



TREASURY DEPARTMENT

BUREAU OF CUSTOMS

BALTIMORE, MD.



January 12, 1965

REFER TO

Mr. Cecil Buchanan
Isotopes Branch
Division of Materials Licensing
United States Atomic Energy Commission
Washington 21, D.C.

Dear Sir:

Request is made for an amendment to our current license 19-8654-1 (G-66) to possess a narrow band X-ray gold detector containing 100 millicuries of Xe-133 gas hermetically sealed into a stainless steel capsule. The capsule was tested for leakage at the time of manufacture and again before shipment -- a time interval of approximately 1 month to verify the fact the source was sealed.

This unit is a prototype device designed by TRACERLAB under contract from the Department of Isotope Development for evaluation by the U.S. Customs Laboratory. George Rotario of the Isotope Development Group is the project monitor.

The device is appropriately labeled with radioactive caution sign stating the quantity, isotope and date of measurement.

Radiation levels measured at the surface of the instrument when it contained 100 millicuries of Xe-133 were negligible. Radiation level measurements made at the source end at the most accessible area did not exceed 40 mr/ 1 hour. This represents the condition under which the instrument is actually operated - one foot away from the source end. The radiation level is less than 4 mr/ 1 hour. With the protective shield supplied with the instrument in place over the source the radiation level is negligible.

In actual operation this shield is removed. As the Xe-133 decays, additional thin lead absorbers are removed to maintain proper operating level.

Full operating instructions are supplied with the instrument by TRACERLAB and are enclosed herewith.

Thank you for your prompt attention.

Sincerely yours,

A handwritten signature in cursive script that reads "Melvin Lerner".

Melvin Lerner
Chief Chemist

Enclosure

ATOMIC ENERGY COMMISSION
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)

**U.S. Customs Laboratory
103 S. Gay Street - Room 704
Baltimore, Md. 21202**

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL.
**Chief Chemist, U.S. Customs Lab.
103 S. Gay Street - Room 704
Baltimore, Md. 21202**

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

19-8654-1 (A 66)

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

Melvin Lerner, Chief Chemist

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

Melvin Lerner

6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)

Xenon-133

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

**Xenon-133 gaseous form - 100 millicuries
sealed in stainless steel capsule.**

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

Used as activating source in narrow band X-ray gold detector.

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	U.S. Customs Laboratory	4 yrs.	(Yes) No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	U.S. Customs Laboratory	4 yrs.	(Yes) No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	U.S. Customs Laboratory	4 yrs.	(Yes) No	Yes No
d. Biological effects of radiation	U.S. Customs Laboratory	4 yrs.	(Yes) No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Recent experience with exempt quantities of the following radioactive sources: Cobalt 60; Polonium 210; Carbon 14. Four years' experience in the use of equipment for monitoring uranium and thorium ores. On-the-job study of radiation practices and principles.				

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
MARK II	1	C L A S S I F I E D			
Navy Radiac 27E	1	beta and gamma	.01-500	Navy Types BS1 & BS2	Monitoring
NRD Scaler	1	beta & gamma	.01-500	3-4	Measuring

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

Calibrated by Naval Research Lab. once a year; Radioactive Test Sample MX-1083B available.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

N O N E

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) (Yes) No **Fume hoods**

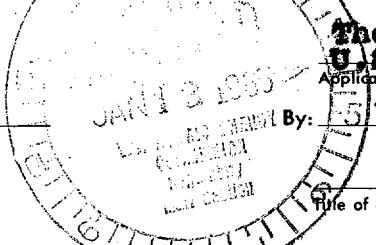
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. **Initial leak tests and radiation survey to be made by installing company.**

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date **January 12, 1965**


 The Treasury Department
U.S. Customs Laboratory
 Applicant named in item 1
 By: *Melvin Lerner*
Melvin Lerner
Chief Chemist
 Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 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 matter within its jurisdiction.

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INSTRUCTIONS FOR USE OF THE TRACERLAB NARROW
BAND X-RAY GOLD DETECTOR

1. Turn instrument on by use of the On-Off switch.
2. With standard in sample position, position range switch so that meter reading is on scale.
3. Adjust Tune for Max. control for maximum reading.
4. With Z Supp and Range Vernier controls full clockwise, the meter reading should be above half scale with Range Switch at 100 position. If it is not, remove a sufficient number of lead source filters (see Half-Life compensation below) to make it so. The removal of one lead foil will increase the meter reading approximately 1.4 times.
5. The amount of gold on the surface of a sample may be compared to that on a standard by normalizing the meter reading obtained from the standard. Meter readings from samples will then be directly in percentages. The meter readings may be normalized by setting the meter needle at full scale with the Range Vernier. It may be necessary to adjust the Range control to do this.
6. The detection of very small amounts of gold on the surfaces of samples may be done as follows: With the Range switch on the lowest position which allows on-scale readings with the sample holder in position, adjust the Z Supp control to set the meter at 20 or at the point where the audio oscillator frequency starts to increase with increasing meter readings. Now, with the sample in the measuring position a sizable increase in counting rate is a good indication of the presence of gold.
7. If the count rate increases only slightly it is possible that the mass of the object is causing increased scatter. This can be compensated for by substituting another article as much like the sample as possible, but without a gold content. The instrument should be set at 20 as previously discussed with the dummy sample, then the original one should be remeasured. An unambiguous increase in counting rate now is a good indication of the presence of gold.
8. After operation for 10 to 12 hours, or when the meter needle falls below 80% when either battery test button is depressed, the instrument should be recharged for about 16 hours.

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Half Life Compensation

1. Since the 5 day half life of Xe-133 would cause a rapid diminution in source strength without compensation, a method has been devised for this compensation. When new, the source is far stronger than needed, but this strength, or activity, is reduced by a number of thin lead foils placed in front of the source. These are removed one by one as the source diminishes in strength, with a probable frequency of two every five days. The following instructions describe the method for removing the lead foils.
2. Arrange the lead glass supplied with the instrument so you must look through it to see the source. Leave enough room to work on the source.
3. Take the truark plier and carefully remove the snapping on the front of the source. Be careful not to apply pressure to the lead foils under the ring.
4. With a sharp, pointed implement such as a sharp lead pencil, a dissecting needle or a scribe, carefully work up the edge of the outer foil at the open slot at one side of the source.
5. When you are sure that only one foil has been loosened, remove it with a pair of tweezers.
6. After the necessary number of foils have been removed, replace the snap ring, using the same care as in removal. The ring need not be tight against the remaining foils, but may be as much as 1/16 inch away.
7. During this procedure, work carefully but do not waste time. The level of activity at the measuring plane is low - 40 mr. per hour -- but unnecessary exposure of the hands is to be avoided.

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REPLACEMENT OF SOURCE

1. When the source decays below the point of usefulness (meter reading below full scale on the Range 10 position with the gold standard), a new source is required.
2. A replacement source from Tracerlab is shipped in its lead hat, or container, with a full complement of lead foils installed. It is not necessary to look at the face of the source, so the lead glass is not needed.
3. To replace the source, remove the bottom ring from the Detector by loosening the four allen-lead screws around the side. The ring may now be removed with the bottom shield in place. Be careful that the lining does not slide out of the Detector tubing.
4. Remove the three screws holding the lead hat in position. Remove the lead hat.
5. Remove the lead cover from the face of the new hat and place it in the same position occupied by the old one. Replace the three screws and tighten.
6. Place the lead cover over the face of the old hat and return it to Tracerlab.
7. Replace the ring on the gold detector and tighten the four allen set screws.