Shirley,

Please accept the following on behalf of Kearfott Corporation.

As you may know, Kearfott is a I 00% American owned company whose primary business is the development and assembly of guidance, navigation, and motion control components and systems for military and commercial applications. The product that Kearfott assembles that is the subject of the attached Exempt Distribution License is the ring laser gyroscopes. The end user of the overwhelm in number of rin laser roscopes assembled by Kearfott is [redacted]

While Kearfott understands that the NRC implemented a change to the regulations at 10 CFR 40.22 in 2013, the NJDEP-BER advised Kearfott in an e-mail dated January 23, 2017 that its possession and use of thorium foils for the assembly of gyroscopes (discussed in more detail below) falls under the general license discussed in IO CFR 40.22. However, by e-mail dated December 21, 2017, the NJDEP-BER notified Kearfott that it may be required to obtain a license for the thorium used in its assembly process. As a result, on August 2, 2018, Kearfott submitted its NJRAD Form-313 to the NJDEP-BER. By letter dated March I, 2019, the NJDEP-BER issued Kearfott a Radioactive Materials License.

NJDEP-BER also informed Kearfott that it needed to apply to the NRC for an Exempt Distribution License. As discussed below, Kearfott is unclear as to this requirement and believes that, given the limited use (small metal foil containing of thorium-232 assembled in a sealed cavity) and volume involved (total inventory of less than 1 pound), it still qualifies for a general license. As I discussed with you last week, Kearfott may need your assistance on this iss ue.

Kearfott has been diligently working toward resolving this issue since the NJDEP-BER's issuance of the lice nse . **At the same time, while Kearfott still has many questions as to whether the requirements for obtaining an Exempt Distribution License applies to it for the reasons set forth below, it has nonetheless attached hereto an Exempt Distribution License Application for your review.** I believe that this submission shows Kearfott's good faith effort to comply with the NRC's requirements if it is ultimately determined that a general license is no longer available to Kearfott.

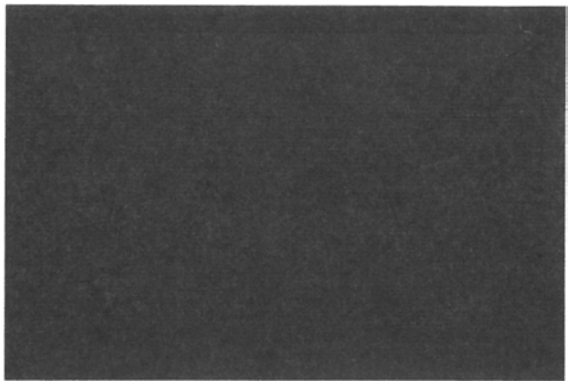
For your convenience, the following is a brief summary of the use at issue herein.

Ring laser gyroscopes assembled by Kearfott provide motion information for guidance navigation systems. Kearfott is not at liberty to identify the applications / use of the ring las e r gyroscopes by its customers due to contractual and national security concerns. However, if required by the NRC, Kearfott may be able to provide this information if its application for withholding proprietary information is granted.

[redacted]

[redacted]

A picture of the ring laser gyroscope cavity or block is attached below:



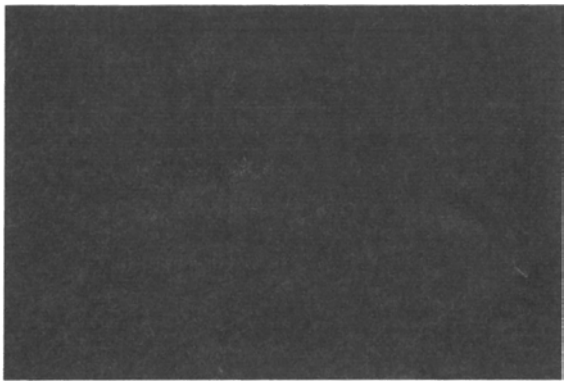
It is important to note that before leaving Kearfott's facility, the above block/cavity is further sealed into [redacted] that is part of the end product.

The Consolidated Guidance About Materials Licenses provides, in part, the following:

> Exemptions from licensing requirements are based on a determination by the Commission that the exempted classes of products or types of uses will not constitute an unreasonable risk to the common defense or security or to public health and safety, nor constitute a frivolous use of radioactive material. Radiation safety is primarily dependent on safety features built in to the sealed source or device or no restriction on the amount of radioactive material that can be initially distributed.

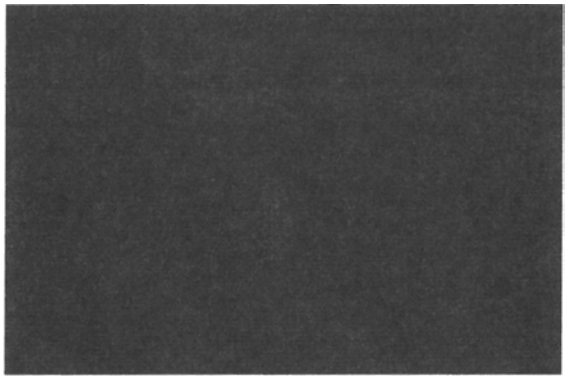
Kearfott's use of the thorium in assembling the ring laser gyroscope falls squarely within the above. Clearly, the use "[does not] constitute an unreasonable risk to the common defense or security or to public health and safety, nor constitute a frivolous use of radioactive material" and is "built in to the sealed source or device ...."

- The following is a picture of a metal foil (small black strip in the middle of glass circle sitting on top of honeycomb screen):

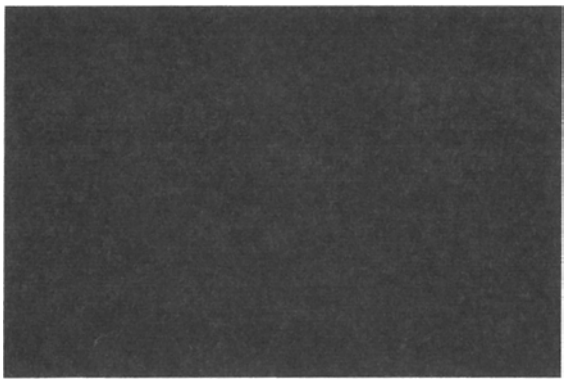


- Kearfott uses one of two metal foils depending upon the ring laser gyroscope being assemble d.

METAL FOIL A (picture below) measures approximately



METAL FOIL B (picture below) measures approximately



- The amount of thorium on Metal Foil A and Metal Foil B is approximately Ill respectively.

- Based upon the current inventory of metal foils, which was purchased in 2012, the total maximum quantity of Thorium on the metal foils is less than I pound.
- The following is a picture of the Metal Foil Storage:

- Kearfott does not have any plans, current or otherwise, to purchase additional metal foils.
- Each ring l e uses [redacted] (picture above), which is further [redacted]

The attachment to Kearfott's application describes in great detail Kearfott's handling of the metal foils including, among other things, the training program for individuals working with the metal foils or in certain areas, Kearfott's facilities and equipment, radiation safety program, and waste management. If you have any questions regarding this or any other information, please give me a call.

