The Toledo Hospital

June 13, 1985

Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Applicant June 24 III
Check No. 21292 $120
Amount Fee Category 7C
Type of Fee annual
Date Check Rec'd 6/26/85
Received By

RECEIVED '85 JUN 26 P12:40

#34-01710-05

To Whom It May Concern:

I am hereby requesting an amendment to The Toledo Hospital's United States Nuclear Regulatory Commission materials license, #34-01710-05, to include the use of Gadolinium-153 in bone mineral analysis. As per a telephone conversation with B. J. Holt I am including the following data in support of my requisition:

Scanning Device: Dual-photon scanning system
Model DP-3 as supplied by
Lunar Radiation Corporation
916 Williamson Street
Madison, Wisconsin 53705
NRC Registration # NR-430-D-101-S

Gadolinium-153 Source: Model GD-1 as supplied by
Gulf Nuclear
Webster, Texas
Source Radioactivity approximately 1 curie
Type of source - sealed
Isotope - Gadolinium-153
Maximum activity on hand 2.5 curies

Note: During normal use only one Gadolinium-153 source will be on site. For continuity of patient scanning, the total amount of activity requested will include the summed radioactivity of a newly received source and the decayed source to be returned to the source manufacturer. Also we request that our license amendment include any other N.R.C. registered sealed source supplier of Gadolinium-153.

Leak Tests: Leak tests will be conducted at 6 month intervals in accordance with N.R.C. Rules and Regulations Part 35.

Principal Use: General medical use in performing bone mineral analysis.

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CONTROL NO. 79207

JUN 21 1985

2142 North Cove Boulevard Toledo, Ohio 43606

Custom Device: No

Authorized Users: C. Douglass Ford, M.D., R.S.O.
William F. Jeffries, M.D.
Daniel Singer, M.D.

Please refer to previously submitted License renewal application for credentials regarding training and experience of the aforementioned users. (Copies enclosed Supplement A).

Training for Individuals Working in or frequenting Restricted Areas:

All Nuclear Medicine personnel are board certified, see previous application for renewal (Copies enclosed).

Facilities & Equipment: Except during source exchanges the Gadolinium-153 source will be in the Lunar DP-3 scanner. This source is contained in a lead lined holder, Lunar model A-SRC-0100-01. If necessary the source will be temporarily stored in a lead container within a locked drawer in the Hot Lab. The entire Nuclear Medicine Department is locked during off hours. (See enclosed copy of department diagram).

RadiationDetection Equipment: See previously submitted License renewal request (copies enclosed) for equipment and calibration procedures. Appendix D

Personnel Monitoring Devices: See enclosed copies of previously submitted License renwal application. All personnelinvolved in maintenance, source exchange, operation and the radiation safety program will be monitored with the devices indicated.

Radiation Protection Program: The Radiation Safety Officer or his designate will be responsible for

1. Receiving shipments of sealed sources
2. Exchanging sources
3. Review of personnel film badge monitor readings
4. Radiation Surveys
5. The semi-annual wipe test of sealed sources
6. Source disposal
7. Emergency Procedures
8. Ensuring proper operation of shutter mechanism
9. Radiation Safety Program including personnel training

Source Exchange: The procedures for source exchange will be explained and demonstrated during the two days of on-site installation and training by a factory representative from Lunar Radiation Corporation. This will include instruction on the installation and replacement of the source. Installation of the source and use of the scanner will not occur prior to such training by the factory representative. (See enclosed installing and removal of source procedures).

Warning Labels: The entrances to the room where the scanner will be located will have the appropriate radiation warning signs posted.

Emergency Procedures: In the event of an emergency the Radiation Safety Officer will be notified immediately. The phone number of the R.S.O. and an alternate will be posted within the room.

Source Disposal: The depleted sealed source will be returned to the manufacturer for disposal. The manufacturer will be notified of the pending shipment and the anticipated delivery date. In the event that the manufacturer is no longer in businesss, or for other reasons cannot accept the source, an alternate method waste disposal will be determined.

James M. Johnson

James M. Johnson
Technical Manager
Nuclear Medicine Department
The Toledo Hospital

Enclosures

SUPPLEMENT A

Training and Experience

As outlined in Regulatory Guide 10.8, Item 8, if a physican has been previously authorized to use the radioactive material requested in this application it is necessary to submit only the previous license number. This is the case for:

C. Douglass Ford, M.D.
William F. Jeffries, M.D.
William D. Eggleston, M.D.
Steven Zeidner, M.D.
Ralph R. Dobelbower Jr., M.D.
Henry R. Silverman III, M.D.
Shui Chin Chen, Ph.D.

Please refer to License #34-01710-05

Doctors Gerald Wayne Marsa, M.D. and Chun Il Mah, M.D. are authorized on our Teletherapy license, #34-01710-07. This, then, may be referred to in regard to their qualifications.

C. Douglass Ford, M.D. has been the Radiation Safety Officer since 1958. I have been informed by Ms. Holt, of your Licensing Section, that Dr. Ford's past experience would preclude the necessity of completing a NRC 313M, listing the training and experience of the Radiation Safety Officer.

