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Chief, Materials Licensing Branch,  
Division of Radiation Safety & Security  
U.S. Nuclear Regulatory Commission Region IV  
1600 East Lamar Boulevard  
Arlington, Texas 76011-4511

**Subject:** Notification of Possession of Source Material Under Small Quantity Exemption and Rare Earth Products  
containing Naturally Occurring Radioactive Material

**Via email to:** Neil.o'keefe@nrc.gov

Dear Mr. O'Keefe

I am writing to request concurrence from the US Nuclear Regulatory Commission (USNRC) Region IV that Tronox LLC (located at 3301 NW 150<sup>th</sup> Street, Oklahoma City, OK 73134) is not required to hold a specific license from the USNRC for possession of small quantities of Rare Earth Mineral Concentrates (REMC) containing Uranium and Thorium below the exempt quantities limit in 10 CFR 40.22, and that possession of mixed rare earth products containing naturally occurring Actinium-227 is not subject to licensing.

We understand that Region IV of the USNRC holds primacy for this question within Oklahoma, since the State of Oklahoma Agreement State program does not have authority over uranium and thorium and does not specifically regulate the possession of low concentration NORM. In addition, we have separately contacted the USNRC Office of International Programs for concurrence that this same material is not subject to a specific USNRC import license (copy of correspondence attached).

This letter serves as our official notification in compliance with USNRC regulations, and request for concurrence that the USNRC agrees with our regulatory interpretation.

### **Rare Earth Mineral Concentrate**

Our organization will possess rare earth mineral concentrates in quantities that do not exceed the exemption limit of 1.5 kg (3.3 lbs) of uranium and thorium at any one time. This material is monazite concentrates from Tronox's operations in Australia and South Africa. Typical elemental composition of these materials are shown in the table in Appendix A. Below are the details regarding our planned shipments:

- **Description of Goods:** Materials are rare earth mineral concentrates with the primary component being monazite (60-90%), staurolite, zircon, and ilmenite. The detailed elemental analysis is presented in Appendix A.
- **Quantity:** 500 g each of 6 samples for a total of ~3 kilograms. The total of Th + U from the six samples will be about 154 grams. This is well below the U/Th exemption amount of 1.5 kgs defined in 10 CFR 40.22 (a) (1).
- **Country of Origin:** Australia
- **Expected Date of Arrival:** August 2024
- **Port of Entry:** Houston, TX

### **Mixed Rare Earth Product**

Our organization will also possess a mixed rare earth product, containing 1 Bq/g of Actinium-227 for laboratory testing at our Oklahoma facility. Actinium-227 is a naturally occurring radioactive material (NORM) and at these low concentrations we believe it is not subject to USNRC jurisdiction or licensing.

- **Description of Goods:** Materials are rare earth products in the form of granules, with the primary components being lanthanum carbonate, cerium carbonate, praseodymium carbonate and neodymium carbonate. The chemical composition is presented in Appendix B. The material will also contain 1 Bq/g of Actinium-227.
- **Quantity:** 500 grams per shipment, with up to four (4) shipments per year.
- **Country of Origin:** Australia
- **Expected Date of Arrival:** August, 2024

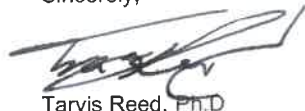
Both the rare earth mineral concentrate and the mixed rare earth product described above will be used for analytical testing and research & development purposes. We will ensure that all safety protocols and regulatory requirements are strictly adhered to. To ensure compliance with the USNRC regulations, we have established the following safety measures and protocols:

1. Secure storage: The source material will be stored in a designated, secure area.
2. Radiation safety: We have appointed a Radiation Safety Officer (RSO), Whitlee Tyler, who is responsible for overseeing radiation safety protocols and ensuring compliance with NRC regulations.
3. Record keeping: Detailed records of the acquisition, usage, and disposal of the source material will be maintained and made available for USNRC inspection upon request.
4. Training: All personnel handling the source material will receive comprehensive training on radiation safety, proper handling procedures, and emergency response protocols.