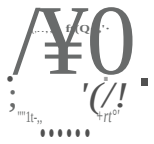
However, as stated above, Kearfott questions whether it needs a specific Exempt Distribution License. The reason for this question, in addition as discussed above, is for the following reasons:

I. The foils are used "as received" from the supplier. No processing or modification is performed that alters the chemical or physical form of the material;
2. The thorium-232 is in a non-dispersible form;
3. As an alpha emitter, the thorium is one of the lower forms ofradiation and is not dangerous to human health;
4. The amount of thorium on the metal foils, as discussed above is less than, II
5. Kearfott contains a total inventory of thorium on the metal foils of less than I pound;
6. One metal foil containin the thorium as discussed above is [redacted] in other words, an "unimportant quantit[y] of source materials" [IO CFR 40.23].

Upon your review , please let me know whether you have any questions or comments. I will make myself available at your request.

NRC FORM 313 **U.S. NUCLEAR REGULATORY COMMISSION**

(10-2017)
10 CFR 30, 32 33, 34, 35, 36, 37, 39, and 40



APPLICATION FOR MATERIALS LICENSE

APPROVED BY 0MB: NO. 3150-0120 **EXPIRES: 06/30/2019**

Estimated burden per response to comply with this mandatory collection request: 4.3 hoors. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Information Services Branch (T-2F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. or by e-mail to Infocollects.Resoorce@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washingto,nDC 20503. If a means used to impose an information collection does not display a currently valid 0MB control numbe,rthe NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTION;SSEE THE CURRENT VOLUMES OF THE NUREG-1666 TECHNICAL REPORT SERIES (" CONSOLIDATEDGUIDANCE ABOUT MATERIALS LICENSES") FOR DETAfLED INSTRUCTIONS FOR COMPLETING THIS FORM; http ://www.nrc.govlreading-rmldoecollectionslnuregs/s tafflsr1566l. SEND TWO COPIES OF THE COMPLETED APPLICATION TO THE NRC **OFFICE SPECIFIED BELOW.**

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH;

MATERIALS SAFETY LICENSING BRANCH
DIVISION OF MATERIAL SAFETY, STATE. TRIBAL AND RULEMAKING PROGRAMS
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON. DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS;

IF YOU ARE LOCATED IN;

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, **MAINE,** MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, **NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,**

SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIAPA 19406-2713

IF YOU ARE LOCATED IN;

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND **APPLICATIONS TO;**

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION REGION 111
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

IF YOU ARE LOCATED IN;

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, **LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING,**

SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
1600 E. LAMAR BOULEVARD
ARLINGTON, TX 76011-4511

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriale ilem)*

[I] A. NEW LICENSE

D B. AMENDMENT TO LICENSE NUMBER _____

D C. RENEWAL OF LICENSE NUMBER

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include zip code)*

Kearfott Corporation
1150 McBridge Avenue
Woodland Park, NJ 07424

3. ADDRESS WHERE LICENSED MATERIALS WILL BE USED OR POSSESSED

1225 McBridge Avenue
Woodland Park, NJ 07424

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Julie R. Witte

BUSINESS TELEPHONE NUMBER **973-785-6100**

BUSINESS CELLULAR TELEPHONE NUMBER **201-400-2446**

BUSINESS E-MAIL ADDRESS **j.witte@kearfott.com**

SUBMIT ITEMS 5 THROUGH 11 ON B-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL

a. Element and mass number; b. chemical and/or physical form: and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT

12. LICENSE FEES (Fees required only for new applications. with few exceptions') *(See 10 CFR 170 and Section 170.31)*

CA:Ee:ORY

AMOUNT ENCLOSED$ **2,200**

'Amendments/Renewals that Increase the scope of the existing license to a new or higher lee category will require a lee.

PER THE DEBT COLLECTION IMPROVEMENT ACT OF 1996 (PUBLIC LAW 104-134), YOU ARE REQUIRED TO PROVIDE YOUR TAXPAYER IDENTIFICATION NUMBER. PROVIDE THIS INFORMATION BY COMPLETING NRC FORM 631: https;l/www.nrc.gov/reading-rm/doc-collections/lorms/nrc631inlo .html.

13. CERTIFICATION. *(Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPL/CATION ARE BINDING UPON THE APPLICANT.*

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2. CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS. PARTS 30, 32. 33. 34, 35, 36, 37, 39. AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.
WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25. 1946 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATIER WITHIN ITS JURISDICTIO.N

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	$ AMOUNT RECEIVED	CHECK NUMBER	COMMENTS

APPROVED BY	DATE

Addendum to Kearfott Corporation's
Application for Exempt Distribution License

Item 5. Radioactive Material

a. *Element and mass number:* Thorium-232 (99.5%).
b. *Chemical and/or physical form:* Thin metal foil.
c. *Maximum amount which will be possessed at any one time:* Less than one pound (<I lb).

Item 6. Purpose for Which Licensed Material Will Be Used

A single metal foil containing minute amount of Thorium-232, as received from supplier, is assembled and sealed in the cavity of a ring laser gyroscope to act as an alpha emitter. Please see attached memorandum dated 7/2/2019.

The attached memorandum provides the detailed source and product information for the distribution license as outlined in applicable section of Title 10 of the Code of Federal Regulations (JO CFR) Part 32 or Part 40 and discussed in Chapter 9 "Jriformation Required for the Specific Types or Distribution Licenses" of this NUREG.

KEARFOIT CORPORATION PROPRIETARY INFORMATION

TO: NUCLEAR REGULATORY COMMISSION

FROM: KEARFOTI CORPORATION

SUBJECT: RING LASER GYROSCOPES

DATE: 7/2/2019

PROPRIETARY

BACKGROUND

BUTION TO THIRD PARTIES,

KEARFOTI ASSEMBLES RING LASER GYROSCOPES FOR SALE AND DISTRI
INCLUDING THE UNITED STATES GOVERNMENT. SEE PICTURE 6.

ABSENT OF LIGHT AND REQUIRES FREE

RT AND TO ASSURE THAT THE RING LASER

THE RING LASER GYROSCOPE IS IN A HOUSING THAT IS
ELECTRONS FOR THE HELIUM NEON PLASMA TO STA
ITIONS.
GYROSCOPE WILL LIGHT UNDER ALL OPERATING COND

UMENT FILLED WITH H

TO ELECTRONIC TERMINALS ON THE GYROSCOPE. THE

THE RING LASER GYROSCOPE IS A SEALED INSTR

ELIUM NEON GAS. TO INITIATE

GA O TURN TO PLAS
ITS OPERATION A HIGH VOLTAGE IS APPLIED

GAS CAUSING IT TO LASE, THAT IS GENERATE A LASER BEAM

HIGH VOLTAGE WILL CAUSE THE HELIUM ST MA, THE ENERGY FROM THE HELIUM
INTERNAL TO THE GYROSCOPE, THE LASER BEAM IS USED TO SENSE MOTION.
PLASMA WILL ENERGIZE THE NEON

[redacted]

EACH RING LASER

GYROSCOPE HAS FROM TWO TO SIX 'LE
GYROSCOPE WILL NOT FUNCTION P PE

KEARFOTT USES ONE OF TWO MET

GS' OR PATHS TO LIGHT. IF ANY OF THE LEGS DO NOT LIGHT THE

RING LASER GYROSCOPE
RO RLY AND RENDER THE NAVIGATION SYSTEM USELESS.