Doctors Philip J. Silverman, M.D., Michael R. Hay, M.D., Allan S. Kaufman, M.D., Daniel Singer, M.D., William G. Novak, M.D., and Harvey E. Muehlenbeck, M.D. are currently licensed to use byproduct material under License #34-15184-01. Please refer to this license regarding their qualifications.

A statement from Dr. Warren Nordin's preceptor, Dr. S. C. Chen, is enclosed.

Item No. 8
DATE Jan. 4, 1983

APPENDIX F

Personnel Training Program

Nuclear Medicine Department

1. All technologists working in the Nuclear Medicine Department have been certified as having passed an accepted registry examination such as the American Registry of Radiologic Technologists, The American Society of Clinical Pathologists or The Nuclear Medicine Technologist Certification Board.

   In addition, all technologists participate in Continuing Education programs. These programs include those offered by the Continuing Medical Education Department of the hospital, as well as Nuclear Medicine meetings and workshops outside of the hospital.

2. Before assuming their duties all personnel working with or in the vicinity of radioactive materials shall be informed of the following:

   a) All terms of the license pertinent to Radiation Safety.

   b) Areas where radioactive material is used or stored.

   c) Potential hazards associated with radioactive material.

   d) Radiological safety procedures appropriate to their respective duties.

   e) Pertinent N.R.C. regulations.

   f) Rules and regulations of the license.

   g) Their obligation to report unsafe conditions to the Radiation Safety Officer.

Item No. 12
DATE Jan. 4, 1983

The Toledo Hospital Nuclear Medicine Dept

NOTE:
THIS DRAWING IS FOR INFORMATION ONLY AND IS NOT PART OF THE CONTRACT DOCUMENTS

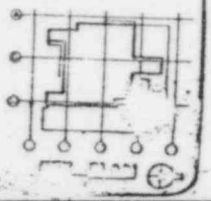
HOLDING
LIN. LINEN
SOILED LINEN
N.M. OFFICE
SOIL HOLD
TRAFFIC
LAV.
CLASSROOM 2
N.M. 5
N.M. 6
PATIENT HOLDING
CORRIDOR
M.T.
W.T.
LOCK
LOCK
HALL
N.M. 4
N.M. CORRIDOR
CONFERENCE
COMPUTER
HALL
DARK ROOM
CALIB.
HOT LAB
WAITING
N.M. 7
EXAM
STERILE PREP
SHOWER
READING
N.M. CORRIDOR
N.M. 3
N.M. 2
N.M. 1
N.M. OFFICE
REPAIR
WET LAB
SECY
SECY/FILES
HALL
2 STAIR
ANGIO 2

Xenon 133 will be administered in either N.M.1 or N.M.2 air flow rates for these two rooms are: intake 850 CFM, exhaust 950 CFM, emergency exhaust 1425 CFM each.
Xenon will be stored and disposed of in the Hot Lab air flow rates in the room are: Supply 275 CFM exhaust 400 CFM emergency exhaust 650 CFM

OUTSIDE WALL

Room dimensions: NM1 - 20X14
NM2 14X18 Hot Lab 9X13.5

PARTIAL 2ND FLOOR PLAN



RADIONUCLIDE RECEIPT

All radionuclides delivered to the Nuclear Medicine department will be placed in the calibration room (2167). Here, as per our previously submitted package receipt procedure, packages will be monitored, wipe tested (if indicated) and a package receipt form completed. See Appendix G of our previously submitted license application (enclosed).

Relevant equipment in the Calibration Room keyed to the enclosed diagram.

#71 "L" Shields (two)

#125 Victoreen Survey Meter - Model 491 - 0.1-100 mr/hr

#128 Capintec Dose Calibrator CRC 16

RADIONUCLIDE STORAGE

All radionuclides will be stored in the Hot Lab #2170.

Relevant equipment in the Hot Lab keyed to the enclosed diagram.

#75 Decay Module DC 203

General Storage Module containing three shelves, a keylocked door and 1/8" lead shielding on all sides.

#76 Decay Module SM 1205

A twelve drawer storage cabinet with keylocked spill proof drawers. In the back of the module are two well shaped storage containers. The module is shielded on all sides by 1/2" lead.

#77 Enclosure Base EB 406

An open storage cabinet with keylocked doors and 1/2" thick lead on all sides.

#78 Sink & Waste Module SW 102

Is a sink with cabinet below. There is an opening in the tope for depositing waste into a container below. The entire module is shielded with 1/8" lead. The door is keylocked.

#79 Decay & Storage Module DSM 405
Is a storage cabinet containing four drawers and three shelves all of which are keylocked. Shielding consists of 1/8" thick lead on all sides.

#80 Preparation Enclosure PE 101

Includes a fume hood enclosure shielded with 1/4" thick lead encased in a stainless steel jacket. There is a sliding shield (1/2" thick lead) on the front opening for personal radiation shielding. The front panel contains

leaded glass that runs the entire width. A rear baffle with a fixed open upper exhaust slot and an adjustable lower exhaust slot are provided for exhausting gaseous radiopharmaceuticals.

