

Form NRC-313R (7-77) 10 CFR 34	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR BYPRODUCT MATERIAL LICENSE— USE OF SEALED SOURCES IN RADIOGRAPHY	Approved by GAO B-180735(R0335)		
(SEE ATTACHED FORM NRC-313R INSTRUCTIONS AND NRC REGULATORY GUIDE 10.6—USE SUPPLEMENTAL SHEET WHERE NECESSARY) BE SURE ALL ITEMS ARE COMPLETED AND THAT ALL NECESSARY ATTACHMENTS ARE FURNISHED. IF ANY PORTION OF THE APPLICATION IS NOT APPLICABLE SPECIFICALLY SO STATE. DEFICIENT OR INCOMPLETE APPLICATIONS MAY BE RETURNED WITHOUT CONSIDERATION. LICENSE FEE REQUIRED, SEE ITEM 7 OF INSTRUCTIONS.				
1(a) NAME AND ADDRESS OF APPLICANT AND TELEPHONE NUMBER John Deere Foundry Route 84 & 14th Avenue East Moline, IL 61244 1(b) TELEPHONE NO.: Area Code (309) 752 6786	2. THIS IS AN APPLICATION FOR: (Check appropriate item) A. <input type="checkbox"/> NEW LICENSE B. <input checked="" type="checkbox"/> AMENDMENT TO LICENSE NO. <u>12-09111-01</u> C. <input type="checkbox"/> RENEWAL OF LICENSE NO. _____			
1(c) APPLICANT IS: An individual <input type="checkbox"/> A partnership <input type="checkbox"/> A Corporation <input checked="" type="checkbox"/> An Unincorporated Association <input type="checkbox"/> Other <input type="checkbox"/> If applicant is other than an individual, the applicable section on the reverse side must be completed.	3. LOCATION(S) WHERE SEALED SOURCES WILL BE USED AND/OR STORED. (If use will be made in states other than named in 1(a), they should be listed here.) Same address as 1(a)			
4. SEALED SOURCES TO BE USED IN RADIOGRAPHY (Attach supplementary pages, if necessary)				
BYPRODUCT MATERIAL <small>(Element and Mass No.)</small>	SOURCE MODEL NUMBER	NAME OF MANUFACTURER	MAXIMUM ACTIVITY PER SOURCE	NUMBER OF SOURCES
A. Cobalt 60	A. #424-8 Modified to use #550 Ball Connector.	A. Tech/Op	A. 50 Curies	A. *One
B. Cesium 137	B. #773 Source Rod	B. Tech/Op	B. 165mCi	B. One
5(a) RADIOGRAPHIC EXPOSURE DEVICES (Attach supplementary pages, if necessary)				
MODEL NUMBER	NAME OF MANUFACTURER (Include description if custom made)			
A. Model #446 Projector	A. Technical Operations			
B. Model #773 Calibration Kit	B. Technical Operations			
C.	C.			
5(b) RADIOGRAPHIC SOURCE CHANGERS (Attach supplementary pages, if necessary)				
MODEL NUMBER	NAME OF MANUFACTURER (Include description if custom made)			
A. Model #488 or #771	A. Technical Operations			
B.	B.			
C.	C.			
6. THE FOLLOWING INFORMATION IS ATTACHED AS A PART OF THIS APPLICATION: (Check appropriate blocks and attach information called for in the instructions with this form.)				
	Not Applicable	Attached See index	Previously Submitted	
(a) Description of radiographic facilities (Instruction 6-a)	<input type="checkbox"/>	<input checked="" type="checkbox"/> to Manual	<input type="checkbox"/>	on _____ (DATE)
(b) Description of radiation detection instruments to be used (Instruction 6-b)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(c) Instrument calibration procedures (Instruction 6-c)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(d) Personnel monitoring equipment (Instruction 6-d)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(e) Operating and emergency procedures (Instruction 6-e)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(f) Training program (Instruction 6-f)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(g) Internal inspection system or other management control (Instruction 6-g)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(h) Overall organizational structure (Instruction 6-h)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
(i) Leak testing procedures (Instruction 6-i)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	on _____ (DATE)
CERTIFICATE (This item must be completed by applicant)				
7. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMES 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.				
LICENSE FEE ENCLOSED \$ <u>\$40.00</u>		BY: <u>Robert M. Chaney</u> (Signature) Robert M. Chaney (Type or print name of certifying official) General Manager (Title of certifying official)		
DATE <u>21 January 1982</u>				
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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LEGAL STRUCTURE OF APPLICANT

