	1		
Zinc								
Zirconium					ppm	19		
Total Impurities								
Halides (Cl+Br+I)					ppm	11.1		
Plutonium (ppbU)								
Neptunium (ppbU)								
Pu + Np (Bq/g)					Bq/kg U	1.20E+03		
Alpha Activity								

**Technical Description and Characterization Summary  
LOT # 4**

Lot 4 (Depleted UF4)								
Reusable Uranium Products & Services Catalog (October 2002) stated that the depleted metals were created utilizing similar DUF4. No actual data on the depleted UF4 at Portsmouth.								
Note: Data obtained from Nuclear Fuels Services Report on Depleted Metal. Data is limited but representative of Lot #4.								
Chemical Name	Uranium Products & Services Catalog				USM Ore™ Specification Scoping (Rev. 6.1)			
	Average	Low	High	Units	Units	Average	Low	High
Moisture								
ZrNb95								
Protactinium 234m								
Gamma Fission Product					Mev Bq/kg U	3.70E+03		
Gamma %								
Trans Alpha								
Americium-241					ppm	6.3E-06		

Units	
ug/g U	1ugram = 1e-6gram so it is 1 part per million
pCi/g U	
mg/kg U	1mgram = 1e-6 kilogram so it is 1 part per million
mg/kg	1mgram = 1e-6 kilogram so it is 1 part per million
ug/kg	1ugram = 1e-9 kilogram so it is 1 part per billion

Data from Reusable Uranium Products & Services Catalog October 2002  
Additional analytical data available per Uranium Products & Services Catalog October 2002

USM Ore™ Specification Scoping (Rev. 6.1) Report: "Y-  
12 Lab Analysis of 1.25% Derbies and Oxide"

Converdyn Data Needed for UF6 processing

Denotes an estimated value in USM Ore™

U= Not Detected Above Method Detection Limit (MDL)  
\* = Aged Natural Uranium