[redacted]

THE AMOUNT

AL FOILS IN THE MANNER SET FORTH ABOVE DEPENDING UPON THE

OF THORIUM ON METAL FOIL A AND METAL FOIL B IS APPROXIMATELY AND
BEING ASSEMBLED. METAL FOIL A (SEE PICTURE 7)
RESPECTIVELY. BASED UPON CURRENT INVENTORY, WHICH WAS PURCHASED IN 2012, THE TOTAL
MAXIMUM QU

ANTITY OF THORIUM ON THE METAL FOILS IS LESS THAN 1 POUND. KEARFOTI DOES NOT HAVE ANY PLANS, CURRENT OR OTHERWISE, TO PURCHASE ADDITIONAL METAL FOILS.

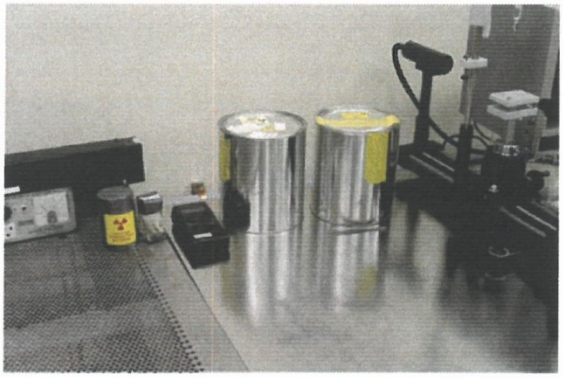
METAL FOIL HANDLING

THE METAL FOILS WERE RECEIVED IN A GLASS CONTAINER WITHIN A METAL CONTAINER (REFERRED TO HEREIN AS "CONTAINER"). SEE PICTURE 1.

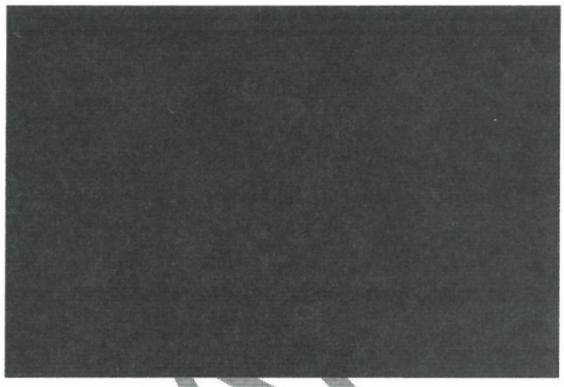
~~OF THE KEARFOTI CORPORATION. USE OF THIS INFORMATION IS LIMITED TO NRC FOR EVALUATION PURPOSES ONLY.~~

KEARFOTI CORPORATION PROPRIETARY INFORMATION

THE METAL FOILS ARE STORED IN THE SAME CONTAINER AT A WORK STATION IN A- CLEAN ROOM (SEE PICTURE 1).



1. METAL FOIL STORAGE



2. METAL FOIL

THE METAL FOILS ARE USED fl.S RECEIVED" FROM THE SUPPLIER AND NO PROCESSING OR M ODIFICATION IS PERFORMED ON THE METAL FOIL - FOILS.

AS PART OF KEARFOTI'S ASSEMBLY PROCESS, A SINGLE METAL FOIL IS SEALED WITHIN THE RING LASER GYROSCOPE.

THE METAL FOIL IS REMOVED FRO M THE CONTAINER W ITH THE USE OF TWEEZERS AND IS CLEANED WITH [redacted] IN A PYREX DISH (SEE PIC TURE 2). THE METAL FOIL IS THEN POSITIONED IN THE DISH AND PLASMA CLEANED [redacted].

THE METAL FOIL IS THEN ASSEMBLED TO A SUPPORT USING A METAL SEAL AS SEEN IN PICTURES 3, 4, AND 5.

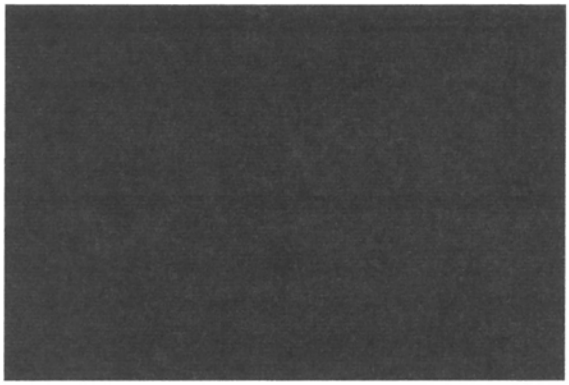
THE SUPPORT IS THEN ASSEMBLED TO THE GYROSCOPE WITH THE METAL FOIL NOW INTERNAL AND SEALED INTO THE RING LASER GYROSCOPE CAVITY AS SEEN IN PICTURE 6. BEFORE LEAVING KEARFOTI'S FACILITY, THE CAVITY IS FURTHER SEALED WITHIN [redacted] THAT ARE PART OF THE END PRODUCT.

METAL FOILS REMOVED FROM RING LASER GYROSCOPES RETURNED BY CUSTOMERS FOR REPAIR OR SCRAP ARE STORED IN A GLASS CONTAINER AND PLACED INTO A SAFE PENDING DISPOSAL. DISCARDED METAL FOILS WERE SENT OFF FOR DISPOSAL ON OCTOBER 4, 2017. CURRENTLY, THERE ARE NO DISCARDED METAL FOILS BEING STORED FOR DISPOSAL.

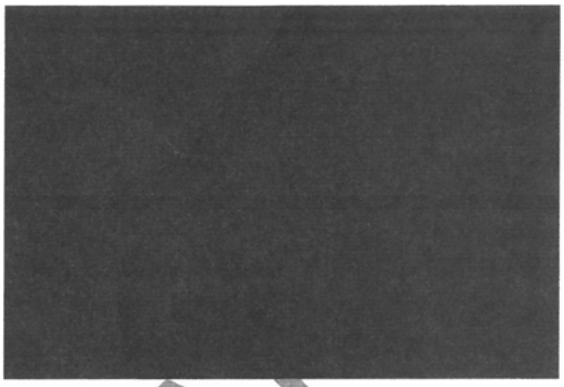
AS AN ALPHA EM ITI ER, THORIUM IS ONE OF THE LOWER FORMS OF RADIATION AND IS NOT DANGEROUS TO HUMAN HEALTH. AS SET FORTH ABOVE, THE ABOVE DOES NOT CONSTITUTE **AN** UNREASONABLE RISK TO THE COMMON DEFENSE OR SECURITY OR TO PUBLIC HEALTH AND SAFETY, NOR CONSTITUTE A FRIVOLOUS USE OF RADIOACTIVE MATERIAL.

