Rocky Mountain Instrument Co.
106 LASER DRIVE, BUILDING 1
LAFAYETTE, COLORADO 80026
Phone 303-664-5000 Fax 303-664-5001

16 January 2025

Michelle M. Hammond, M.Sc.
Materials Safety and Licensing Branch
Division of Materials Safety Security, State,
And Tribal Programs
Office of Nuclear Materials Safety
And Safeguards

Reference:
License No. 05-35173-01E
Docket No. 040-38375
Mail Control No. 642344

Sent Via email:Michelle.Hammond@nrc.gov

Re: Rocky Mountain Instrument CO. Request for Additional Information

Michelle;

Please find Our response to questions 1 and 2 (a-e).

1. We are requesting to continue distribution of optical products, containing no more than 10% by weight thorium in each product, to persons exempt from licensing under the Title 10 of the Code of Federal Regulations (10 CFR) Paragraph 40.13(c)(7).

2.

   a. A description of the details of construction, including a description of manufacturing methods that will ensure that the coatings are unlikely to be removed under the conditions expected to be encountered during handling and use;

Facilities and Equipment: Rocky Mountain Instrument Co occupies a 60,000 sq. ft. facility in Lafayette, CO and manufactures precision optics (www.rmico.com). The Thorium containing optics are coated with thorium in high-vacuum coating chambers. There are 4 high-vacuum coating machines that are used for thorium coating. A segregated radiation sandblasting machine is used to sandblast thorium contaminated high-vacuum coating fixtures. The facility is monitored and regulated pursuant to Colorado Radioactive Material License No. 975-01.

RMI

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The evaporation of ThF_4 is performed by thermal resistance method. The granular ThF_4 is put into a tantalum boat. ThF_4 vapor is sublimated when the ThF4 is heated to approximately 1110 degrees C by means of thermal resistance. The vapor is deposited on the substrate or partner chemicals on the substrate. The ThF_4 thin film and thin film combination partners is stable. Coatings meet or surpass military standard testing for adhesion, abrasion and 24 hour humidity test sequentially. The thin film should not be removed during normal handling and use.

b. A description of the quality control procedures to be followed in the fabrication of production lots of the product and the quality control standards the product will be required to meet;

The thin film coating thickness on lenses is well controlled. The manufacturing process uses physical vapor deposition by means of thermal resistance inside high-vacuum coating chambers. The thickness of the lens coating is controlled by crystal monitor. Every batch of thorium coated lenses is checked by means of spectrophotometer to make sure the lenses meet the reflectance or transmission specifications. Meeting these specifications insures that the lenses are properly coated. Coatings meet or surpass military standard testing for adhesion, abrasion and 24 hour humidity test sequentially. Rocky Mountain Instrument Co is an ISO 9001 certified manufacturer. The weight ratio of ThF_4 to substrate material should not exceed 0.05%.

c. A description of the proposed method of labeling or marking of each unit and its container with the identification of the manufacturer or initial transferor of the product and the byproduct material in each product;

Package is labeled (A bright yellow sticker label):

WARNING: RMI
This package Contains Thorium

Rocky Mountain Instrument Co. – Thorium Coating

This product contains trace amounts of Thorium on finished optical lenses. This lens is not to be used as an eyepiece or other use in close proximity to the eye. Thorium is a naturally radioactive substance and should be handled with care. Do not scratch or intentionally grind the surface of the lenses as the Thorium coating could be removed. Thorium is an inhalation hazard. Normal handling should not produce any measurable radiation dose during use or storage.

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This Product contains Thorium on finished optical lenses and mirrors; each lens or mirror contains no more than 10% by weight of Thorium.

d. A description of the radiation safety precautions and instructions relating to handling, use, and storage of products to be used under 10 CFR 40.13(c)(7); and

Product warning package insert: "This product contains trace amounts of Thorium on finished optical lenses. This lens is not to be used as an eyepiece or other use in close proximity to the eye. Thorium is a naturally radioactive substance and should be handled with care. Do not scratch or intentionally grind the surface of the lenses as the thorium coating could be removed. Thorium is an inhalation hazard. Normal handling should not produce any measurable radiation dose during use or storage."

e. Confirm that each product will contain no more than the quantity or the concentration of source material specified for that product in 10 CFR 40.13(c)(7), and that the exempt distribution does not authorize the shaping, grinding or polishing of such lens or mirror or manufacturing processes other than the assembly of such lens or mirror into optical systems and devices without any alteration of the lens or mirror; or the receipt, possession, use, or transfer of uranium or thorium contained in contact lenses, or in spectacles, or in eyepieces in binoculars.

Rocky Mountain instrument Co makes both commercial (catalogue) and custom optics to the specifications of the customer. ThF_4 coatings are applied to the substrate in thicknesses that vary depending on the transmission wavelength and reflectance properties desired. A typical coating is the thickness ¼ of the transmission wavelength. A typical wave length for thorium coated lenses is 1064 nm (nanometer). A single coating is therefore ¼ * 1064nm and adjusting for the refractive index is 172 nm (0.000000172 m). Each sq cm of single coated optic contains 0.0000172 cubic cm or 0.000109 g of ThF_4. Up to 14 ThF_4 coating layers may be used so a maximum of 0.00152 g per square centimeter of ThF_4 is applied to 14 layer coatings. ThF_4 is not used as a substrate material only as a coating material. Commercial lenses are from ½ inch diameter to 2 ½ inch diameter and are approximately 0.29 inch (0.7 cm) thick. The maximum quantity of thorium fluoride on a large 2.5 in diameter lens is therefore 0.05 g ThF_4. The lens substrate weight is greater than 118 g depending on the convex radius. The percent ThF4 of the lens is less than 0.05%.

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"This product contains Thorium on finished optical lenses and mirrors; each lens or mirror does not contain more than 10 percent by weight of thorium.

Please contact me for any additional information that may be necessary. Kindly send an acknowledgement of receipt of the Request for Additional Information.

Sincerely,

Thomas Frotten

Thomas Frotten

Director of Operations