

FORM NRC-313 I (3-80) 10 CFR 30 U.S. NUCLEAR REGULATORY COMMISSION

1. APPLICATION FOR: (Check and/or complete as appropriate)

APPLICATION FOR BYPRODUCT MATERIAL LICENSE INDUSTRIAL

a. NEW LICENSE

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

b. AMENDMENT TO: LICENSE NUMBER

c. RENEWAL OF: LICENSE NUMBER 08-14043-01

2. APPLICANT'S NAME (Institution, firm, person, etc.)

IRAD/IRID INC.

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION (202) 387-2655

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION

DR. David G. Mahan-President

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION (202) 387-2655

4. APPLICANT'S MAILING ADDRESS (Include Zip Code) (Address to which NRC correspondence, notices, bulletins, etc., should be sent.)

600 U STREET, N.W. WASHINGTON, D.C. 20001

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED (Include Zip Code)

SAME AS IN ITEM 4

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL (See Items 16 and 17 for required training and experience of each individual named below)

FULL NAME	TITLE
a. DR. David G. Mahan	PRESIDENT
J. RAO NIBHANUPUDY	RADIATION SAFETY OFFICER
b. KRISHNAN SUTHANTHIRAN	VICE-PRESIDENT
RAJKUMAR KRISHNAN	PRODUCTION MANAGER
c. S.K. GHOSH	RADIATION SAFETY AND QUALITY CONTROL TECHNICIAN.

7. RADIATION PROTECTION OFFICER

J. RAO NIBHANUPUDY

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

LINE NO.	ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source)	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
A	B	C	D	E
(1)	IRIDIUM 192	Iridium-Platinum alloy sealed in stainless steel	RAD/IRID INC. capsule	15 curies
(2)	Chromium-51	Metal	Model 1	150 Millicuries
(3)	Iron-59	Metal	-	5 Millicuries
(4)	Cobalt-60	Metal	-	15 Millicuries
(5)	Cobalt-58	Metal	-	10 Millicuries
(6)	Manganese-54	Metal	-	5 Millicuries

DESCRIBE USE OF LICENSED MATERIAL

(1) Fabrication of medical therapy sources and distribution to specific licensees.

(2) Items (2 through 6) : possession as impurities formed as a result of irradiation of the metal capsule containing iridium seeds.

9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Source Holders	RAD/IRID INC.	R/I P-1P-2,
(2)			P-3and P-4
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)						
(2)	SEE ATTACHED SHEET.					
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

<input type="checkbox"/> a. CALIBRATED BY SERVICE COMPANY NAME, ADDRESS, AND FREQUENCY	<input type="checkbox"/> b. CALIBRATED BY APPLICANT Attach a separate sheet describing method, frequency and standards used for calibrating instruments.
-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
<input type="checkbox"/> (1) FILM BADGE <input checked="" type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD) Wholebody & ring <input type="checkbox"/> (3) OTHER (Specify): _____	Eberline Company Santa Fe, New Mexico	<input checked="" type="checkbox"/> MONTHLY <input type="checkbox"/> QUARTERLY <input type="checkbox"/> OTHER (Specify): _____

13. FACILITIES AND EQUIPMENT (Check where appropriate and attach annotated sketch(es) and description(s).)

a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.  
 b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.  
 c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.  
 d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED  
**RADIATION SAFETY ORGANIZATION, 16305 GRATES ST., LAUREL, MARYLAND 20810**

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

**INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17**

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

- 15. **RADIATION PROTECTION PROGRAM.** Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures (if needed), day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.
- 16. **FORMAL TRAINING IN RADIATION SAFETY.** Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.
  - e. Principles and practices of radiation protection.
  - b. Radioactivity measurement standardization and monitoring techniques and instruments.
  - c. Mathematics and calculations basic to the use and measurement of radioactivity.
  - d. Biological effects of radiation.
- 17. **EXPERIENCE.** Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

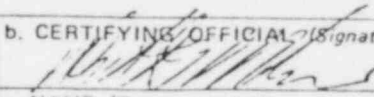
Applicant	1381
Check No.	1381
Amount/Fee Category	\$150 (3A) + \$310 5/12 7/81
Type of Fee	Renewal
Date Check Recd.	5/5/81
Received By	BROWN

1441  
 18. CERTIFICATE  
 This item must be completed by applicant  
 Brown

RECEIVED BY LFMB	
Date	5/5/81
Log	May 6 1981
By	Brown
Orig. To	
Action Compl.	

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, 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.

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.

a. LICENSE FEE REQUIRED (See Section 170.31, 10 CFR 170)	b. CERTIFYING OFFICIAL (Signature) 
	c. NAME (Type or print) Dr. David G. Mahan
(1) LICENSE FEE CATEGORY: 3B	d. TITLE President
(2) LICENSE FEE ENCLOSED: \$150.00	e. DATE 4/20/81

ITEM#8

DESCRIPTION OF RAD/IRID SOURCE, TYPE-1

PLEASE SEE THE ATTACHED SHEET WITH TITLE "RAD/IRID SOURCE TYPE-I" and Fig "1", for construction, proto type tests and quality controls.

Iridium-192 Seeds in nylon ribbons for interstitial implants are illustrated in fig.2.