PROPRIETARY

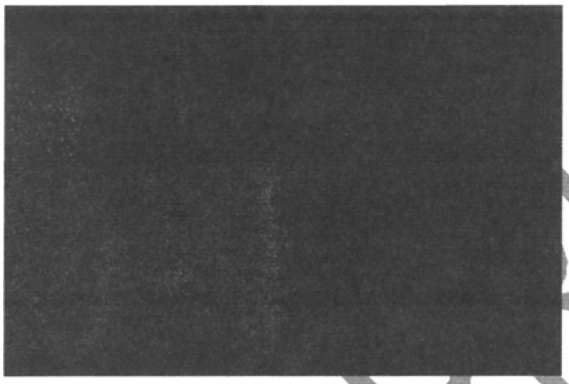
KEARFOTI CORPORATION PROPRIETARY INFORMATION



3. SUPPORT ASSEMBLY

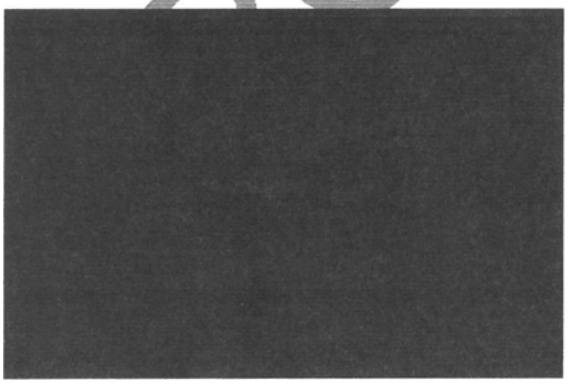


4. ASSEMBLY PRESS

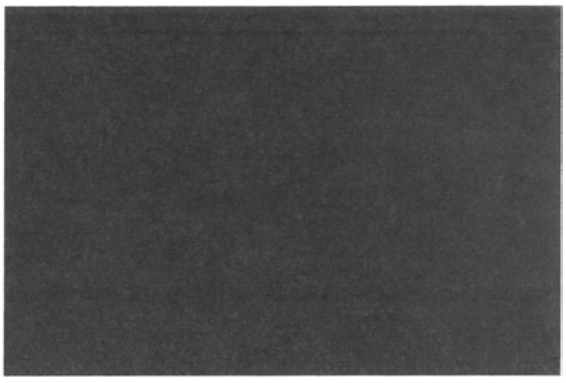


5. SUPPORT ASSEMBLY WITH METAL FOIL

6. SUPPORT ASSEMBLED TO RING LASER GYROSCOPE



7. THORIUM FOIL 'A'



8. THORIUM FOIL' B'

KEARFOTI CORPORATION PROPRIETARY INFORMATION. FURTHER DISTRIBUTION PROHIBITED WITHOUT THE EXPRESS WRITIEN PERMISSION OF THE KEARFOTI CORPORATION. USE OF THIS INFORMATION IS LIMITED TO NRC FOR EVALUATION PURPOSES ONLY.

NRC FORM 313
APPLICATION FOR
EXEMPT DISTRIBUTION LICENSE

KEARFOTI CORPORATION
GUIDANCE & NAVIGATION DIVISION

Radiation Safety Officer name, training, experience, telephone number, and email.

Name: John Pecoraro

Training and Experience: See attached resume.

Telephone Number: 973-785-6309

Email: j.pecoraro@kearfott.com

See attached Emergency Evacuation Procedure Thorium.

See also Radiation Safety Program, Appendix C.

John P. Pecoraro
74A Primrose Lane
Paramus, New Jersey 07652

973-785-6309
201-845-8454 (Home)
862-221-4044 (Cell)
jpecoraro@paramuses.org
j.pecoraro@kearfott.com

Qualifications:

First responder training thru the New Jersey State Police as a Radiological Technician as taught in the NJSP Hazardous Materials Technician Class

40 plus years ' experience as an emergency responder, with varying levels of training and experience in the hazardous materials response, which handles radiological incidents.
Proficient in the use of detection equipment for radiological monitoring.

Current certifications:

RSO - Thomas Edison State University
Emer gency Medical Technician - Defibrillator
Am erican Heart Association C.P.R. and First Aid Instructor
Hazardous Materials Technician
Radiological Technician (NJSP)
He avy Rescue Certification
Confined Space Technician
Fire Fighter I
Fire Fighter II
Fire Fighter Ill

Senior Rescue Instructor at Bergen County Technical School ' s EMS Training Center
Experience in Heavy Rescue, Extrication , Ropes and Knots , Confined Space and Specialized Rescue, Hazardous Materials Response

During the past 45 years of active servic e, I have received training and certifications at the following facilities:

New Jersey State Police Training Facili ty, Hamm onton, New Jersey
New Jersey State Department of Health
University of Medicine and Dentistry of New Jersey
Saint Louis Fire Department
Houston Fire Department
Hazardous Material Training by Safety Systems, Palatka, Florida
St. Augustine Technical Center, Florida
Hazardous Materials Training, Niagara Falls Fire Department
Rockland County Fire Department
Bergen County EMS Training Center
Bergen County Law and Public Safety Institute
Paramus Fire Department

Affiliations:

Paramus Rescue Squad, Chief (1995 - 2007 , 2015 - Present)
Paramus Rescue Extrication Competition Team, Captain
Paramus Hazardous Materials Team, Member
Paramus Emergency Medical Services, Captain and Executive Officer
Bergen County EMS Training Center, Senior Instructor
Bergen County EMS Advisory Board, Member
State of New Jersey Rescue Association
National Fire Protection Association (NFPA), Member

Kearfott
Guidance & Navigation Division

STANDARD OPERATING PROCEDURE

Number	Issue No.	Date
SAF 5.3	1	July 02, 2019
Subject Emergency Evacuation Procedure Thorium	Uncontrolled Copy when printed	

1. PURPOSE

1.1. This document is intended to describe the actions to be taken in the event that a building evacuation is necessary in response to any radiological emergency situation that may occur at the facility, primarily at point of use.

2. SCOPE

2.1. Applies to all KGN New Jersey facilities. (1150 McBride Avenue, 1225 McBride Avenue)
2.2. Kearfott does not plan to possess radioactive materials in excess of quantities listed in 10 CFR 30.72
2.3 Kearfott will follow standard evacuation procedures should it be necessary. RSO will determine when it is permissible to enter the building.

3. RESPONSIBILITIES

3.1. EMERGENCY AREA REPRESENTATIVES
- 3.1.1 Know the primary and alternate paths of evacuation from assigned area.
- 3.1.2 During an emergency evacuation
  - 3.1.2.1. Instruct building occupants to evacuate by most accessible route.
  - 3.1.2.2. Follow Emergency Coordinator 's instructions.
  - 3.1.2.3. Keep all evacuees away from building until instructions to re-enter are given.
  - 3.1.2.4. Account for all occupants in assigned areas.
  - 3.1.2.5. Report missing personnel to Emergency Coordinator.
  - 3.1.2.6. Communicate with Emergency Coordinator for instructions to re-enter a building.
  - 3.1.2.7. Following an emergency evacuation, report the performance of evacuees in their assigned area.