If applicant is a corporation, complete Items 8 through 11; if applicant is a partnership, complete Items 12 through 14; if applicant is an unincorporated association or a legal entity other than a partnership or corporation, complete Items 15 and 16. Attach separate sheets where space provided proves inadequate.

CORPORATION

8. STOCK OF APPLICANT CORPORATION

NO. OF SHARES AUTHORIZED	NO. OF SHARES ISSUED	NO. OF SHARES SUBSCRIBED	TOTAL NUMBER OF:	
			(a) Stockholders	(b) Subscribers
Common:	Common:	None	Approximately	None
80,000,000	67,727,264		31,015	
Preferred:	Preferred:			
3,000,000	0			
Figures are as of 31 November 1981				

9. Is applicant corporation directly or indirectly controlled by another corporation or other legal entity?

* YES ☐

NO ☒

If answer is "YES" give name and address of other corporation or other legal entity and describe how such control exists and the extent thereof.

John Deere Foundry is a division of Deere & Company

10. (a) Identify by name and address any individual, corporation, or other legal entity (1) owning 10 percent or more of the stock of applicant corporation issued and outstanding or (2) subscribing to 10 percent or more of the authorized but unissued stock of the corporation.

(b) Identify by name and address all officers and directors of the corporation.

(a) None

(b) See attachment

11. Identify the State, District, Territory, or possession under the laws of which the applicant is incorporated.

Delaware

PARTNERSHIP

12. Name and address of each individual or legal entity owning a partnership interest in the applicant.

13. State the percent of ownership of the applicant partnership held by each of the individuals or legal entities listed in item 12.

14. Identify the State, District, Territory, or possession under the laws of which the applicant partnership is organized.

OTHER

15. Describe the nature of the applicant and identify the State, District, Territory, or possession under the laws of which it is organized.

16. State the total number of members or persons holding an ownership in the applicant, identify each by name and address, and indicate the ownership interest thereof.

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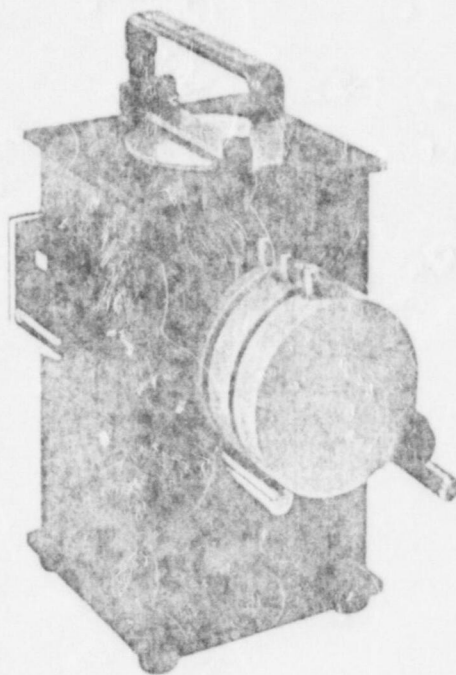
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Tech/Ops Model 773 Instrument Calibration Device Operation Manual



TECHNICAL OPERATIONS, INC.
Radiation Products Division
Burlington, Mass. 01803
Phone (800) 225-1383 (toll free)
[in Mass. call (617) 272 2000]

Technical Data

Size:	5 in (12.7 cm) wide, 5 in (12.7 cm) deep, 8.5 in (21.6 cm) high
Weight:	(with attenuators) 52 lbs. (24 kg) (without attenuators) 45 lbs. (20 kg)
Source:	Model 77302, $^{137}\text{Cesium}$, 150 millicuries
Transport Status:	DOT Specification 7A Type A Package
Shielding Material:	Lead Approx. 29 lbs. (13 kg)

General

The Model 773 is a small, portable radiation survey instrument calibration device. The unit consists of a 150 millicurie $^{137}\text{Cesium}$ source permanently attached to a movable source rod which is installed in a lead shield casting. The source is exposed by raising the source rod which positions the source in a $36^\circ \times 20^\circ$ collimated beam port.