# RAD/IRID SOURCE-TYPE 1.

- A. Identification: Rad/Irid - 1
- B. Proposed Use: For removable interstitial implant.
- C. Radioisotope: Iridium 192 in form of a 30% Iridium - 70% platinum alloy wire of a 0.075 mm (0.003 inches) in diameter up to 1.0 mc per wire, 2 to 4 Curies total.
- D. Construction: Active material in 2 stainless steel capsules. The inner stainless steel capsule has an inside diameter of 0.225 mm (0.009 inches). Outer capsule has an outside diameter of 0.50 mm (0.020 inches), capsules are cold welded by shearing forces.
- E. Prototype Tests: These sources have been in use for 22 years and no problems have been encountered in clinical practice.
- Corrosion: Sources have been exposed to water and to cold and warm isotonic saline solutions (0.025% sodium Chloride by weight) for periods up to 6 months without any signs of corrosion or deterioration.
- Prolonged exposure to concentrated "zephherin" (antiseptic solution) up to 6 months shows no signs of corrosion or deterioration.
- Sources are autoclaved at pressure up to 350 psi and temperatures up to 250 F for 30 minute periods without any adverse affects noticed.
- F. Quality Controls: Are provided routinely throughout the manufacturer and use of the sources. The stainless steel tubing from which the capsules are made are certified by the manufacturer (Superior Tube Company) to be type 304 stainless steel hyperdemic needle tubing with the usual composition and mechanical properties tested and notorized. The manufacturer (Engelhard Industries) of the wire used certify it to be an alloy of 30% Iridium and 70% platinum. During seed fabrication representative numbers are individually inspected with a microscope to ensure the cold weld when fabrication is complete, all seeds are individually inspected for uniformity, bent or damaged seeds are discarded. After seeds are irradiated they are comparatively measured with a standard of known activity. Representative are then smear tested for possible contamination.

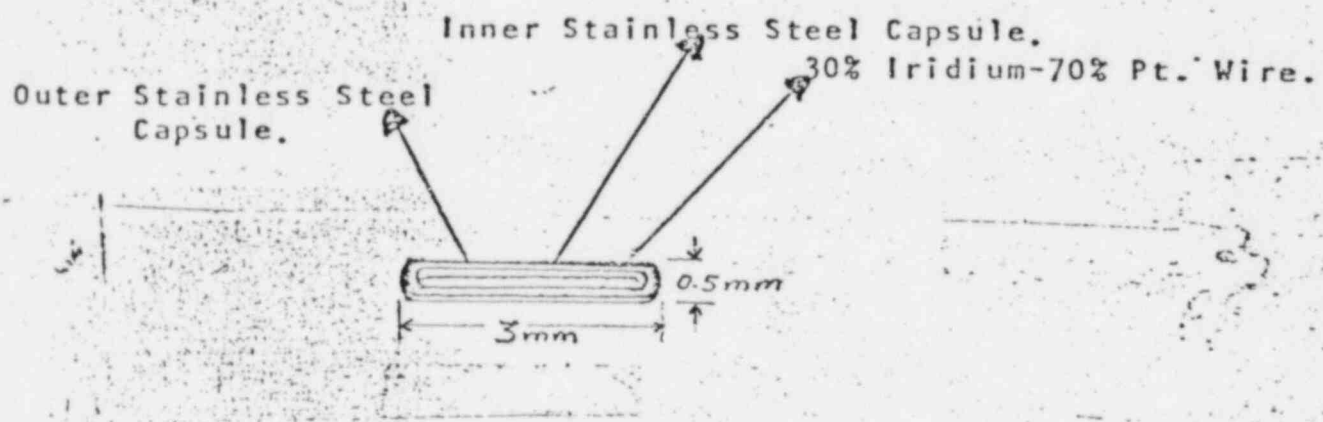
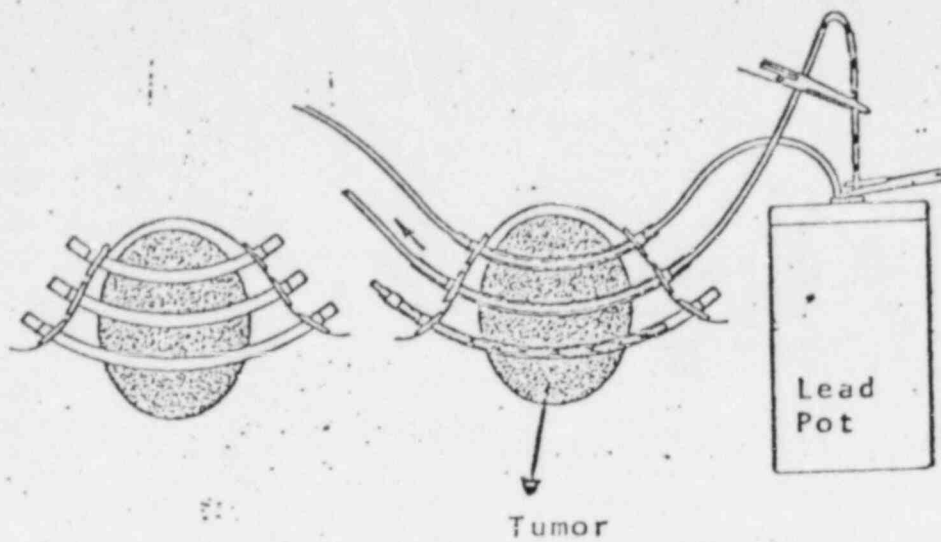


Fig. 1: Iridium - 192 Seed.