3.2. EMERGENCY COORDINATOR
- 3.2.1 Assign and train Emergency Area Representatives and Alternates (i.e., Attendance Monitors).
- 3.2.2 Maintain current building evacuation plans and designated area evacuation points.
- 3.2.3 Maintain emergency equipment (flashlights, bullhorn).
- 3.2.4 Communicate with all federal, state, and local authorities during an emergency.
- 3.2.5 During an emergency
  - 3.2.5.1. Wear white hat for easy identification.
  - 3.2.5.2. Implement facility emergency evacuation procedure.
- 3.2.6 Assess possible hazards to human health and the environment that may result from the emergency.
- 3.2.7 Implement all reasonable measures necessary to ensure that fires, explosions, and discharges do not occur, recur, or spread.

3.3. ALTERNATE EMERGENCY COORDINATOR
- 3.3.1 Assume Emergency Coordinator's duties during his/her absence
- 3.3.2 Assist Emergency Coordinator.

3.4. FACILITY OCCUPANTS

3.4.1 Evacuate facilities when a facility alarm sounds or if ordered to do so by Emergency Personnel.
3.4.2 Follow the most appropriate evacuation route as established in building evacuation plans
3.4.3 Evacuate to designated rally points.
3.4.4 Do not leave rally points until instructed to do so by Emergency Personnel.
3.4.4.1. All employees must remember if your conditions preclude you from reaching your normal assembly point, you should notify one of the other attendance monitors if possible that you have successfully evacuated from the building.
3.4.5 Please follow any alternate instructions as provided by law enforcement or other emergency responders outside of Kearfott.

3.5. LINE MANAGEMENT
3.5.1 Follow instructions of Emergency Personnel.
3.5.2 During an emergency, maintain employees at evacuation points until further instructions are given.

3.6. LOCAL FIRE DEPARTMENTS
3.6.1 Coordinate response actions with the Emergency Coordinator and Manager of Security and Maintenance.

3.7. LOCAL POLICE DEPARTMENTS
3.7.1 Coordinate response needs with Emergency Coordinator and Manager of Security and Maintenance

4. PROCEDURE

4.1. All employees shall completely evacuate the building to the assigned assembly areas in the east and west parking lots. Once out of the building, they should make every reasonable effort to report to their supervisor to permit completion of a headcount in an expeditious manner.

4.2. Once an alarm is sounded, all vehicular movement at the facility shall cease. This includes commercial delivery and service vehicles in addition to employee vehicles. All driveway access points shall be kept clear to permit emergency response vehicles unimpeded access to the plant. In addition, no employees shall leave the site without the expressed permission of their immediate supervisor.

4.3. No one shall reenter the building until the formal "All Clear" is declared. For routine fire drills, the Vice President or Director of Operations shall have the authority to declare the "All Clear". For any incident that results in West Paterson Fire Department response, the "All Clear" shall be declared by the Fire Chief or his designated representative. **Do not backtrack for personal items!**

4.4. The Emergency Coordinator and designated personnel should be equipped with communication devices and identified for each assembly area. This will permit for rapid transmission of essential information regarding headcount, possible injuries, and "All Clear" information to be available to supervisory personnel. For "All Clear" signals, the use of a bull horn is utilized by the Emergency Coordinator.

5. TRAINING

5.1. Periodically, Emergency Area Representatives shall be retrained with respect to their responsibilities as defined in Section 4.1 above.

5.2. At least annually, an evacuation drill shall be conducted in order to assess the performance of all employees in evacuating the facility in a timely manner.

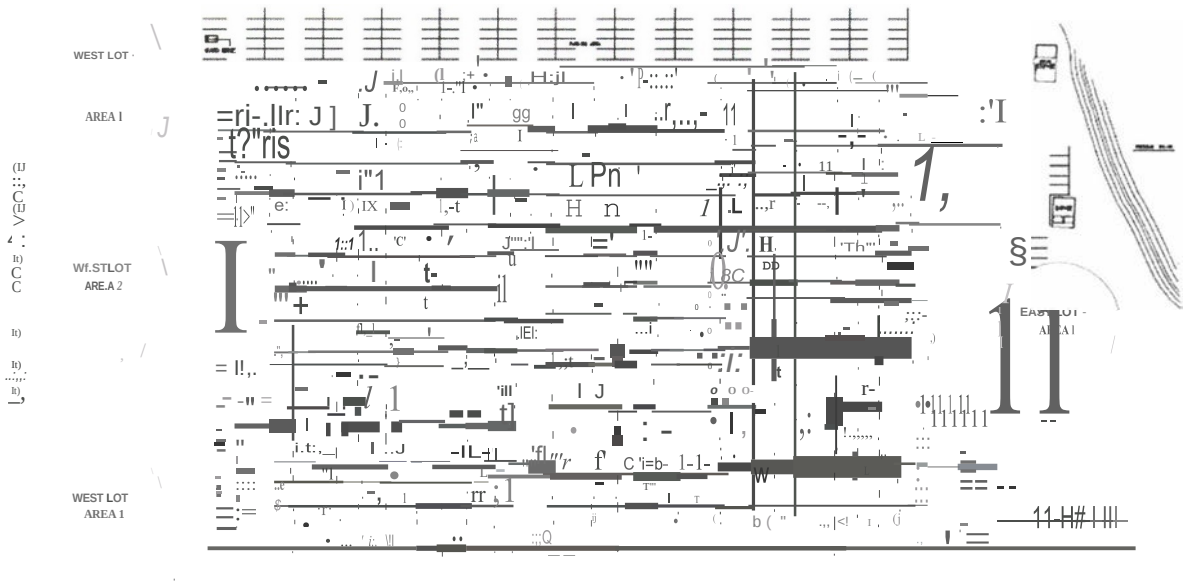
6. RECORDKEEPING

6.1. Following any event that results in evacuation of the facility (fire drill, emergency situation, etc.}, a written evaluation of the performance of the evacuation shall be prepared by the Emergency Coordinator. This evaluation should, at a minimum, describe the nature of the evacuation, the time needed to fully clear the facility, any issues identified during the evacuation that indicate the need for revisions to this procedure or refresher training, and provide corrective actions to address the deficiencies found.

6.2. This Procedure shall be revised and/or modified to address any necessary corrective actions that may be identified during an incident that required implementation of this procedure.

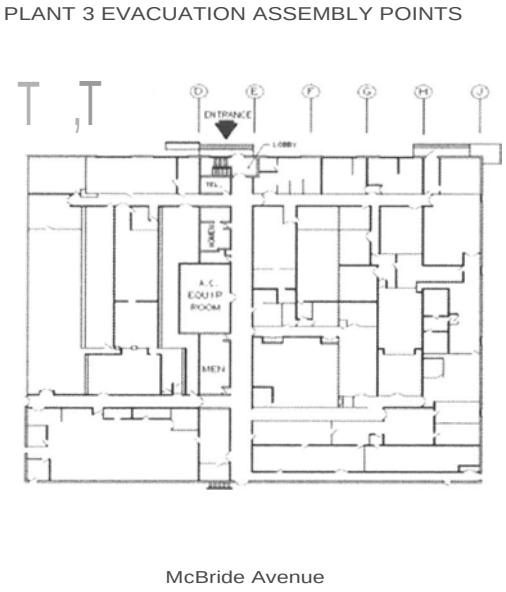
Figure 1 Plant Evacuation Congregation Areas

PLANT 1 EVACUATION ASSEMBLY POINTS



McBride Avenue

Figure 3 Plant Evacuation Congregation Areas



Revision History

Revision Number	Date	Revision	Approved
0	2 July 2018	Original issue	J. P. Pecoraro
1	2 July 2019	Annual Review	J. P. Pecoraro

NRC FORM 313
APPLICATION FOR
EXEMPT DISTRIBUTION LICENSE

KEARFOTT CORPORATION
GUIDANCE & NAVIGATION DIVISION

Training program for individuals working in or frequenting restricted areas.