All of the above modules have polyurethane painted exterior and interior surfaces to provide corrosion resistance and easier maintenance. The counter tops in the Hot Lab are stainless steel with a 4" rear splash plate and a spill lip on the remaining three sides.

The counter tops in the Wet Lab and Calibration Room are of similar construction but are covered with Formica.

#74 Refrigerator

All radioactivity stored in the refrigerator will remain in the manufacturer's shipping container (lead pig). In addition, a 1/4" thick lead ring is placed around the shipping container. The average radiation reading at the surface is less than 2 mr/hr.

#108 Generator Safe GS 101

Is a shielded container used for the storage of our Mo99-Tc99m generator. The shield contains approximately 1" of lead on all sides. In addition to this a shield consisting of 1½" thick lead will be placed inside the generator safe. This then would result in an overall generator shield thickness of 2½" of lead beyond the shielding provided by the manufacturer.

#71 "L" Shield

Additional counter top shielding (2" thick lead bricks) will be provided for counter top radiopharmaceutical preparation such as boiling of sulfur colloid preparations. Remote handling devices such as 6-8" forceps are available for handling of vials containing radioactivity.

During routine department hours (8:00 a.m.-4:30 p.m.) radiopharmaceuticals will be prepared in the Hot Lab and stored in the Calibration Room. All radiopharmaceuticals in the Calibration Room are placed in color coded lead containers (usually about ¼" thick lead). L shields and syringe shields are also available for additional shielding. Patient doses will be drawn up and assayed in the calibration room. At the end of each working day all radiopharmaceuticals will be moved into the Hot Lab for storage or disposal. The entrance to the Hot Lab will be locked at the end of the working day. Short half-lived radionuclides will be stored in the Hot Lab until sufficient time has lapsed for disposal as nonradioactive waste (minimum of 10 half-lives). Radionuclides with longer half-lives will be temporarily stored in the Hot Lab until they can be moved to our long term storage facility located in the basement of the parking garage. (See enclosed diagram). All radionuclide disposal will be in accordance with previously stated policies and procedures. (See previous license application Appendix L, enclosed).

All patient doses will be administered either in the patient imaging rooms or in the patient holding area.

All areas involved with radiopharmaceutical preparation and dose administration will be surveyed at the end of each working day. Survey results will be recorded and maintained in a survey log.

All radionuclides stored in the Hot Lab or Calibration Room will be sufficiently shielded so as to ensure that radiation levels outside of these areas do not exceed the limits specified in Paragraph 20.105 (b) of 10 CFR Part 20.

The Hot Lab entrance and Calibration Room will be posted with "Caution Radioactive Materials" and "Caution Radiation Area" signs. The Wet Lab will be posted with a "Caution Radioactive Materials" sign.

In regard to the use of radioactive gases, especially Xe 133, the following changes have been made:

Use and Storage

1. All Xenon doses will be administered in either NM 1 or NM 2 (see diagram).
2. All Xenon will be stored in the "Hot Lab". Vials that are not currently being used will be stored in their lead shipping container and shielded with an additional ¼" of lead. Vials no longer in use will be stored in one of the decay modules located in the "Hot Lab".
3. Used Xenon charcoal filters will be shielded with up to ½" of lead and stored in the Hot Lab until they can be transported to the long term storage area located in the parking garage, where they will remain until they have decayed to background levels.
4. Ventilation - Imaging rooms, NM 1 and NM 2,have a supply air flow of 850 CFM each. The exhuast air flow for each room is 950 CFM. The Hot Lab has a supply air flow of 275 CFM and an exhaust air flow of 200 CFM at the floor and an additional 200 CFM at the exhaust hood. An emergency exhaust system has been installed which would increase the imaging room exhaust rates to 1425 CFM. The Hot Lab increase would be to 600 CFM. Each area is equipped with a "Pilot" light to indicate that the exhaust fans are on. All three areas, NM 1, NM 2 and the Hot Lab have completely separate exhaust systems. All exhausted air is vented directly to the roof of the new building. Exhaust vents are located at least 50 feet from the nearest intake and are positioned so as to direct the air away from the building. At no time is any of the air from these areas recirculated into the hospital atmosphere. No changes in flow rates are anticipated between heating and cooling seasons. The ventilation system will be checked to confirm effective operation on an annual basis. The system will be checked for proper mechanical function on a quartly basis by our Maintenance Department as part of a preventative maintenance program.

Emergency Procedures

In the event of an accidental release of Xenon 133 the following procedures will be observed:

Hot Lab:

1) The exhaust fans will be turned up to emergency speed (600 CFM).
2) The Xenon trap will be activated.
3) The room will be evacuated and the door closed.
4) The room will remain empty until the volume of air in the room can be exchanged 10 times. (approximately 16 minutes)
5) Upon reentry the room will be surveyed with a low level survey meter (0-0.1 mr/hr).
6) Areas of contamination will be decontaminated as outlined in Appendix J of our previous submitted license renewal application.
7) The safety procedures described in Appendix J of our previously submitted license renwal application will be observed whenever handling radioactivity.