# IRIDIUM 192 SEEDS IN NYLON RIBBONS for Interstitial Implants

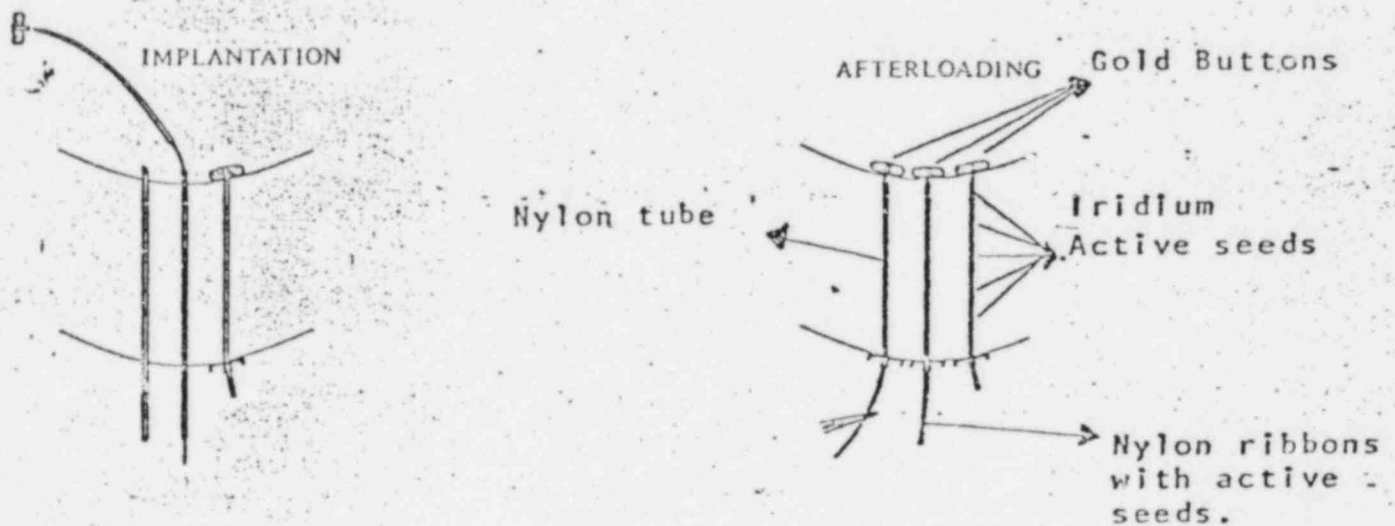


Fig. 3 Description of Iridium Implant

**RAD/IRID, Incorporated**

600 V-ST, 2212 Georgia Ave., NW,  
Washington, D.C. 20001  
(202) 387-2655

ITEM #10

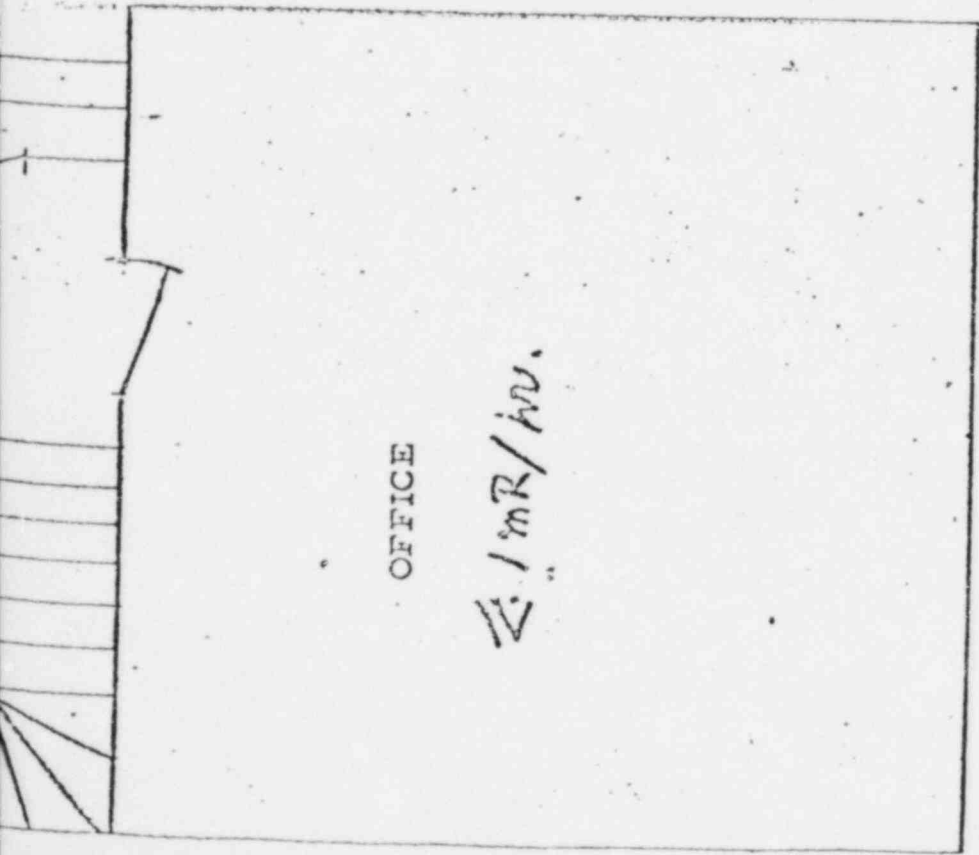
---

TYPE	MANUFACTURER	MODEL	NO.	RADIATION	SENSITIVITY RANGE
G.M.COUNTER	EBERLINE	E-120	2	BETA, GAMMA	0.1-50mr/hv
SURVEY METER	VICTOREEN	491	1	BETA, GAMMA	0.1-50mr/hv
SURVEY METER	VICTOREEN	493	1	BETA, GAMMA	0.1-50mr/hv
SURVEY METER	VICTOREEN	440	1	BETA, GAMMA	0.1- <sup>30</sup> mr/hv
SURVEY METER	DOSIMETER CORP.	3032	1	ALPHA, BETA GAMMA.	0-5r/hv



ITEM #11-B

1mg Radium Standard Source is used for calibration of survey instruments. The calibration will be performed at two points on each scale and are about  $1/3$  and  $2/3$  of full scale. Instruments are considered properly calibrated if the instrument readings are within 10% of the calculated values. The frequency is quarterly.



