NRC FORM 313M (9-81) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR MATERIALS LICENSE – MEDICAL	Approved by OMB 3150-0041 Expires 9-30-83

INSTRUCTIONS – *Complete Items 1 through 26 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 26 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to: Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials 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, Parts 19, 20 and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 26 and the appropriate fee enclosed.*

1.a. NAME AND MAILING ADDRESS OF APPLICANT *(institution, firm, clinic, physician, etc.)* INCLUDE ZIP CODE

Lahey Clinic Foundation
41 Mall Road
Burlington, MA 01805

TELEPHONE NO. AREA CODE 617 273 5100

1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED *(If different from 1.a.)* INCLUDE ZIP CODE

SAME AS ABOVE

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Robert S. Wenstrup, Ph.D.

TELEPHONE NO. AREA CODE (617) 273-8166

3. THIS IS AN APPLICATION FOR: *(Check appropriate item)*

a. ☐ NEW LICENSE
b. XX AMENDMENT TO LICENSE NO. 20-05766-02
c. ☐ RENEWAL OF LICENSE NO. _____

4. INDIVIDUAL USERS *(Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)*

Sanford R. Kurtz, M.D.
(see application of 02/13/85)

5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)*

Robert S. Wenstrup, Ph.D.

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES		
10 CFR 35.100, SCHEDULE A, GROUP I		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III		
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.		

6.b. RADIOACTIVE MATERIAL FOR USES NOT LISTED IN ITEM 6.a. *(Sealed sources up to 3 mCi used for calibration and reference standards are authorized under Section 35.14(d), 10 CFR Part 35, and NEED NOT BE LISTED.)*

ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES OF EACH FORM	DESCRIBE PURPOSE OF USE
I 125	NaI solution	100 mCi	in vitro labelling of proteins

ML18

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

For Items 7 through 23, check the appropriate box(es) and submit a detailed description of all the requested information. Begin each item on a separate sheet. Identify the item number and the date of the application in the lower right corner of each page. If you indicate that an appendix to the medical licensing guide will be followed, do not submit the pages, but specify the revision number and date of the referenced guide: Regulatory Guide 10.8 , Rev. 1 Date: 1980

	7. MEDICAL ISOTOPES COMMITTEE
	Names and Specialties Attached; and
	Duties as in Appendix B; or *(Check One)*
	Equivalent Duties Attached

	8. TRAINING AND EXPERIENCE
	Supplements A & B Attached for Each Individual User; and
	Supplement A Attached for RSO.

	9. INSTRUMENTATION *(Check One)*
	Appendix C Form Attached; or
X	List by Name and Model Number

	10. CALIBRATION OF INSTRUMENTS
	Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
	Equivalent Procedures Attached; and
	Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
	Equivalent Procedures Attached

	11. FACILITIES AND EQUIPMENT
X	Description and Diagram Attached

	12. PERSONNEL TRAINING PROGRAM
X	Description of Training Attached

	13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL
X	Detailed Information Attached

	14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*
X	Appendix F Procedures Followed; or
	Equivalent Procedures Attached

	15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*
	Appendix G Rules Followed; or
	Equivalent Rules Attached

	16. EMERGENCY PROCEDURES *(Check One)*
	Appendix H Procedures Followed; or
X	~~Equivalent Procedures Attached~~ See 23 Below

	17. AREA SURVEY PROCEDURES *(Check One)*
	Appendix I Procedures Followed; or
X	Equivalent Procedures Attached

	18. WASTE DISPOSAL *(Check One)*
	Appendix J Form Attached; or
X	Equivalent Information Attached

	19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*
	Appendix K Procedures Followed; or
	Equivalent Procedures Attached

	20. THERAPEUTIC USE OF SEALED SOURCES
	Detailed Information Attached; and
	Appendix L Procedures Followed; or *(Check One)*
	Equivalent Procedures Attached

	21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon – 133)
X	Detailed Information Attached

	22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS
	Detailed Information Attached

	23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b
X	Detailed Information Attached

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)

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: 7C Amendment

(2) LICENSE FEE ENCLOSED: $ $120.00

b. APPLICANT OR CERTIFYING OFFICIAL (Signature)

(1) NAME (Type or Print)
Robert E. Wise, M.D.