In the event of an accidental release of Xenon 133 in an imaging area the following procedures will be observed:

1. The exhaust fans will be turned up to emergency speed (1425 CFM).
2. The patient and technologist will leave the room, and the door will be closed.
3. The room will remain empty until the volume of air in the room can be exchanged 10 times. (approximately 16 minutes)
4. Upon reentry the room will be surveyed with a low level survey meter (0.-0.1 mr/hr).
5. Areas of contamination will be decontaminated as outlined in Appendix J of our previously submitted license renewal application.

Air Concentrations of Xenon 133 in Restricted Areas

$(\frac{A}{V})\ (f) \leq 1 \times 10^{-5}$ uCi/ml

Radioactive gases will be used in rooms marked N.M. 1 & N.M. 2
Supply air flow for each room is 850 CFM
Exhaust air flow for each room is 950 CFM

$$V \geq \frac{A\ f}{1 \times 10^{-5}\ \text{uCi/ml}}$$

Where

V = volume of air available per week for dilution of Xe-133
A = maximum amount of Xe-133 to be used/week
1×10^{-5} uCi/ml = NRC maximum allowable concentration in a restricted area
f = average leakage of Xe-133/week
1 CFM = 6.79×10^{7} ml/40 hour week

$$(950\ \text{CFM})\ (6.79 \times 10^{7}\ \text{ml/40 hr. week/CFM}) = \frac{(A)(0.35)}{1 \times 10^{-5}\ \text{uCi/ml}} =$$

A = 1843 mCi can be administered/40 hour week with an average patient dose of 10 mCi it would be feasible that we could administer up to 184 doses/week. Presently, we are performing approximately 10-15 ventilation scans/week.

Method of Xenon Disposal

The exhaust flow for our Hot Lab is 400 CFM using this figure to determine the maximum amount of Xenon 133 that may be exhaused into an unrestricted yields a value of

Calculations:

$C = \frac{A}{V} \leq 3 \times 10^{-7}$ uci/ml
V = air flow/year
A = maximum amount of Xe-133 to be released/year
3×10^{-7} uci/ml = NRC maximum allowable concentrations of Xenon 133 that may be released into an unrestricted area/year.
Hot Lab exhaust rate = 400 CFM

$A \leq (3 \times 10^{-7}\ \text{uCi/ml})\ (V)$
V = 400 CFM = 5.936×10^{12} ml/year
$A \leq (3 \times 10^{-7}\ \text{uCi/ml})\ (5.936 \times 10^{12}\ \text{ml/year})$
$A \leq 1.78 \times 10^{6}$ uci/year
$A \leq 1.78 \times 10^{3}$ mCi/year
A ≤ 1.78 curies/year

At present we are using a Radax Model #120 Xenon trap with a charcoal filter to dispose of unwanted Xenon. This trap is set to give an audilbe warning when 2 microcuries or more of Xenon gets past the filter cartridge. The problem of trap leakage has been solved by venting the exhaused air from the trap directly into the exhaust hood, which in turn vents the Xenon to the roof of the building. From the above calculations 34 millicuries/week could be exhausted from the Hot Lab. I find it very unlikely that we would even approach this limit. When the Xenon filters are saturated they are temporarily stored in the Hot Lab's decay modules until they can be transported to the long term storage area in the parking garage. The storage area is frequently monitored, has appropriate radiation signs posted, is only accessible via a locked door and have permanent records of radiation levels and disposals. After an appropriate time interval has lapsed to allow for decay, the filter is monitored for residual radioactivity. If it has decayed down to a background level, it is discarded in the hospital trash. A permanent record of the disposal is kept.

Estimated quantities of Xenon to be used (20-25 studies/wk) dosage (10 mCi/patient) and the desired possession limit of 1.5 curies remains unchanged.

Other information regarding equipment utilized during ventilation studies including procedurs for routine use and our Xenon trap can be found in the enclosed copy of our previously submitted license renewal application Appendix O, Jan. 4, 1983. (Relevant data indicated by arrow)

APPENDIX D

Survey Meter Calibration

Nuclear Medicine Department

Survey Meters:

Victoreen Survey Meter Model 491

Victoreen Survey Meter Model 6A

Victoreen Survey Meter 740F

Victoreen Survey Meter Model 1A

Calibration Procedures:

1. Victoreen Survey Meter Model 491, Geiger-Mueller detector

   a) Frequency - at least annually and following repair.

      1) electronic calibration as per manufacturer's procedure

      2) an additional calibration check using a Cs^{137} source containing 220 uCi of Cs^{137} will be performed. This source is a New England Nuclear source #356. It was calibrated by direct comparison to a standard certified by the National Bureau of Standards with an overall error of $\pm$4.3% and does approximate a point source.

      3) The instrument will be checked for accuracy on the exposure ranges routinely used for daily surveys (at least 2 points on each scale). Calibration will be considered correct if the exposure rate measured by the instrument varies by less than 10% from the true exposure rate.

      4) A certificate of instrument calibration as shown on page 10.8-26

of Regulatory Guide 10.8 will be completed with each calibration.