The unit is equipped with three attenuators (Transmission of 0.25, 0.10 and 0.10) to allow a survey instrument with three ranges to be calibrated at 20% and 80% of each range without changing the position of the survey instrument. The Model 773 can be used to calibrate survey instruments with ranges up to 2000 milliroentgens per hour.

The unit is equipped with a carrying handle which also serves as a source locking bar to prevent unauthorized use of the calibrator. A shipping cover is also attached to provide and additional means of securing the source.

Receiving

Survey the device for excessive radiation levels. The device should have radiation levels less than 200 mR/hr at the surface and less than 10 mR/hr at three feet from the surface. Inspect the device for shipping damage and insure that the device is locked.

Safety Precautions

The Model 773 Meter Calibration Device contains a 150 millicurie $^{137}\text{Cesium}$ source that

emits gamma radiation which can cause injury if improperly used. Disassembly of the device or removal of the source requires special equipment. We recommend that any service requiring disassembly of the device or removal of the source be performed by the manufacturer.

Instrument Devices

Although the device has radiation levels which are well below the maximum radiation level permitted on storage containers, personnel should not stay close to the device any longer than necessary.

Precautions should be taken to store the instrument calibration device in an area that meets the requirements of Title 10 Code of Federal Regulations 20.202(b) (2), 20.203(b) and 20.203(e).

It is recommended that personnel operating the equipment use a calibrated and operable survey instrument and wear appropriate personnel monitoring devices. The radiation level at the source rod when the source is in the "operate" position is approximately 50 milliroentgens per hour.

Movement of the source rod should be accomplished as expeditiously as practicable. An alternative method of raising the source rod would be the use of a string and pulley arrangement.

In no case should anyone enter the area of the radiation beam or expose any part of his body to the radiation beam.

Preparation for Use

Place the source shield in a restricted area so that the directional port is aimed horizontally. To minimize the effects of scattered radiation, the unit should be 16 feet from any wall in the direction of the primary beam.

Position a support horizontally from the Model 773 Instrument Calibration Device as shown in Figures 1 and 2.

Restrict access to the area where the radiation level is in excess of 2 milliroentgens per hour. (See Figure 4).

Operation

Note: To properly calibrate a survey instrument it is necessary to check the instruments response at two points on each of the instruments ranges. These points must be separated by at least 50% of the full scale reading. The instruments reading should agree with the actual radiation intensity within 10% to be in proper calibration.

The following procedure is designed for a survey instrument with three scales and a range of 0-1000 mr/hr. For instruments with different ranges, the procedure will be similar but the points will differ.

1. Turn on the survey meter and allow it to "warm up" for approximately 10 minutes.
2. Determine the activity of the source on the date of calibration from the decay chart provided with the source.
3. Determine the distance from the source at which the radiation intensity would be 800 mr/hr (use Figure 3).
4. Using the tape measure attached to the Model 773, place the survey meter such that the axis of the detector is located at the proper distance from the source as determined above.

Note:

The survey meter should be located so that the center of the detector is at the correct distance and centered on the center line of the radiation beam. The axis of the detector should be perpendicular to the centerline of the radiation beam. Depending upon the physical size of your survey instrument, it may be necessary to mount it somewhat higher than the bench surface. When the proper geometry for your instrument has been established, use the same physical arrangement consistently in future calibration operations.

At short distances, using survey instruments with large detector volumes, the radiation intensity will not be uniform across the detector. Consideration should be given to this effect when determining the radiation intensities to be checked.