(2) TITLE
Chief Executive Officer

c. DATE 5/1/85

NRC FORM 313M (9-81)

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313M. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30-36 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES** The information may be used: (a) to provide records to State health departments for their information and use; and (b) to provide information to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for a NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you. A copy of the license issued will routinely be placed in the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed.

5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

INSTRUMENTATION

Instrumentation used for the Iodine-125 labelling consists of the following:

1. Electrometer/Geiger counter: Eberline E-120 electrometer and Eberline HP-260 low energy hand probe.

2. Gamma counters: Micromedic 4-200 or IsoData 20-20.

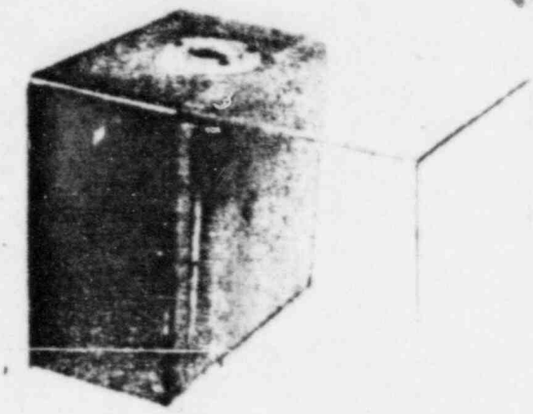
3. Radioiodine mini-hood.

4. Air filter to sample the hood effluent transported to a roof exhaust fan.

RADIOIODINE MINI-HOOD

The hood within a hood that offers EXTRA PROTECTION in radioiodine control.

for labelling hood



Self-contained Mini-Hood has an activated charcoal air filtering cartridge to efficiently trap up to 90% radioiodine. Used inside a regular operating hood, it provides additional working protection and reduces radioiodine discharge to well within permissible limits. Eliminates the need for expensive in-line filter systems. Reduces hood maintenance costs.

Constructed of sturdy, shatterproof Lucite®, Mini-Hood has an integral blower capable of pulling 100 linear feet per minute; minimum of 100 linear feet per minute face velocity. One cubic foot of working volume offers adequate working area. Lightweight, portable . . . easily set up for radioiodine work and stored away when not in use. On-Off switch is located directly on blower. Comes with 5 feet of 3-line cord and grounding connector. 115V, 50/60 Hz.

112-035	Radioiodine Mini-Hood	$495.00
112-036	Replacement Charcoal Air Filtering Cartridge 12"x12"x1"	90.00
087-112	220V Converter	55.00

TOTAL POWER CORP.

MEDICAL DIVISION

6 New York Ave.
Framingham, Mass. 01701
Phone (617) 237-2024 or 879-2066

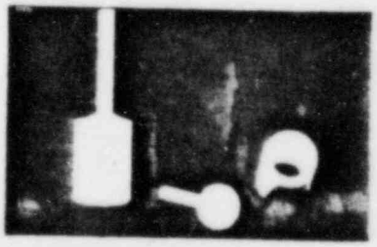
PLANCHETS

Atomlab Planchettes are available in several variations:

Aluminum with Flat Bottoms = AL Flat
Aluminum with Raised Concentric Rings = AL Con
Stainless Steel with Flat Bottoms = SS Flat
Stainless Steel with Raised concentric Rings = SS Con
Copper with Flat Bottoms = COP Flat
Copper with Raised Concentric Rings = COP Con

SIZE	#	PRICE PER C
1" x 5/16"		
AL Flat	129-001	$ 10.00
AL Con	129-002	$ 10.00
SS Flat	129-003	$ 10.00
SS Con	129-004	$ 12.00
1-1/4" x 3/32"		
AL Flat	129-005	$ 9.00
AL Con	129-006	$ 9.00
SS Flat	129-007	$ 10.00
SS Con	129-008	$ 10.00
COP Flat	129-025	$ 15.00
COP Con	129-026	$ 15.00
1-1/4" x 5/16"		
AL Flat	129-009	$ 9.00
AL Con	129-010	$ 9.00
SS Con	129-012	$ 11.00
1-1/2" x 1/4"		
AL Flat	129-013	$ 10.00
AL Con	129-014	$ 10.00
SS Flat	129-015	$ 11.00
SS Con	129-016	$ 11.00
2" x 1/8"		
AL Flat	129-017	$ 11.00
AL Con	129-022	$ 12.00
SS Flat	129-018	$ 18.00
SS Con	129-019	$ 18.00
2" x 1/4"		
AL Flat	129-023	$ 13.00
AL Con	129-024	$ 13.00
SS Flat	129-020	$ 19.00
SS Con	129-021	$ 19.00