See attached.

Radiation Safety Training

Updated 07-02-2019

Agenda

- Introductions
- Technical Safety Presentation
- Practical Applications

Instructors

- J. Pecoraro, SHEC & RSO
- D. Cardy, Manufacturing

Attendees

- Attendance Sheet to be filled with Asheville training
- Target employees to include any employee who wears, on a daily basis, a radiation detection device supplied by Landauer

Frequency of Training

- Training will be done on an annual basis
- Training will be recorded in the individual's training records
- Training will expire twelve months from instruction, on the last day of the month.

Outline

- Kearfott's Rad Safety Program
- Responsibilities
  - -SHEC
  - **-RSO**
  - - Supervisor
  - - Employee

Outline

- Definitions
  - Radiation
  - Radiation Area
  - Controlled Area
  - Source Material

Outline

- Safe Handling Procedures
  - Incoming Inspecting
  - RLG Assembly
  - Clean Room Assembly
  - Documentation
  - Disposal

What is Thorium?

- Radioactive metal strip
- abbreviated Th
- occurs naturally, as abundant as lead
- very stable-14,000,000,000 years 1/2 life
- used by Kearfott in RLG

Th radioactive properties

- primary-alpha particle
- secondary-beta particle
- safe working distance-6"
- would not contaminate storage container
- pieces must be collected and disposed due to long, long half-life

Kinds of Radiation

Beta	Small	-	Low
Neutron	Medium	0	High
Proton	Small	+	Low
Alpha	Large	0 and+	Low
Xray	None	0	High
Gamma	None	0	High

Review of Prior Goals

- Financial
- Competitive
- Progress

Radiation Measures

• Dose	• absorbed energy
• Roentgen	• energy in cubic meter
• RAD or Radiation Absorbed Dose	• 100 ergs/gram of material
• REM or Radiation Equivalent in Man	• 100 ergs/gram of man
• Curie	• 37,000,000,000 disintegrations per second

Single event exposures

• 5000 REM	• Death
• 450 REM	• 50°/o survive
• 100 REM	• nausea, fatigue
• 50 REM	• temporary blood changes
• 5 REM	• Maximum permissible annual dose
• 0.3 REM	• chest X-Ray
• 0_1-0 _ RFM	• natural sources

Personal protective measures

- Always wear gloves and use tweezers
- Stay 6 inches away
- Don't grind, file or chip Th strip
- Alcohol wipe of tweezers
- Collect and dispose of all scrap pieces of Th
- Ask questions of supervisors, SHEC, and or/RSO

Dose comparisons

• 1 Th strip	• 0.005 uCi, 0.05 g
• sq mile top soil	• 1.0 g Ra
• smoke detector	• 1.0 uCi
• body covered with Th strips	• 0.48 REM/year
• background and medical	• 0.5 REM/year

Practical Applications

- How to measure radiation
- How to transport
- How to open container
- How to handle Th strip
- How to store and dispose
- Locations for storage

Summary

- Thorium Safety
- Types of Radiation
- Dose Information
- Proper Handling, Storage and Disposal

NRC FORM 313
APPLICATION FOR
EXEMPT DISTRIBUTION LICENSE

KEARFOTI CORPORATION
GUIDANCE & NAVIGATION DIVISION

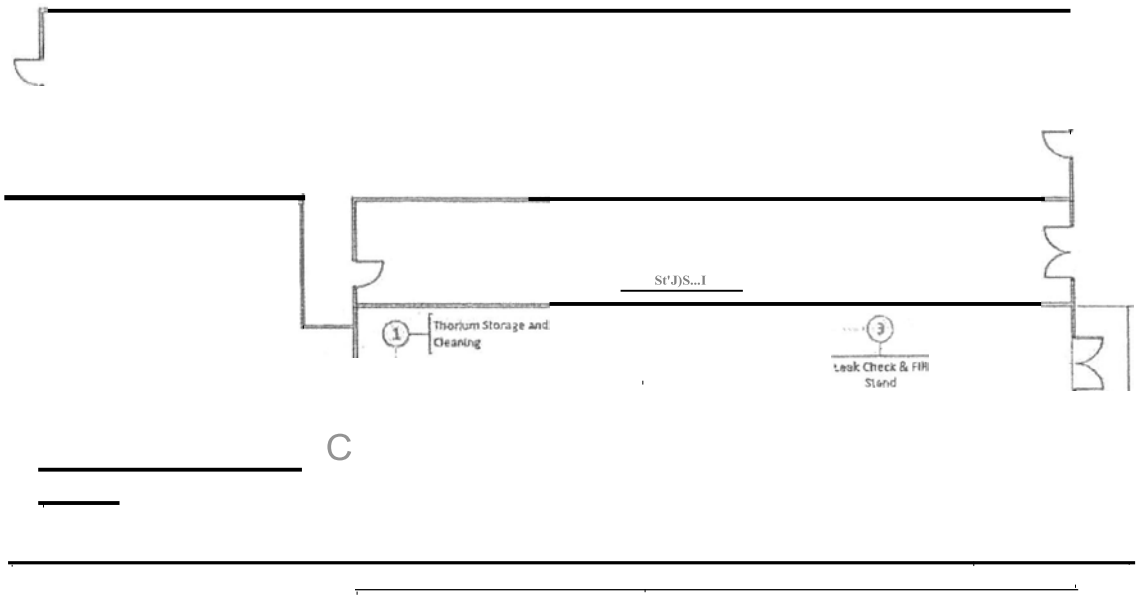
Facilities and equipment.

See the July 2019 Memorandum from Kearfott Corporation to the Nuclear Regulatory Commission and the Radiation Safety Program, including Appendix A (att ach ed).

Number	Issue No.	Date
RAD 1.1	2	02 Ju\v 2018
Subject ***Radiation Safety Program***	Uncontrolled Copy when printed	

APPENDIX "A"
FLOWCHART

Thorium Class 100 Clean Room Route



Safety

- Tho rium (A206170-1Dll s\orr<J in spu.mi::lhorl\Jm storage C.Onla 1ner.
- Whoeo ha nd ling Thotl1Jn1 a R.adlaUon Monitoring e.adg@ worn bythe Operator.
- A ° MOl'litor 4• R.ldlatloo Ate,,t *OetotctO(* i..s iiko 1.Jsed to det!!cl radiation.