5. The check source on the side of the instrument will also be monitored at the time of calibration. This reading will be noted on the instrument so that it can be referred to as a method of daily calibration check. If at any time a reading of the check source, measured with the same geometry, is not within $\pm$20% of the reading noted at the time of calibration, the instrument will be recalibrated.
6. Those ranges not calibrated will be noted on the instrument. Higher scales will, however, be checked for response.

b) Daily

1. Battery check.
2. Check source on the side of the instrument.

c) Documentation

1. All results of the calibration procedure referrred to above in Part a will be recorded.
2. Records of instrument repair and maintenance will be kept on file.

2. Victoreen Survey Meter Model 6A, Geiger-Mueller detector, calibration procedure:

a) Same as that indicated for Victoreen survey meter Model #491.

3. Victoreen Survey Meter Model 740F, cutie pie, calibration procedure:

a) At least annually and following repair.

1. Electronic calibration as per manufacturer's procedure.
2. An additional calibration check using a Tc99m source containing at least 178 mCi will be used. This source will be calibrated as per our routine procedure for Tc99m assay which is ultimately traceable to a National Bureau of Standards source containing 5 mCi of Co^{57} with an overall error of ±2.9%. This source will approximate a point source.
3. The instrument will be checked for accuracy on the exposure ranges routinely used for surveys (at least 2 points on each scale up to 1R/HR). Calibration will be considered correct if the exposure rate as measured by the instrument varies by less than 10% from the true exposure rate.
4. A certificate of instrument calibration as shown on page 10.8-26 of the Regulatory Guide 10.8 will be completed with each calibration.
5. Higher scales not calibrated will be noted on the instrument. Higher scales will, however, be checked for response.

b) When used

1. The batteries and the meter "zero" will be checked.

c) Documentation

1. All results of the calibration procedure referred to above in Part a will be recorded.
2. Records of instrument repair and maintenance will be kept on file.

4. Victoreen Survey Meter Model 1A, ionization chamber calibration procedure:

a) This survey meter is a civil defense meter and is not used on a routine basis. Once a year, however, the batteries are replaced and a circut check is performed. Other than this the instrument is not calibrated.

Note: If it is anticipated that a particular survey instrument will be used to determine radiation levels of a certain radionuclide, (for instance following an ablative dose of I-131) the instrument will be calibrated for that given radionuclide. Calibration correction factors, if necessary, will be noted on the instrument. Other sources available for this purpose are; New England Nuclear's

Ba 133, 282 uci, Accuracy of assay $\pm$ 3 -5% (NES 358)
with National Bureau of Standards traceability

Co ^{57}, 5 mCi Accuracy of assay $\pm$ 2.9% (NES 206)
with National Bureau of Standards traceability

If a survey meter cannot be adjusted to read within the $\pm$ 10% allowable variance, a calibration factor will be determined and posted on the instrument.

Readings of greater than $\pm$20% variance from the calculated values will not be correctable via a calibration factor and would indicate a need for repair.

The manufacturer's radiation safety recommendations, as well as the safety precautions listed in Appendix G,will be followed whenever handling radioactive sources used in calibration.

Item No. 10
DATE Jan. 4, 1983

SURVEY METER CALIBRATION

DATE_____ CALIBRATED by_____

Instrument:

Manufacturer _____

Type _____

Model Number _____

Serial Number _____

Calibration Source_____ _____ Gamma Constant _____

Exposure Rate for Source _____

Calibration Data

Scale	Distance (cm)	D^2	Actual mr/Hr	Calculated mr/Hr

COMMENTS:_____

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY		FILM		
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
		TLD		
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

Nuclear Medicine Department

Whole Body	Film	R. S. Landauer	Biweekly
Finger Badges	TLD	R. S. Landauer	Weekly

POCKET DOSIMETERS.

Ligand Lab

Whole Body	Film	R. S. Landauer	Monthly

Oncology Department

Whole Body	Film	R. S. Landauer	Monthly
Finger Badges	TLD	R. S. Landauer	Monthly

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS

CITY | STATE | ZIP CODE

b. ATTACH A COPY OF THE AGREEMENT LETTER SIGNED BY THE HOSPITAL ADMINISTRATOR.

c. WHEN REQUESTING THERAPY PROCEDURES, ATTACH A COPY OF RADIATION SAFETY PRECAUTIONS TO BE TAKEN AND LIST AVAILABLE RADIATION DETECTION INSTRUMENTS.

26. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 1a certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Parts 30 and 35, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)*

(1) LICENSE FEE CATEGORY: 7b

(2) LICENSE FEE ENCLOSED: $ 150.00

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

C. Douglass Ford MD

(1) NAME *(Type or Print)*: C. Douglass Ford, M.D.

(2) TITLE: Radiation Safety Officer/ Director Nuclear Medicine Department

c. DATE: 9 Feb 83

C.2.b Installing a Source

1. Use the "shutter open" command of OPTION 5. Alternatively the shutter can be manually opened. Be careful to keep hands and other body parts clear of the actual radiation beam. If the shutter is opened manually, do not force the shutter blade to swing more than 35 degrees; then tape the shutter in this (open) position.