5. Unlock the handle of the Model 773. Re-

move the shipping plate. Remove all the attenuators from the radiation beam.

6. Standing away from the radiation beam, expose the source by manually raising the source rod. Note and record the survey meter reading, return the source to the stored position. The actual intensity is 800 mr/hr. If the reading is within $\pm 10\%$ of the actual intensity, continue checking the instrument. If the instrument reading is not within $\pm 10\%$ of the actual intensity, the instrument must be adjusted and recalibrated.
CAUTION: Do not enter the area of the radiation beam while the source is exposed.
7. Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 200 mr/hr.
8. Remove the 0.25 attenuator from the beam and place a 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 80 mr/hr.
9. Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 20 mr/hr.
10. Remove the 0.25 attenuator from the beam and place the other 0.10 attenuator in the beam. Repeat step 6; the actual intensity is 8 mr/hr.
11. Place the 0.25 attenuator in the beam. Repeat step 6; the actual intensity is 2 mr/hr.

Leak Testing

The Tech/Ops Model 773 Meter Calibration Kit contains a $^{137}\text{Cesium}$ source which must be leak tested at intervals not to exceed six months. This may be accomplished using the Tech/Ops Model 518 leak test kit.

1. Place the Model 773 calibrator in a restricted area.
2. Remove the lock and rotate the handle from the top of the source rod. Remove the shipping cover.
3. Moisten the leak test swab with EDTA solution. Blot off the excess.
4. Wipe around the top of the source rod.
5. Standing away from the beam port, raise the source rod to the open position and

wipe the exposed source rod thoroughly.

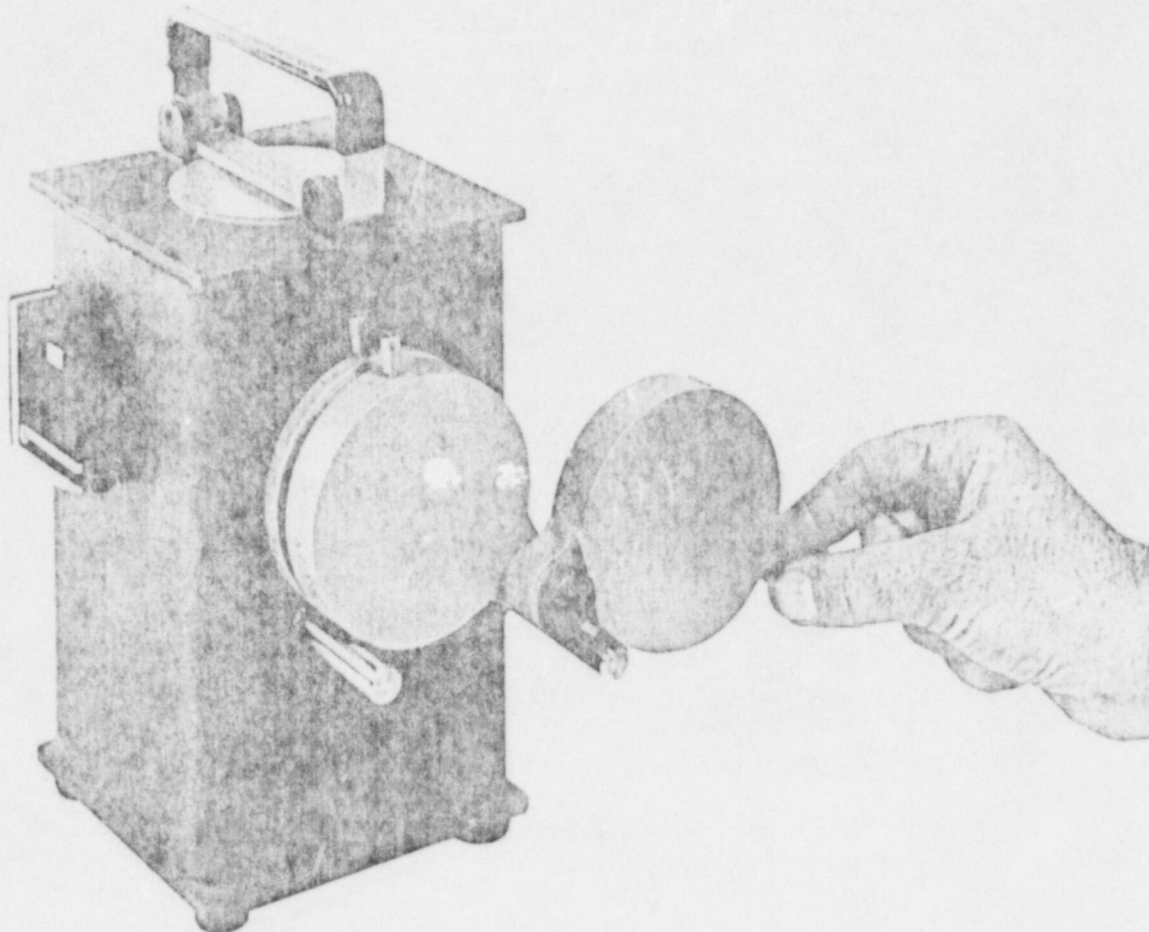
6. Place the leak test swab in the plastic envelope.
7. Set the survey meter on its most sensitive range and place the meter in a low background area. Move the swab, in its plastic envelope, to the meter, not the meter to the swab.
8. If the meter indication is less than 0.2 mr/hr above background, place the plastic envelope with the swab into the mailing box and mail to Technical Operations, Inc., Burlington, Massachusetts. BE SURE TO FILL OUT AND RETURN