ATOMLAB TEFLON PRECIPITATION APPARATUS



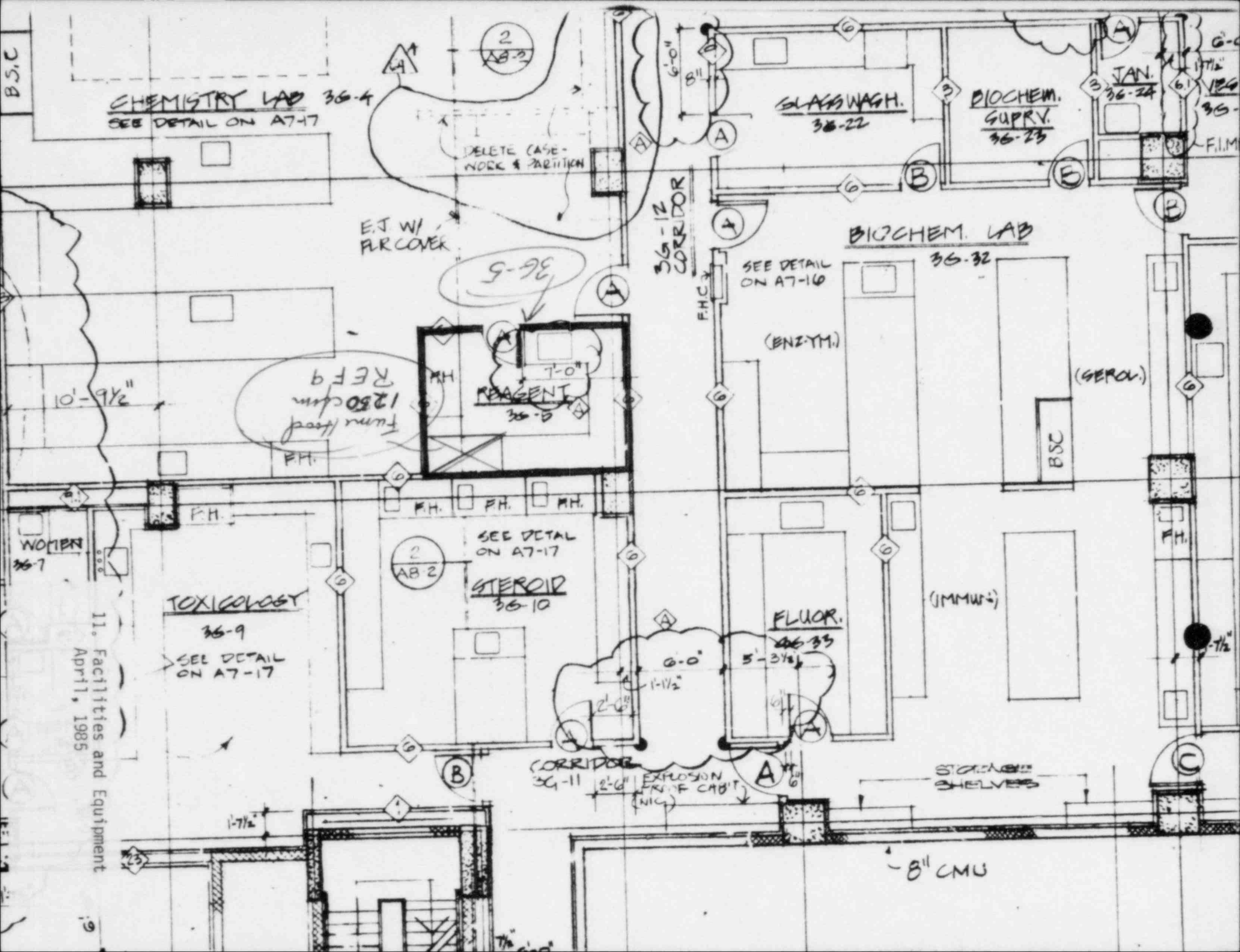
Made of tough rigid white Teflon which, being chemically inert, having an absolute non-adhesive surface and zero moisture absorption, is easily cleaned and decontaminated. The slotted disc accommodates 1-1/8" dia. filter paper for mounting on the very inexpensive, dual purpose nylon cupped-disc and ring device.