2. For new scanners the source holder is provided with the source. The collimator will not have a cap. Remove the collimator from the scanner.

3. Place the lead cap on the source holder onto the brass collimator provided with the scanner. Thread the source holder onto the base of the collimator. Do not force the collimator onto the source holder or it may cross-thread. The source collimato. and holder can now be handled as a unit.

4. Slide the source collimator-holder into the source chuck (Fig. 12) so that the pin on the bottom fits into the notch on the source chuck. The collimator shoulder should rest on the top of the chuck (not the chuck ring).

5. Use the "shutter close" command of OPTION 5 or remove the tape if the shutter is held open manually.

6. Verify that the shutter can swing into the notch on the collimator (Fig. 12).

7. Turn the chuck ring clockwise until the collimator is held firmly in the chuck.

8. Remove the source holder cap from the top of the collimator.

   CAUTION: A narrow beam of intense radiation is now projected upward from the collimator aperture.

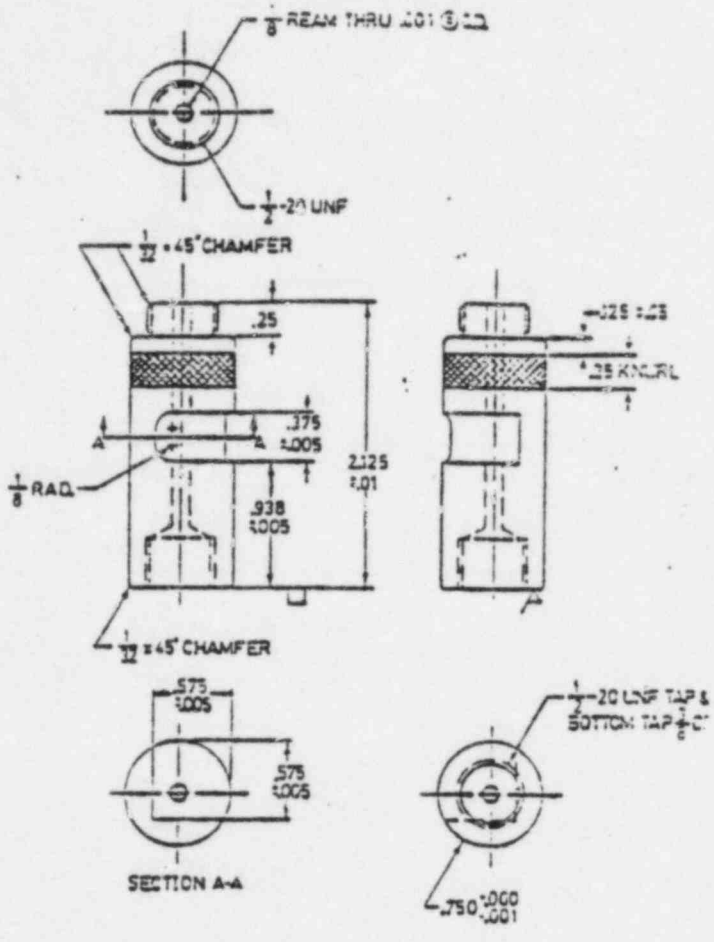
9. Check the shutter for proper operation (User Manual - Standard Scan and QA).

10. Replace the lucite insert (and place the pad on the table). Be sure the lucite insert is placed properly.

11. Monitor radiation levels around the table to insure operator safety.

This completes the source installation procedure.

FIGURE 13
Collimator Details



LUNAR RADIATION CORP. MADISON, WISCONSIN	
TITLE DP3 SOURCE COLLIMATOR (REVISED)	
PART #	MATERIAL BRASS
FOR ASSEMBLY	TOLERANCES (UNLESS OTHERWISE SPECIFIED) .00 ±.01 .000 ±.001
SCALE NONE	DIMENSIONS ARE IN INCHES
DES. BY H NOELDNER 2/82	DRAFTSMAN B RUSCH 2/82
CHECKED BY	CODE