THE IDENTIFICATION SHEET.

9. If the swab should show more than 0.2 mr/hr. DO NOT MAIL. Contact Technical Operations, Inc. for specific instructions.

Note:

The wipe test swab will be subjected to a precise radioassay when received by Tech/Ops and a leak test certificate will be mailed promptly. This certificate must be kept with your records as it is subject to N.R.C. inspection.



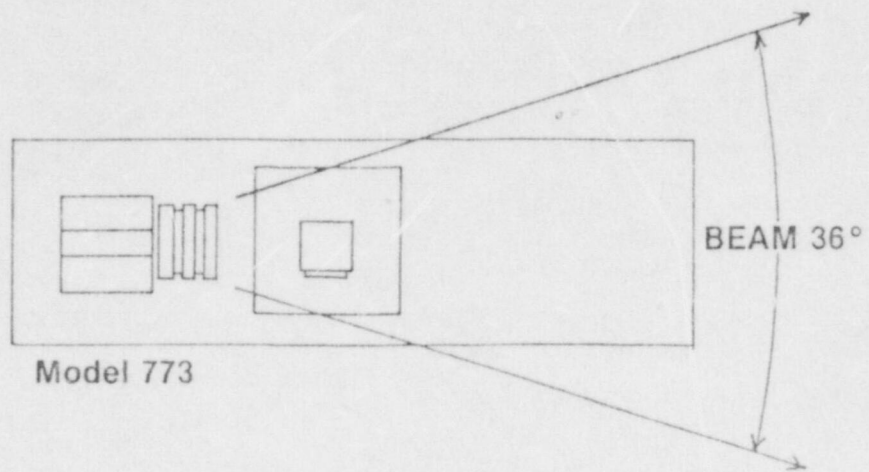


FIGURE 1

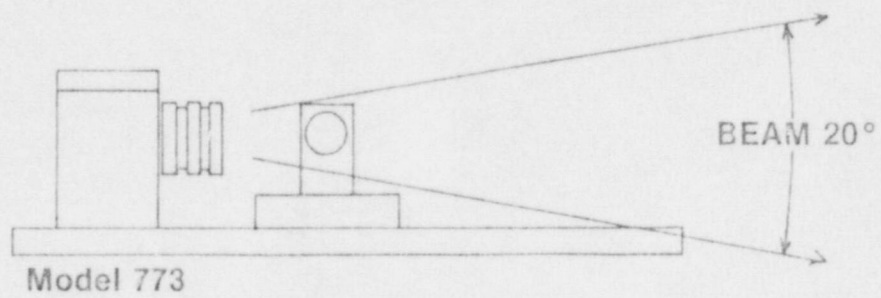
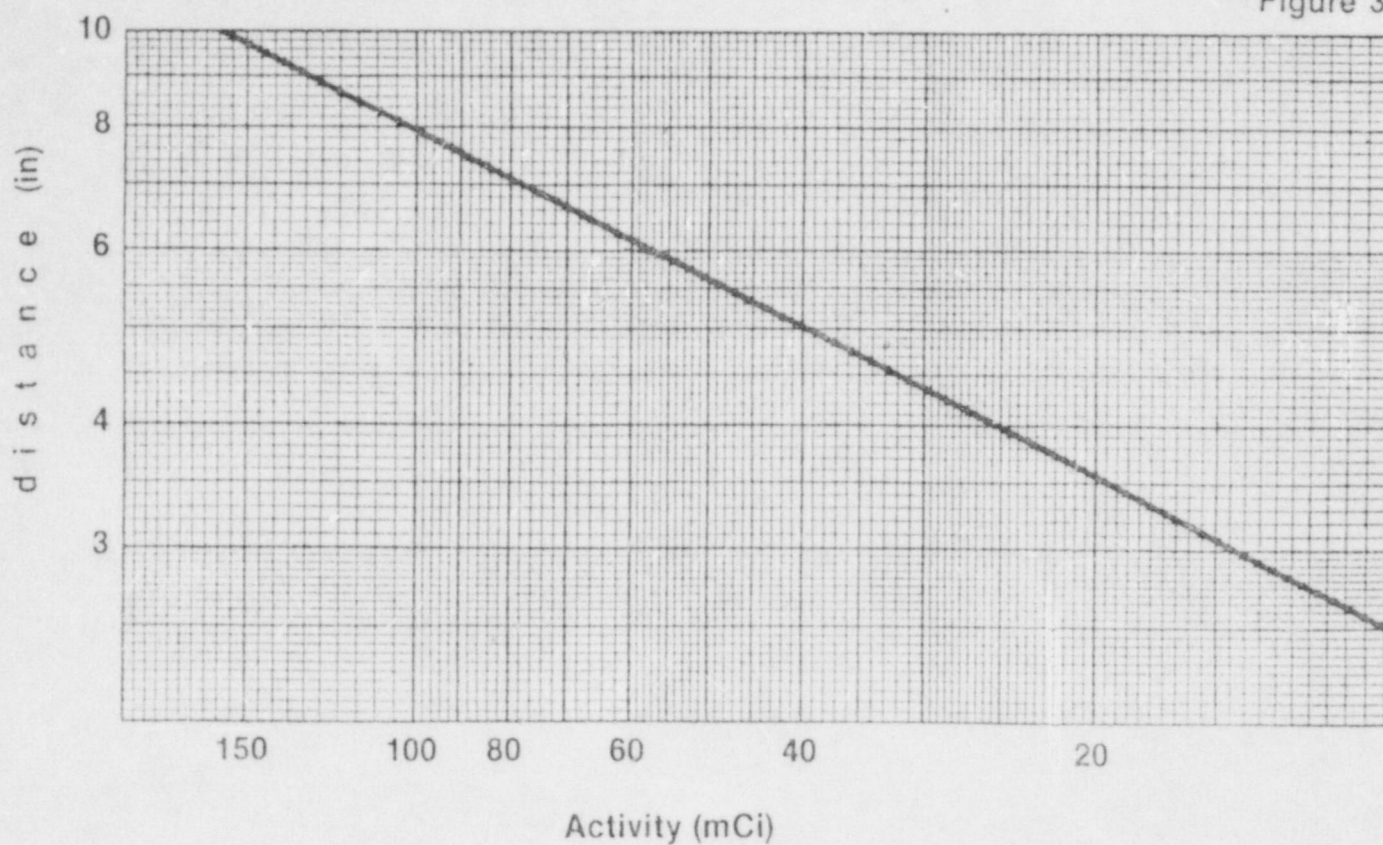