OFFICE

$\leq 1 \text{ m}^2/\text{m}^2$

FIRST FLOOR

UNCONTROLLED AREA (OPEN SPACE)



OFFICE

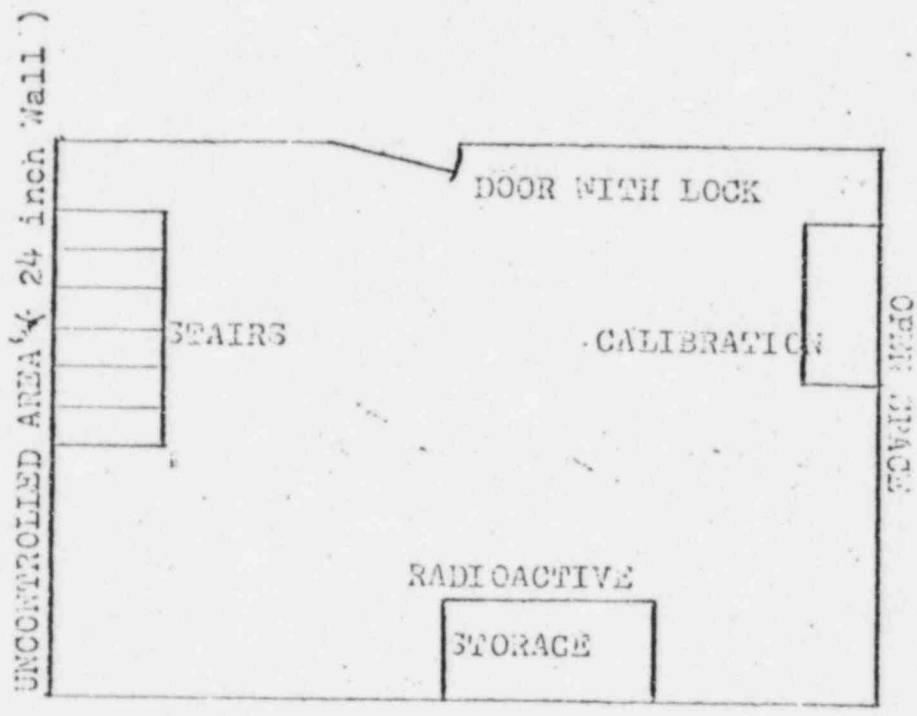
$\leq 0.5 \text{ m}^2/\text{m}^2$

SECOND FLOOR OPEN SPACE

RAD/IRID, 600 U-STREET, WASHINGTON, D.C. 20001

SCALE = 1" = 4'





BASEMENT  
( BELOW UTILITY AREA)

RAD/INTD INC.  
500 V STREET N.W.,  
WASHINGTON, DC. 20001

SCALE = 1" = 4'

ITEM 13-B

13-B.

Lead containers are designated as follows:

- R/1 p-1 Maximum capacity 30 ribbons, 12 seeds each.
- R/1 p-2 Maximum capacity 16 ribbons, 12 seeds each.
- R/1 p-3 Maximum capacity 14 ribbons, 12 seeds each.
- R/1 p-4 Maximum capacity 18 ribbons, 12 seeds each.

Each of these containers are packed in a 12" X 12" X 12" container for shipping. Maximum readings for these containers when packed are as follows:

SOURCE CONTAINER'S RADIATION PROFILE.

MAXIMUM READING WITH MAXIMUM ACTIVITY.

MODEL NO:

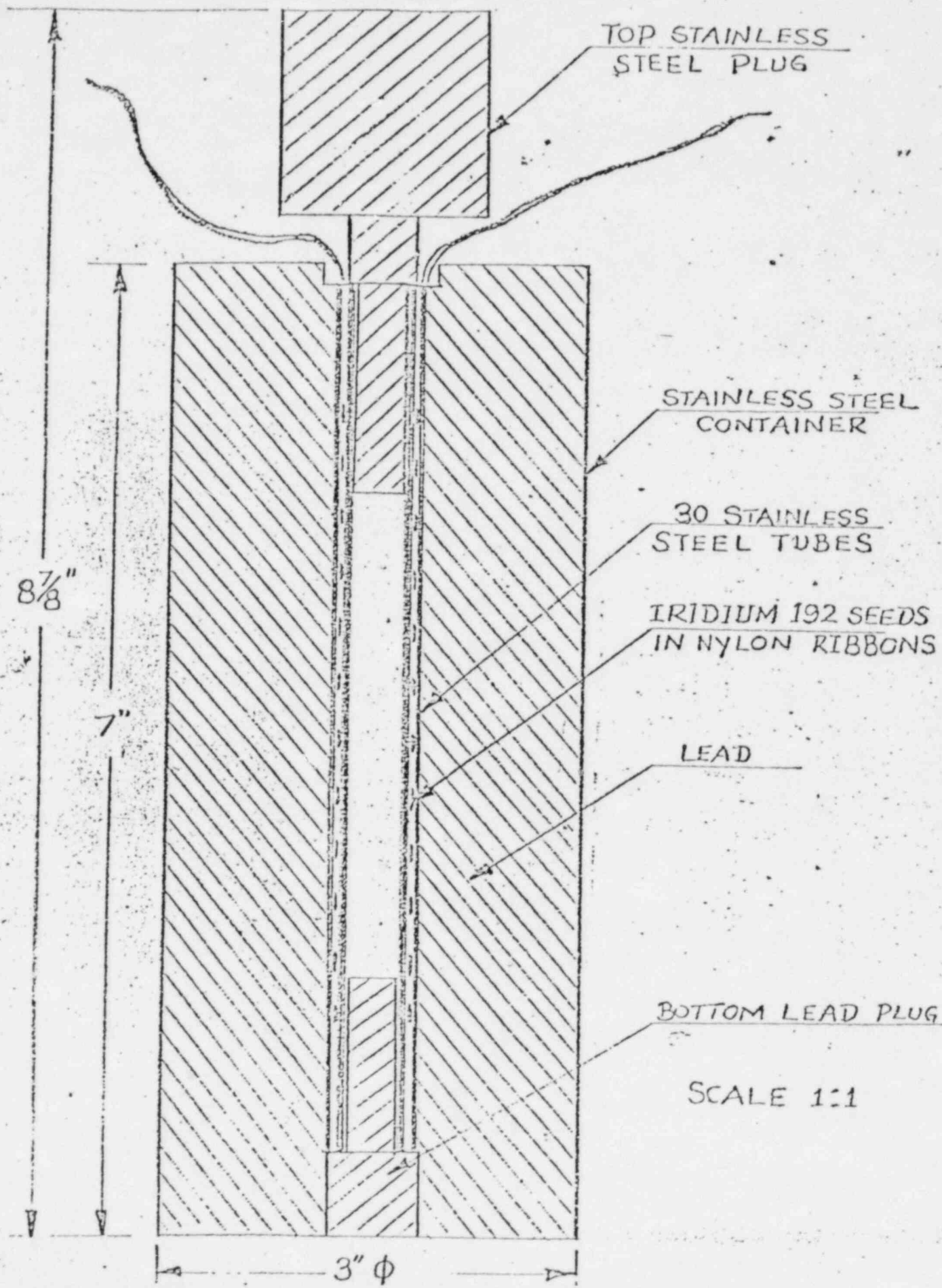
	R/1, P-1	R/1, P-2	R/1, P-3	R/1, P-4
TOP	90 mR/hr	30 mR/hr	50 mR/hr	40 mR/hr
BOTTOM	40 mR/hr	60 mR/hr	35 mR/hr	50 mR/hr
SIDE	96 mR/hr	50 mR/hr	45 mR/hr	40 mR/hr

SHIPPING CONTAINER'S RADIATION PROFILE.

MAXIMUM READING WITH MAXIMUM ACTIVITY.

MODEL NO:

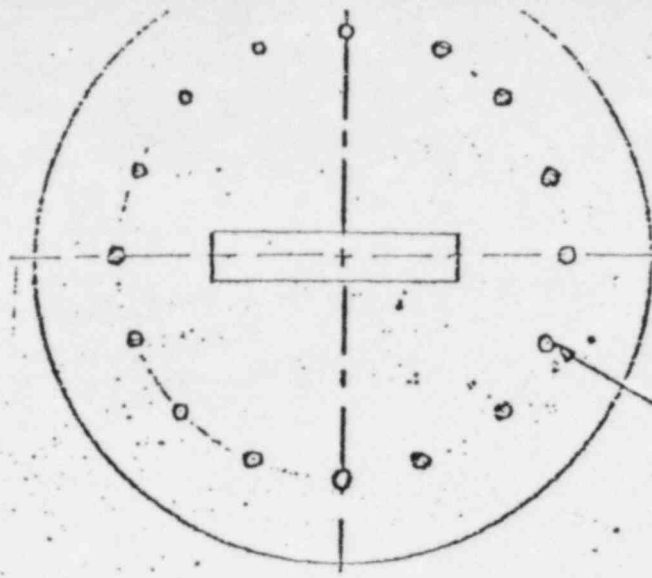
	R/1, P-1	R/1, P-2	R/1, P-3	R/1, P-4
TOP	20 mR/hr	8 mR/hr	20 mR/hr	20 mR/hr
BOTTOM	15 mR/hr	25 mR/hr	15 mR/hr	25 mR/hr
SIDE	20 mR/hr	10 mR/hr	10 mR/hr	15 mR/hr