FIGURE 11
Source Collimator/Holder Assembly

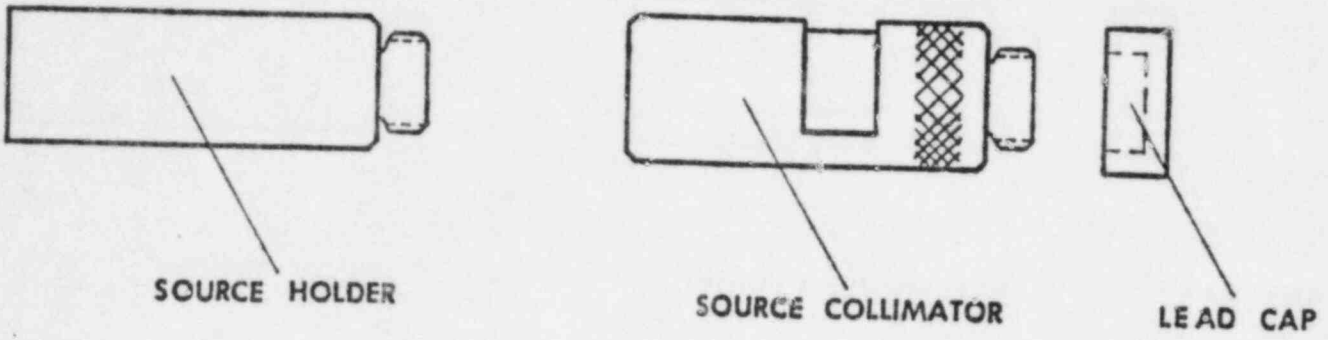


FIGURE 12
Side View of Transverse Carriage

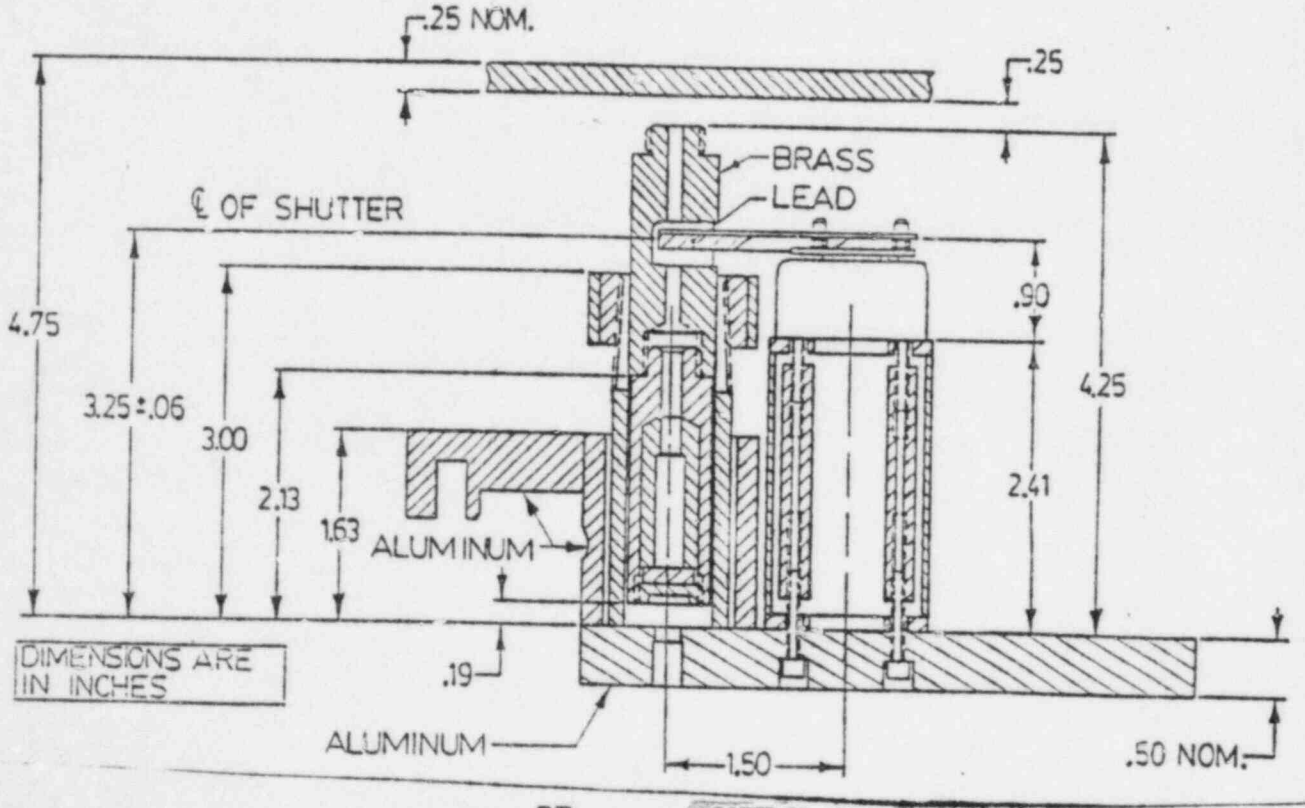
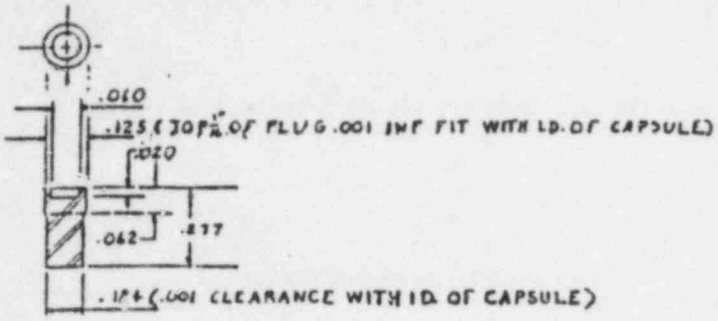
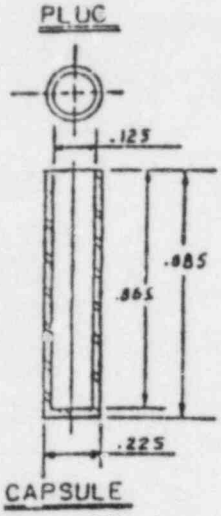
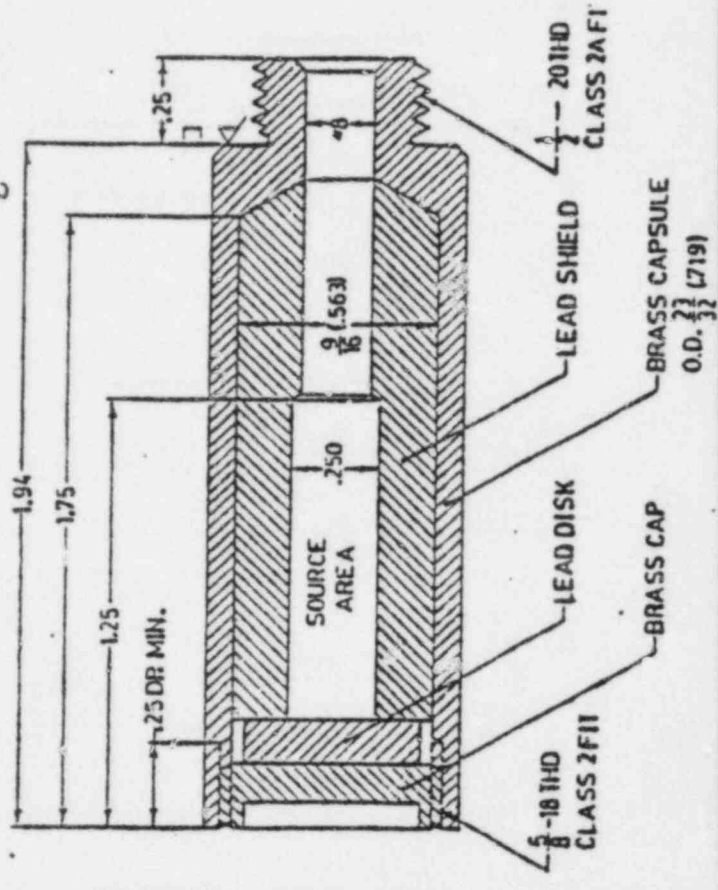