We understand the importance of adhering to all USNRC regulations and are committed to maintaining the highest standards of safety and compliance. **As a result, we are requesting concurrence from USNRC Region IV that possession and testing of the subject materials may be performed by Tronox without a specific radioactive materials license.**

Thank you for your attention to this matter.

Sincerely,



Tarvis Reed, Ph.D

Manager, Analytical Testing

Tronox LLC

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Enclosures:

- Material Characterization (Appendix A & B)
- Tronox letter to USNRC Office of International Programs dated July 10, 2024

## APPENDIX A

### Chemical composition of rare earth mineral concentrate (REMC)

Elemental Analysis of Rare Earth Mineral Concentrates						
Sample Origin	Chandala Australia	Gingko Australia	Wonnerup Australia	Campaspe Australia	Namakwa S. Africa	KZN S. Africa
	wt%	wt%	wt%	wt%	wt%	wt%
Al	0.16	<0.1	<0.2	<0.1	0.57	0.35
Ca	0.71	0.61	0.61	0.55	0.83	0.58
Cr	0.008	0.010	0.004	0.02	0.13	0.09
Fe	0.23	0.13	0.08	0.52	4.73	1.29
Hf	0.03	0.09	0.08	0.13	0.14	0.23
Mg	0.03	<0.01	<0.01	0.015	0.25	0.09
Mn	0.017	0.006	0.004	0.011	0.15	0.06
Na	<0.1	<0.1	<0.1	<0.1	0.15	-
P	11.55	10.96	11.12	10.54	7.78	8.60
Pb	0.30	0.16	0.23	0.15	0.22	0.20
S	0.07	0.05	0.05	0.04	<0.05	<0.1
Si	1.07	1.65	1.58	2.20	3.76	3.98
Th	6.14	4.85	5.52	4.39	4.22	3.97
Ti	0.05	0.12	0.11	0.39	5.71	2.07
U	0.29	0.27	0.24	0.29	0.27	0.29
Zn	0.04	0.007	0.011	0.011	0.04	0.05
Zr	1.47	4.08	3.38	5.89	5.96	9.79
La	11.43	10.20	10.98	9.31	6.68	7.77
Ce	21.94	20.46	21.33	18.40	13.90	15.19
Pr	2.27	2.29	2.25	2.10	1.65	1.80
Nd	7.58	7.94	7.62	7.33	5.80	6.27
Sm	1.27	1.34	1.27	1.28	1.04	1.10
Eu	0.04	0.04	0.04	0.04	0.02	0.03
Gd	0.77	0.81	0.78	0.84	0.71	0.75
Tb	0.08	0.08	0.08	0.09	0.08	0.07
Dy	0.29	0.28	0.28	0.40	0.30	0.27
Ho	0.04	0.04	0.04	0.07	0.04	0.03
Er	0.08	0.08	0.07	0.18	0.08	0.07
Tm	0.007	0.007	0.006	0.022	0.008	0.006
Yb	0.04	0.04	0.03	0.14	0.04	0.03
Lu	0.004	0.005	0.004	0.018	0.004	0.004
Y	1.05	0.99	0.92	1.85	1.08	0.93

## APPENDIX B

### Chemical composition of mixed rare earth product

Mixed Rare Earth	
Element	wt %
Al	0.02
Ca	0.31
Cr	0.001
Fe	<0.01
Mg	0.42
Mn	0.04
Na	0.14
Ni	0.003
P	<0.01
Pb	<0.001
S	1.17
Si	0.014
Th	0.001
Ti	<0.1
U	<0.001
Zn	0.04
Zr	0.002
La	11.98
Ce	23.97
Pr	2.51
Nd	8.84
Sm	1.46
Eu	0.04
Gd	0.91
Tb	0.10
Dy	0.39
Ho	0.05
Er	0.10
Tm	0.009
Yb	0.04
Lu	0.004
Y	1.33