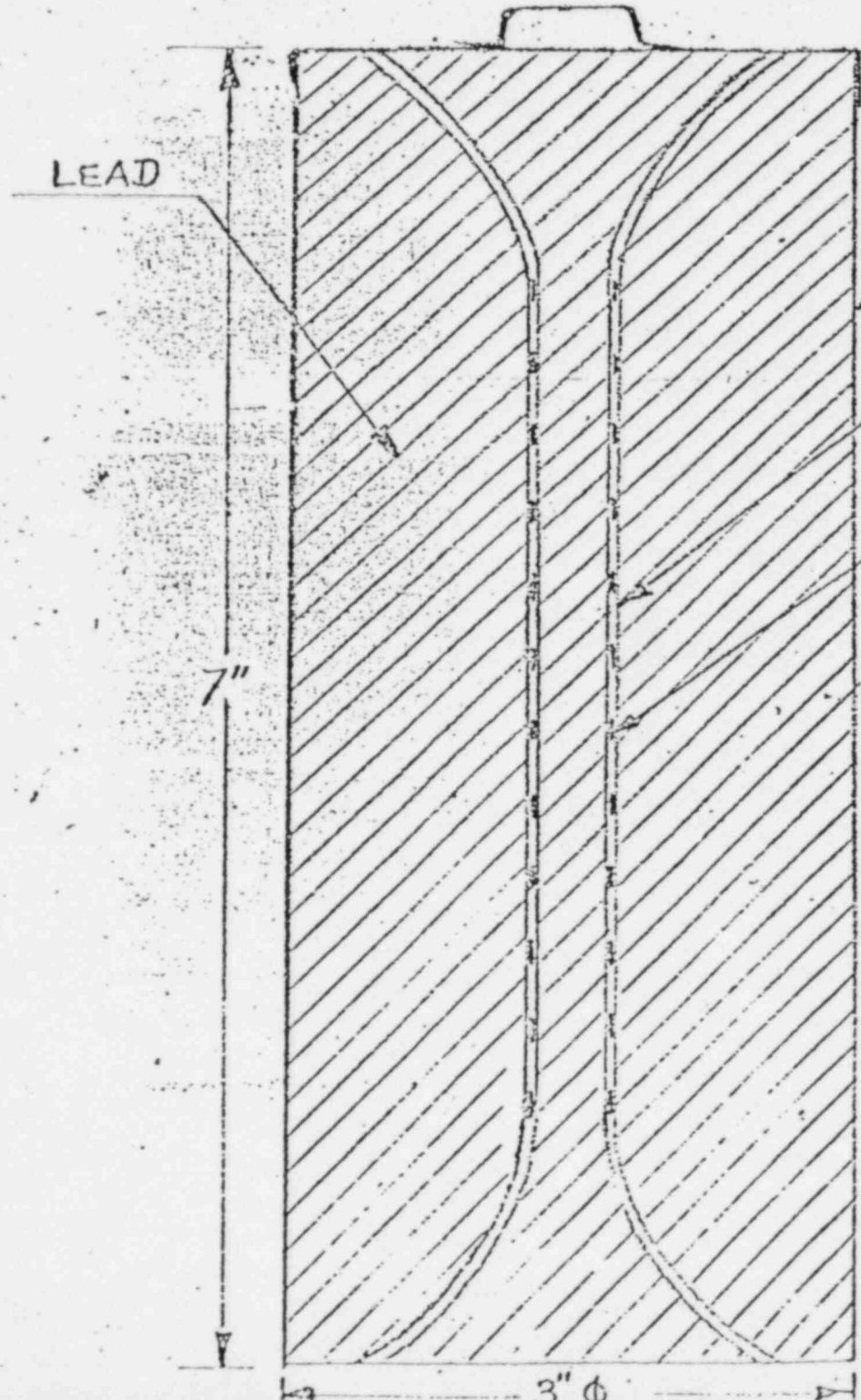
SCALE 1:1

RLT 0-1





16 HOLES



LEAD

STAINLESS STEEL  
CONTAINER

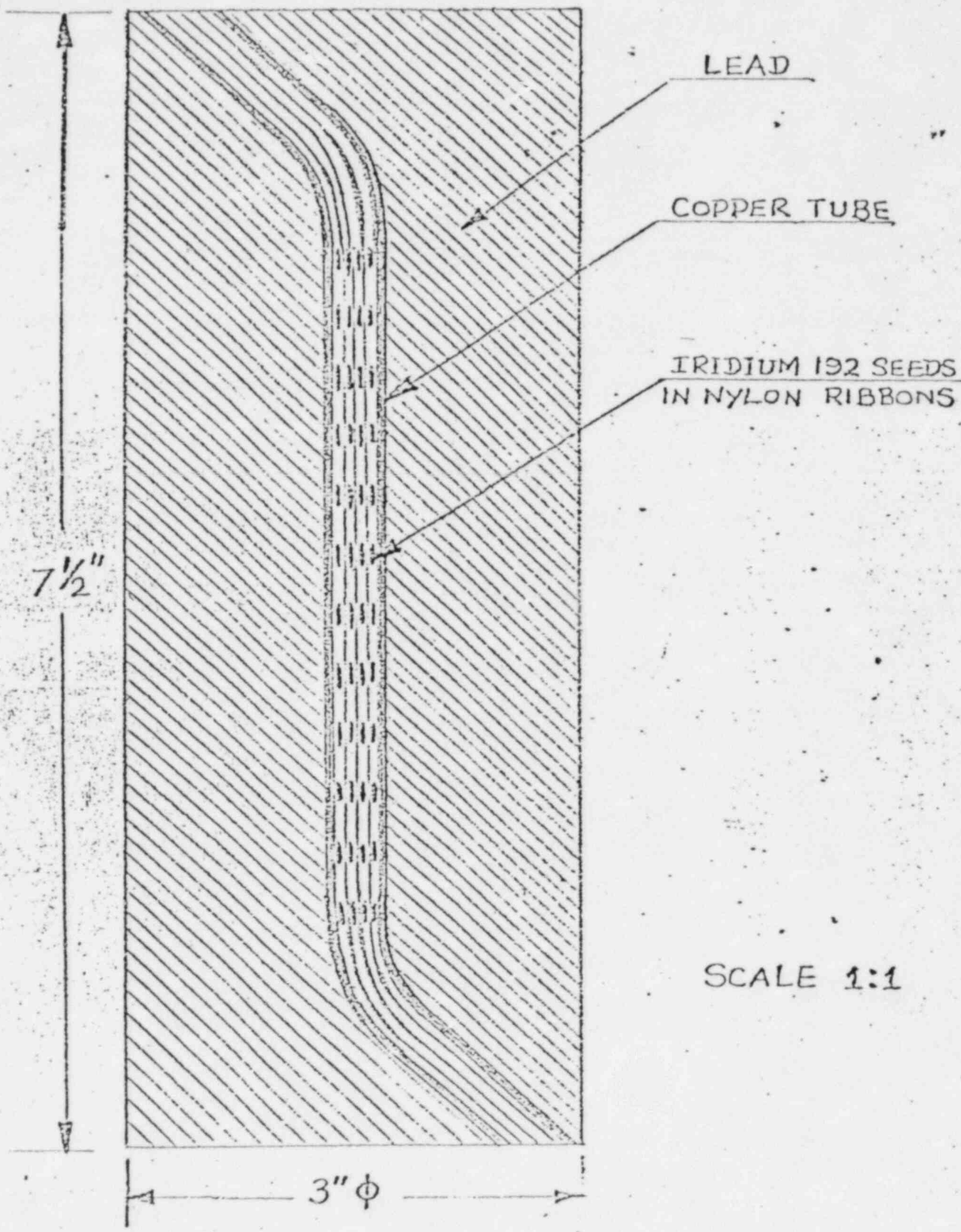
16 STAINLESS  
STEEL TUBES

IRIDIUM 192 SEEDS  
IN NYLON RIBBONS

7"