015-003 Precipita

FACILITIES AND EQUIPMENT

The following layout diagram shows room 3G-5, which is an enclosed room with a built-in fume hood exhausting air to a roof vent at 1250 cubic feet per minute. The heavy line on the layout plan shows the limits of the restricted area.

An activated charcoal trap in the exhaust stream filters out any radioactive iodine which escapes from a small hood placed within the permanent hood. A filter trap placed upstream of the activated charcoal in the laboratory fume hood samples the exhaust air for contamination.


CHEMISTRY LAB 36-4
SEE DETAIL ON A7-17
DELETE CASE-WORK & PARTITION
E.J W/ FLR COVER
36-5
36-12 CORRIDOR
F.H.C.
GLASSWASH. 36-22
BIOCHEM. SUPV. 36-23
JAN. 36-24
BIOCHEM. LAB 36-32
SEE DETAIL ON A7-16
(ENZYM.)
(GEROL.)
(IMMUN.)
BSC
REAGENT 36-5
MH
FH.
WOMEN 36-7
TOXICOLOGY 36-9
SEE DETAIL ON A7-17
STEROID 36-10
SEE DETAL ON A7-17
FLUOR. 36-33
CORRIDOR 36-11
EXPLOSION PROOF CAB'T (NIC)
STORAGE SHELVES
8" CMU
B.S.C

PERSONNEL TRAINING PROGRAM

This Iodine labelling will be done by one or two workers well experienced in this laboratory procedure. The Radiation Safety Officer will meet with them at least once a year to discuss good radiation safety practice.

PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

Each purchase of Iodine-125 will be made in quantities of 10 mCi or less per order. Shipments of less then 10 mCi per order will be sent directly to the clinical labs.

WIPE TEST PROTOCOL

The following is a protocol for wipe-testing areas to assess levels of removable radioactive contamination. Two different types of detectors are available for detection of low level gamma radiation. An electrometer with a thin-window proportional chamber is used as a quick check for gross contamination. Lower levels of activity must be detected with the gamma counter.

A calibration standard is used to determine the response of the radiation detector. A known amount of radioisotope, usually 0.001 microcurie, is deposited on a wipe as a standard. When counted with the appropriate detector this will serve as a calibration standard.

All measurements are to be recorded in a laboratory radiation survey log.

Wipe Test Procedure:

1. Rub 100 cm square with a dry wipe. If a larger area is surveyed the results should be expressed as DPM/100 cm^2.

2. Count the wipe for removable contamination using the appropriate radiation detection instrument.

3. Convert the wipe result in CPM to DPM utilizing the standard mentioned earlier.

4. Convert removable contamination as DPM/100 cm^2 and enter in the radiation survey log.

Interpretation of the results. If the measured contamination is less than 200 DPM/100 cm^2 no additional clean-up is required; if the measured contamination is greater than 200 DPM/100 cm^2 additional clean up is required until the measured activity is less than 200 DPM/100 cm^2.

WASTE DISPOSAL

Radioactive solid wastes resulting from the use of Iodine 125 will be held for decay, as measured in a low background area with a low-level survey meter, until the measured activity reaches background levels.

If appropriate these wastes will be disposed by Interex Corporation, Natick, Massachusetts, NRC license #20-14082.

PROCEDURES FOR THE USE OF RADIOACTIVE GASES

A maximum of approximately 2 millicuries of Iodine 125 will be used for any week for labelling.

The labelling will be done in a fixed hood in Room 3G-5. The exhaust rate to a roof exhaust vent is 1250 cubic feet per minute. The iodination will be done in a hood within the permanent hood. The inner hood has an activated charcoal filter to absorb any iodine released during this study; in addition the permanent hood has an activated charcoal filter in the exhaust stack. Potential release of Iodine up the stack will be monitored with an air filter which samples the exhaust plume.

To calculate the worst case release of Iodine to an unrestricted area, that is the roof of the building, assume that 5% of the activity (100 microcuries) is released into an unrestricted area.