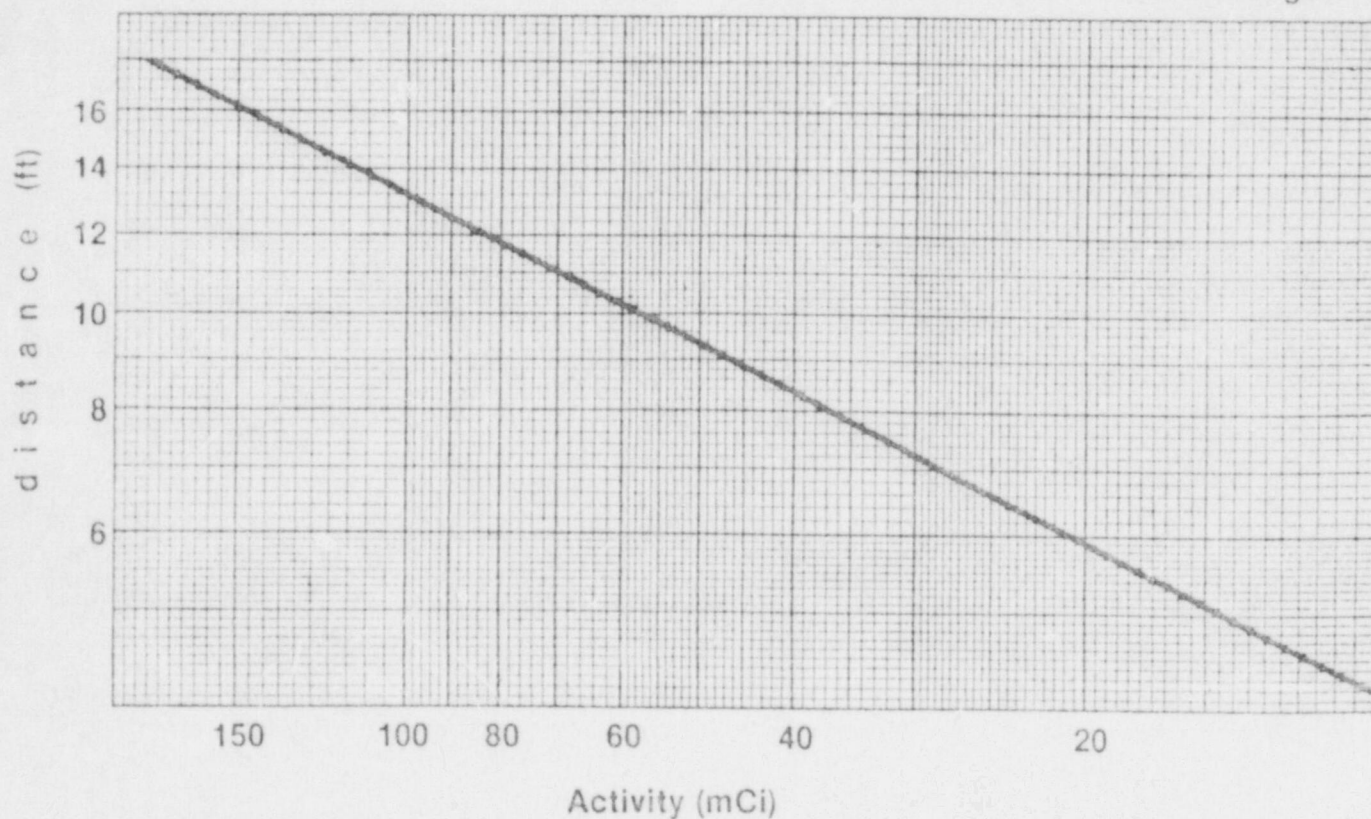
FIGURE 2

Figure 3



Distance to 800mR/hr isodose line as a Function of Activity

Figure 4



Distance to 2mR/hr isodose line as a Function of Activity