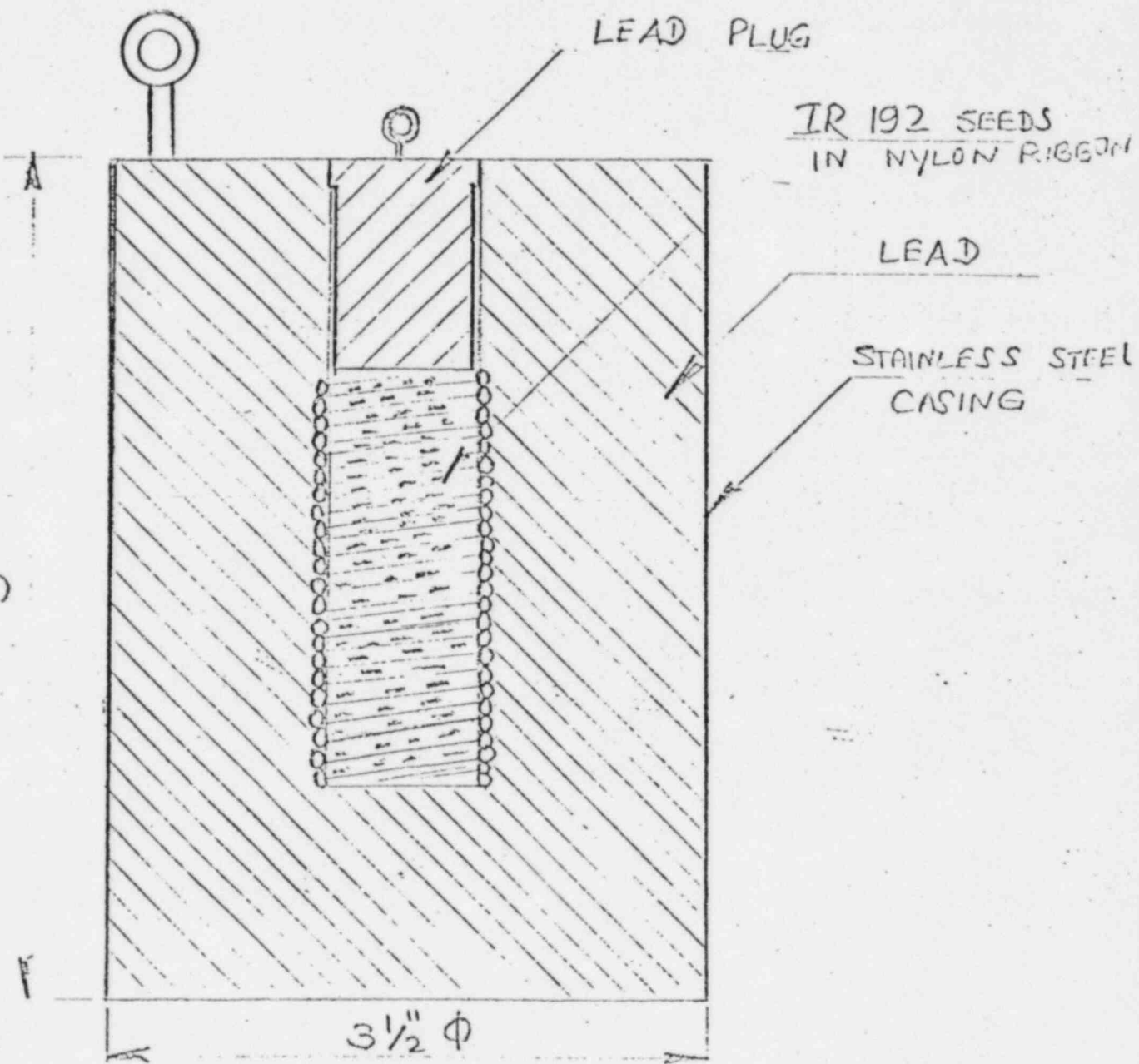
3"  $\phi$

SCALE 1:1



SCALE 1:1

R/I P-3



Mod R/1, P-4

D. SHIPPING OF ACTIVE BEEDS:  
(continued)

4. Affix Class II Radioactive label, stating contents, number of mill-curie and transport Index.
5. Include before packing, a wipe certificate for the seeds, bill of lading, return address label, Iridium 192 decay sheet, and instructions to customers for safe handling of Iridium 192.
6. Tape shipping certificate to box.
7. Check box for radiation levels. Mark diamond tag accordingly.
8. Remove box to safe.
9. Call shipping agent for pick-up.
10. Put shipping receipt in mail box.
11. Enter the shipping particulars VI-no of seeds, surface reading of box, address sent, in the ledger at shipping desk, and sign it with date.