The concentration of Iodine at this release point averaged over a 24 hour period is:

$$C = 100 \text{ u Ci} \times 24 \text{ hr} / (1.25 \times 10^{3} \text{ CFM} \times (1.66 \times 10^{6} \text{ ml/hr - CFM}))$$
$$= 2.0 \times 10^{-9} \text{ u Ci/ml}$$

The concentration is less than the maximum permissible concentration of soluble Iodine (5×10^{-9} microcuries/ml).

EMERGENCY PROCEDURES FOR SPILLS OF RADIOACTIVE IODINE 125 IN THE CLINICAL LABORATORY

If a spill of radioactive Iodine 125 occurs during use:

1. Leave the fume hood "on."
2. Notify all persons not involved in the spill to vacate the area and close the door of the room.
3. Monitor personnel for contamination; individuals not contaminated must vacate the area. Any activity on the skin should be flushed with soap and water.
4. Remove lab coats or other outer garments which may be contaminated.
5. Notify the Radiation Safety Officer and the person in charge of the laboratory.
6. Post a "Radioactive Spill, No Entry" sign on the door of the room.
7. Enter the room again only after the hood has vented the room for one hour.
8. Survey the room with a Geiger counter to determine if there is any residual activity.
9. Perform wipe tests in the area around the spill to determine whether further cleanup is necessary.

Laboratory Supervisor: Phone: Home Phone:

Radiation Safety Officer: Phone: Home Phone:

PROCEDURES AND PRECAUTIONS FOR USE OF IODINE 125

These special precautions shall be observed in handling soluble Iodine 125:

1. A lab coat and 2 pair of disposable gloves must be worn when handling Iodine 125. The gloves should be changed frequently.
2. After handling Iodine wash hands and monitor them with a Geiger counter to detect any contamination.
3. A Geiger counter should be near the hood and switched to the most sensitive range while handling soluble Iodine.
4. Those handling soluble Iodine must have a thyroid scan taken as a baseline measurement, and thereafter within 24 hours after each procedure.

DUPONT NEN Products

TECHNICAL DATA

IODINE-125

CATALOG NUMBER NEZ **033H**

HIGH CONCENTRATION **in ~ 0.1M NaOH**
(reductant free) solution

QUALITY CONTROL RESULTS

Radiochemical Purity:
Measured by thin layer chromatography using the upper phase of the solvent system n:butanol, pyridine, water, conc. ammonium hydroxide, (8:4:8:1) on alumina to contain > 99 % as iodide on the analysis date.

Radionuclidic Purity:
Determined by Ge(Li) γ ray spectrometry to be > 99.9% ^{125}I; 9.0x10^{-5} % ^{126}I on the analysis date. No other radionuclidic impurities were found.

Specific Activity:

MEETS SPECIFICATIONS

Iodination Incorporation:

MEETS SPECIFICATIONS

Concentration: 469 mCi/ml 17353 (MBq/ml) at the analysis date

pH: 13

LOT NO. 4852H

Calibration Date: 04-23-85

Analysis Date: 03-29-85

DuPont/NEN Products offers a wide range of Iodinated compounds. Call us if you need a custom Iodination or assistance with one that is not working. This information is available upon request from technical service.

Complete recovery of microliter quantities of solution is difficult because small droplets may cling to the septum or walls of the container. To maximize volume recovery we suggest the following:

- Shake the container downward to concentrate the solution at the bottom of the vial.
- Using a remote tool, remove the vial from its container and tap vial down against a hard surface in a ventilated hood.

We recommend that your Radiation Safety Office review any change in your existing procedure.

The above suggestions will not insure 100% volume recovery but will maximize recovery and minimize the risk of contamination.

FRESH LOT DATES

1985

JANUARY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

FEBRUARY

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

MARCH

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

APRIL

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

MAY

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JUNE

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

JULY

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

AUGUST

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

OCTOBER

S	M	T	W	T	F	S
			1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

NOVEMBER

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

DECEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

I-125 is available every day from stock. On alternating Wednesdays a fresh lot is stocked. Calibrated for 20 days hence.