NRC FORM 313
APPLICATION FOR
EXEMPT DISTRIBUTION LICENSE

KEARFOTI CORPORATION
GUIDANCE & NAVIGATION DIVISION

Radiation safety program.

See att ached .

Number	Issue No.	Date
RAD 1.1	4	2 Julv 2019
Subject ***Radiation Safety Program***	Uncontrolled Copy when printed	

I. PURPOSE

To provide protection and training for employees who handle radioactive material.

Kearfott commits to the following statements:

"We will survey our facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in Appendix M to NUREG-1556, Vol. 12, Rev. l."

"We will use the model waste procedures and guidelines published in Appendix P to NUREG-1556, Volume 12, Rev. I"

II. SCOPE

This program applies to all Kearfott employees who receive, handle, use, and dispose of radioactive material.

III. DEFINITIONS

Radiation - For the purposes of this program, radiation applies to any quantity of radioactive material capable of producing ionized particles.

Radiation Area - Means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem in I hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Controlled Area - An area used to limit access to radioactive material. Radioactive material must be stored and used in a controlled area.

Source Material - Radioactive material in any physical or chemical form.

IV. RESPONSIBILITIES

A. SAFETY, HEALTH, AND ENVIRONMENTAL CONTROL DEPT. (SHEC)

1. Develop, implement and update Kearfott's Radiation Safety Program.

2. Conduct Radiation Safety Training for employees who receive, hand le , use and dispose of radioactive material. See Appendix A for Safe Handling Procedures For Radioactive Thorium-232. Training to be conducted annua lly, with initial training upon hire date of new employees and every July for existing affected employees

3. Assist Supervisors in tracking the receipt, use, and storage of radioactive material used on site.

4. Maintain employee training records .

B. SUPERVISORS

1. Notify SHEC when new employees will be directly involved with handling of radioactive material.

2. Enforce Kearfott's Radiation Safety Program and ensure trained employees follow safe handling procedures while working with radioactive material.

3. Secure radioactive material to prevent unauthorized removal or access.

4. Designate an inspector to inspect and account for incoming shipments of radioactive material.

5. Document the quantity of radioactive material received and the quantities stored for disposal purposes and forward documentation to SHEC annua ll y.

C. EMPLOYEES

1. Attend Annual Radiation Safety Training Sessions

2. Adhere to the requirements set forth in the training program.

3. Assist supervision in accounting for all quantities of radioactive material.

4. Authorized users listed in Appendix C of this document

D. PURCHASING/RECEIVING/INCOMING INSPECTION

I. RSO will be involved in any purchase of material.

2. Notify RSO and Supervisor of RLG Clean room upon receipt of Incoming shipments of radioactive material

3. Deliver unopened container to designated inspector.

E. RADIATION MONITORING.

I. We will use instruments that meet the radiation monitoring instrument specifications published in Appendix H to NUREG-1556, Vol. 12. We reserve the right to upgrade our survey instruments as necessary

2. Kearfott will monitor individuals in accordance with the Radiation Safety Program .

F. AUDIT **PROGRAM**

I) Radiation dosimeter badges are to be collected on the 10th of every month, and to be returned to the testing company for recording of exposure limits per employee or equipment.

2) RSO to review quantitative results monthly, and report all anomalies to upper management , and is responsible to investigate the possible source of the higher than normal readings.

3) Audit of the Safety Program to be done in conjunction with annual training in July. Audit to include review of the safety program, including any changes

required by regulation upda tes. Audit to encompass work flow, storage, usage and disposal of material.

4) Any deficiencies identified by the internal audit will be corrected within one (1) week of reporting if minor, within 24 hours if major.

5) Survey of the facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in Appendix M to NUREG-1556, Vol.12,Rev. I.

6) All records to be maintained in accordance with Kearfott document retention program.

G. TRAINING PROGRAM

I) Re-certification training will be conducted annually in July
2) Training will inc lude , but not be limited to, the power point presentation entitled "Radiation Safety Training"
3) Agenda of training is to consist of an Introduction to radioactive sources, technical safety presentation and practical applications
4) Attendance sheet is required to be completed and sent to Asheville for proper documentation of class attendance.
5) Training to document proper handling and disposal of Thorium

H. Disposal

See Appendix A, Disposal.

Kearfott will use a ve ndor, that is properly licensed, to collect and transport any discarded strips to a licensed disposal facility in accordance with applicable law.

In the past, Kearfott has used Veolia (EPA ID NJD080631369) who disposed of materials at Alaron Nuclear Services site located at 2138 PA-18 , Wampum, PA 16157, and will continue to use this vendor .

Kearfott will use the model waste procedures and guidelines published in Appendix P to NUREG-1556, Volume 12, Rev. I.

APPENDIX A

SAFE HANDLING PROCEDURES FOR RADIOACTIVE THORIUM-232

GENERAL SAFETY PRECAUTIONS

NOTICE: Handling of Thorium-232 is to be performed only by operators who have been trained and certified in safe handling procedures.

Safe handling procedures must be followed while performing any of the following operations:

I. Inspecting and repackaging of incoming shipments.

2. Installing Thorium-232 in a Ring Laser Gyro (RLG).

3. Removing Thorium-232 from the RLG for disposal.

- Avoid direct contact with Thorium-232
- Operators must use standard latex gloves and tweezers whenever handling Thorium-232
- Limit exposure time when handling Thorium-232
- DO NOT ingest Thorium-232 .
- Keep Thorium-232 gloved hands away from the face.
- All Thorium-232 must be accounted for.
- When finished working with Thor ium- 232, dispose of the glo ves, clean too ls , and wash hands.

FLOW OF THORIUM-232 RECEIVING TO DISPOSAL

RECEIVING

I . Deliver Thorium-232 container to incoming inspection on the day of arrival. Do not open container.

INCOMING INSPECTION

I . Immediately notify the Supervisor of RLG Clean Room and the Safety, Health & Environmental Control Engineer upon accepting container from Receiving.

2. Inspection of the Thorium-232 is to be performed in the RLG Clean Room. A particulate respirator (Moldex R95 Series or equivalent) and standard latex gloves are required during inspection.

3. Inspection of Thorium-232
   - Perform a visual inspection iaw blue print requirements.
   - Repackage Thorium-232 into individual glass vials.
   - Record total quantity of Thorium-232 received on the tracking log .
   - A copy of the arrival report with acceptance stamp must be placed on incoming pick-up shelf for stockroom to process receipt of material.

CLEAN ROOM ASSEMBLY

I. All Thorium-232 use will be documented in the Enterprise Resource Planning (ERP) system. This will control the quantity of strips being used at any time and reduce the possibility of lost or unaccounted radioactive material.

2. Follow operating procedures for installing and removing Thorium-232. Operators must be reminded to use extreme caution when handling the strips and must never touch the strips with the bare skin. The strips must be handled with tweezers using gloved hands at all times.

3. When a determined quantity of scrap is collected inside the Clean Room it must be transported to the lead safe for long term storage, pending disposal. The quantity of Thorium-232 transported to the lead safe must be logged into the Enterprise Resource Planning (ERP) system after removal from the Clean Room.