# RAD/IRID Incorporated

*Iridium 192 Seeds in Nylon Ribbons*

2212 GEORGIA AVENUE, N. W.

WASHINGTON, D. C. 20001

Telephone (202) 387-2655

DR. DAVID G. MAHAN, *President*

KRISHNAN SUTHANTHIRAN  
*Vice President, Customer Service*

SCOTT FONTAINE, JR.  
*Vice President, Production*

SEPTEMBER 22, 1975.

## RADIATION SAFETY PROCEDURES TO BE FOLLOWED WHILE ENTERING AND LEAVING THE RADIATION RESEARCH LABORATORY.

1. SURVEY THE PREMISES AND ENTER THE READINGS (GEIGER COUNTER READINGS) IN THE BOOK.
2. SHOULD YOU FIND UNUSUAL READING IN ANY PLACE CHECK THE AREA YOURSELF FOR THE POSSIBILITY OF ACTIVE SEED OR RADIO-ACTIVE WASTE; IF NOT, INFORM THE RADIATION SAFETY OFFICER IMMEDIATELY.
3. AT THE END OF EACH DAY THE PREMISES SHOULD BE SURVEYED AND THE GEIGER COUNTER READINGS SHOULD BE ENTERED; ANY UNUSUAL READINGS SHOULD BE INFORMED TO THE RADIATION SAFETY OFFICER ON THE FOLLOWING DAY.
4. CHECK YOURSELF ( ALL OVER YOUR BODY) WITH THE GEIGER COUNTER AND MAKE SURE YOU ARE CLEAN.

# RAD/IRID Incorporated

*Iridium 192 Seeds in Nylon Ribbons*

2212 GEORGIA AVENUE, N. W.

WASHINGTON, D. C. 20001

Telephone (202) 387-2655

DR. DAVID G. MAHAN, *President*

KRISHNAN SUTHANTHIRAN  
*Vice President, Customer Service*

SCOTT FONTAINE, JR.  
*Vice President, Production*

SEPTEMBER 22, 1975.

## PROCEDURE FOR LOADING ACTIVE RIBBONS.

1. CHECK THE ENTIRE LOADING AREA AND THE LOADING TABLE WITH A GEIGER COUNTER
2. THERE SHOULD NOT BE MORE THAN ONE BATCH OF SEEDS ON THE LOADING TABLE AT ANY TIME OF LOADING.
3. PLACE THE SEEDS IN THE HOPPER AND CHECK THE TABLE AGAIN WITH A GEIGER COUNTER.
4. AFTER FIXING THE NYLON TUBE TO THE HOPPER, CHECK TO SEE THAT THE PUSHWIRE GOES THROUGH IT EASILY; DISCARD ANY RIBBON THAT DOES NOT MEET THIS REQUIREMENT.
5. LOAD THE SEEDS ACCURATELY SO THAT EACH SEED IS PLACED 1 CM. CENTER TO CENTER.
6. DISCARD ANY RIBBONS THAT DOES NOT OFFER NOMINAL RESISTANCE FOR LOADING.
7. IF MORE THAN ONE RIBBON DOES NOT MEET THIS REQUIREMENT, CHECK THE RIBBON EXTRUDING INSTRUMENT AND POSSIBLY USE A SMALLER SIZE (LARGER GAGE) TUBE FOR EXTRUSION.
8. DO NOT ANSWER THE TELEPHONE AND DO NOT ENTER IN ANY CONVERSATION WHILE LOADING.
9. AFTER LOADING THE ACTIVE SEEDS, TRANSFER ALL THE SEEDS FROM THE HOPPER TO THE LEAD CONTAINER.
10. CHECK THE LOADING TABLE AND YOURSELF WITH A GEIGER COUNTER SO AS TO MAKE SURE THAT YOU WERE CLEAN.



# RAD / IRID Incorporated

*Iridium 192 Seeds in Nylon Ribbons*

2212 GEORGIA AVENUE, N. W.

WASHINGTON, D. C. 20001

Telephone (202) 387-2655

DR. DAVIL G. MAHAN, *President*

KRISHNAN SUTHANTHIRAN  
*Vice President, Customer Service*

SCOTT FONTAINE, JR.  
*Vice President, Production*

SEPTEMBER 22, 1975.

## PROCEDURE FOR MAKING NYLON RIBBONS FOR LOADING ACTIVE SEEDS

1. CUT THE NYLON TUBES (SMALL SIZE TUBE) INTO TWO FEET LENGTHS.
2. START EXTRUDING THE NYLON TUBES AT LEAST FIVE MINUTES AFTER THE INSTRUMENT HAS BEEN ON.
3. USE 27/26/25 G TUBING AND EXTRUDE THEM SLOWLY BUT STEADILY
4. AFTER EXTRUDING THE NYLON RIBBONS, CUT THE TIPS SO THAT EACH IS FOUR FEET LONG FROM THE BOTTOM OF THE KNOB.
5. NEVER EXTRUDE MORE THAN TWO SETS OF NYLON RIBBONS AT ANY ONE TIME.

## PROCEDURE FOR MAKING NYLON RIBBONS FOR LOADING DUMMY SEEDS

1. CUT THE NYLON TUBES (SMALL SIZE TUBE) INTO 15 INCH LENGTHS
2. START EXTRUDING THE NYLON TUBE ONLY AFTER THE INSTRUMENT HAS BEEN ON AT LEAST FOR FIVE MINUTES.
3. USE 27/26 G TUBING AND EXTRUDE THEM SLOWLY BUT STEADILY
4. AFTER EXTRUDING THE NYLON RIBBONS, CUT THEM SO THAT EACH IS TWO AND A HALF FEET LONG FROM THE BOTTOM OF THE KNOB.
5. NEVER EXTRUDE MORE THAN 10 RIBBONS AT ANY ONE TIME.

07137