FIGURE 10
Source Holder for 153-Gd Capsule





CAPSULE
MODEL. GD-1



NOTE—CAPSULE CAN BE EITHER 17-4PH S.S. OR 2024-T4 ALUMINUM

REVISIONS			GULF NUCLEAR, INC.			
NO.	DATE	BY	GADOLINIUM CAPSULE			
1						
2						
3			DRAWN BY FGI	SCALE NONE	MATERIAL 17-4PH SS	
4			CHK'D	DATE 4-3-77	DRAWING NO. A-120	
5			TRACED	APP'D		

LUNAR RADIATION CORP. of MADISON, WISCONSIN		
TITLE GADOLINIUM 153 SOURCE HOLDER		
PART #	MATERIAL BRASS & LEAD	
FOR ASSEMBLY	CLEARANCES (UNLESS OTHERWISE SPECIFIED) .00 ±.01 .000 ±.001	
SCALE 2:1	DIMENSIONS ARE IN INCHES	BREAK ALL EDGES AND CORNERS
DESIGNER date	DRAFTSMAN date S. BUSCH 2/82	CHECKED date
ENGINEER date		

C.2 INSTALLING AND REMOVING THE SOURCE

WARNING: Only personnel trained in the principles of radiation safety and protection should conduct these procedures. The technician should study the following procedures before an actual source transfer is attempted. The press-on lablel withe the warning "CAUTION - RADIOACTIVE MATERIALS" should be affixed to the table of the scanner in a location where it can be seen by the operator, patients and/or visitors to the area where measurements are done.

All steps can be conducted without tools. Use of pliers, clamps, etc. in the procedures may cause damage to parts. The "source" consists of a capsule containing gadolinium in solid form (FIG 9). This source is encapsulated in a lead-lined (4mm) brass source holder (FIG 10).

C.2.a. Removing the Source

PROCEDURE

1. Remove pad (if any) and the lucite insert from the table.

2. Use OPTION 5 (Static Counter, User Manual) of the CLUNAR program to position the arm and source at the center of the window.

3. Place a lead source holder cap onto the source collimator (FIG 11).

4. Use the "shutter open" command of OPTION 5. Alternatively the shutter can be manually opened. Be careful to keep hands and other body parts clear of the actual radiation beam. If the shutter is opened manually, do not force the shutter blade to swing more than 35 degrees; then tape the shutter in this (open) position.

5. Turn the chuck ring (FIG 12) counterclockwise until the collimator is loose in the chuck. Do not completely loosen the chuck ring.

6. Pull the source collimator (which will have the source holder attached to the end of it) out of the chuck. The source collimator and holder can now be handled as a unit.

8. Holding the source collimator and souce-holder upright (as they were positioned in the scanner), unscrew the source-holder from the collimator. Put a lead cap on the source holder.

   CAUTION: RADIATION PRESENT! After the collimator is removed a broad beam of high intensity radiation projects from the top of the source-holder. Exercise due caution.