4. When finished handling radioactive material wash hands and tools.

DOCUMENTATION

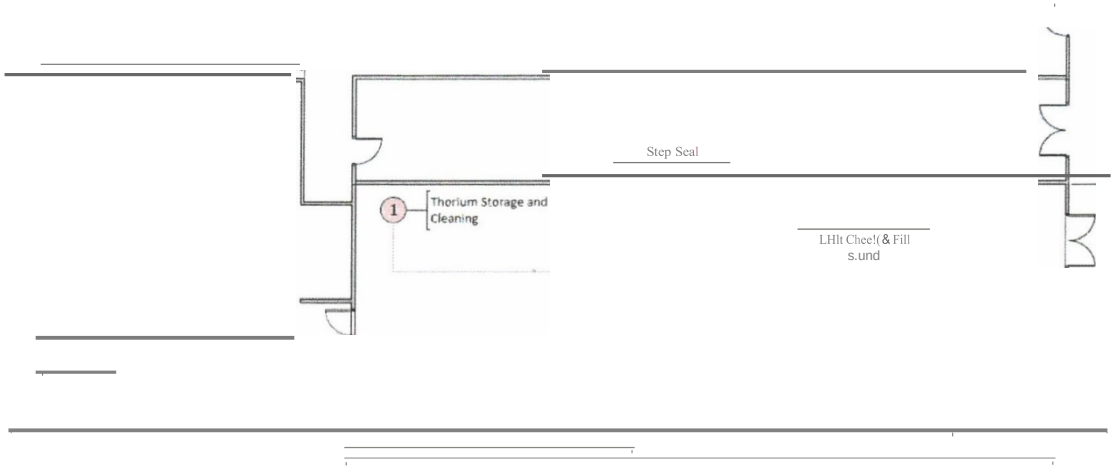
- Tracking of Thorium-232 from Incoming Inspection to final assembly must be logged to provide the Radiation Protection Officer (RPO) and the Safety, Health & Environmental Control Department with data on the location of all radioactive material in storage and production. Logging will be accomplished by means of the Enterprise Resource Planning (ERP) system, which tracks inventory from raw mater ial, in process and finished product.

DISPOSAL

- Storage and dis posal of radioactive waste is s tric tly reg u lated. A ll rad ioactive waste must be transferred to an approved NJ DEP dis posa l co mpa ny. In accordance with N.J.A.C. 7:28-1 .1 , Kearfott on ly contracts with approved ve ndors for dis posa l of all radioactive waste. Vendor m ust supp ly appropriate Uniform Haza rdous Waste Ma n ifest at time of removal of any waste from the faci li ty.
  Docume nts will be kept in accorda nce with th e req u i rements

APPENDIX "B"
FLOWCHART

Thorium Class 100 Clean Room Route

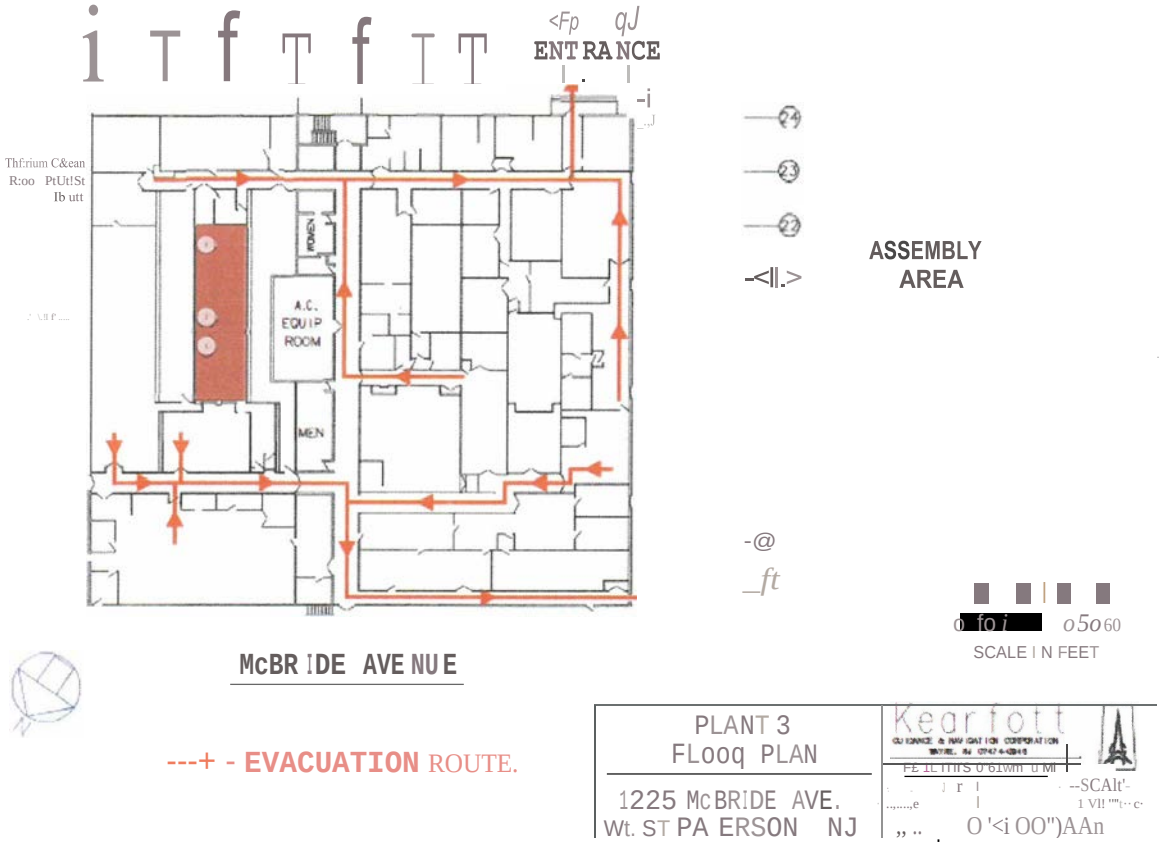


Safety

- Thorium (A.20617()..1011 stored In specific Thorium Storag e Con tainer.
- When handling Thorium ı RidiaUon Monltonng Badge ı worn by the Operator.
- A '"Monitor -4" Radiation Alert Detector ISalso used to detect radiation.

APPENDIX "B" Continued

Class 100 Location in Plant 3



APPENDIXC

AUTHORIZED USERS

Alimi, Hamida (Class 100 Clean Room)

Bellefantie, Lark.land (Quality Control)

Desai, Dhananjay (Quality Control)

Eng, Wai (Engineering)

Genneken, Christian (Class 100 Clean Room)

Gulistan, Bahri (Quality Control)

O'Leary, Patrick (Class 100 Clean Room)

Sarkar, Pankaj (M&P Lab)

Original - June 4, 2004
Revision 1 - Sept. 5, 2017
Revision 2 - July 2, 2018
Revision 3 - Jan 22, 2019
Revision 4 - July 2, 2019

NRC FORM 313
APPLICATION FOR
EXEMPT DISTRIBUTION LICENSE

KEARFOTT CORPORATION
GUIDANCE & NAVIGATION DIVISION

Waste management.

See Radiation Safety Program.