^{125}I Decay Table
Physical Half-Life 60 Days

Days Before Calibration Date	0	1	2	3	4	5	6	7	8	9
20	1.260	1.274	1.289	1.304	1.319	1.335	1.350	1.366	1.381	1.399
10	1.122	1.135	1.149	1.162	1.176	1.189	1.203	1.217	1.232	1.245
0	1.000	1.012	1.023	1.035	1.047	1.059	1.072	1.084	1.097	1.110
Days After Calibration Date	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	1.000	0.989	0.977	0.966	0.955	0.944	0.933	0.922	0.912	0.901
10	0.891	0.881	0.871	0.861	0.851	0.841	0.831	0.822	0.812	0.803
20	0.794	0.785	0.776	0.767	0.758	0.749	0.741	0.732	0.724	0.715
30	0.707	0.699	0.691	0.683	0.675	0.667	0.660	0.652	0.645	0.637

Multiply this factor times the nominal amount in the vial to get the amount on any given day.

NEN PRODUCTS 331 Treble Cove Road, North Billerica, MA 01862, TOLL FREE NUMBER 800-225-1572, Telex 94-0996

^{125}I
60d
EC
γ 0.035
E 0.177

IODINE–125: HANDLING PRECAUTIONS

NEN Products has developed the following suggestions for handling ^{125}I after years of experience working with this low energy gamma and X-ray emitter.

PHYSICAL DATA

Principle radiation emissions (1)

Gamma	0.035 MeV (6.5%)
Kα X-rays	0.027 MeV (112.7%)
Kβ X-rays	0.031 MeV (25.4%)

Unshielded exposure rate at 1 cm from 1 mCi point source = 1.4 R h^{-1} (2)

Half value layer for lead shielding = 0.02 mm (2)

OCCUPATIONAL LIMITS

Maximum permissible air concentration based on a 40 hour working week = 5×10^{-9} μCi ml^{-1}(3)

Maximum permissible body burden = 4.0 μCi (5)

Maximum permissible thyroid burden = 1.2 μCi (5)

DOSIMETRY

The thyroid is the critical organ for ^{125}I uptake. Individual uptake and metabolism vary over a wide range. The thyroid may be assumed to accumulate 30% of soluble radioiodine intake to the body and retain iodine with a 138 day biological half-life.(4) All radioiodine in the body can be assumed to be eliminated via the urine.(6)

SERVICES AVAILABLE:

Dupont NEN Products has gained considerable experience with trapping and monitoring the volatile species of Iodine. This data is available upon request from customer service.

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The following Iodination publications could be helpful in designing or improving incorporations.

W. M. Hunter, F. C. Greenwood, Nature, 194, p. 495 (1962)
R. H. Seevers, R. E. Counsell, Chem. Rev., 82, 575 (1982)
J. C. Travis, Fundamentals of RIA and Other Ligand Assays, Scientific Newsletters, 1977, p. 56.

SPECIAL PRECAUTIONS:

Store Na ^{125}I solutions at room temperature because freezing results in subsequent volatilization of radioiodine. Avoid acidic solutions to minimize volatile species of radioactivity. Some radioiodine compounds may penetrate gloves. When handling these compounds use remote tools, wear two pairs of gloves and change the outer pair frequently or whenever suspected to be contaminated.

PRECAUTIONS

1. Designate area for handling ^{125}I and clearly label all containers.
2. Store mCi quantities of ^{125}I in containers surrounded by ⅛" thick lead.
3. Use tools to prevent direct handling of potentially contaminated vessels and unshielded multi mCi sources.
4. Prohibit smoking, eating and drinking in the laboratory where ^{125}I is handled.
5. Use transfer pipets, spill trays and absorbent coverings to confine contamination.
6. Handle quantities greater than 10 μCi in a ventilated hood.
7. Handle mCi quantities in closed systems vented through activated charcoal traps.
8. Sample exhausted effluent by continuously drawing a known quantity of air through cartridges containing activated charcoal.
9. Use disposable lab coat, gloves and wrist guards for secondary precaution.
10. Select gloves appropriate for chemicals handled.
11. Regularly monitor and promptly decontaminate gloves and surfaces to maintain contamination control.
12. Use NaI (Tl) detector or liquid scintillation counter to detect ^{125}I.
13. Submit urine samples for bioassay from 2 to 12 hours after handling ^{125}I to indicate personal uptake.
14. Conduct periodic thyroid counts to determine dose.
15. Isolate waste in sealed labeled containers.
16. Establish surface contamination, air concentration, urinalysis, and thyroid burden action levels below maximum limits and investigate any causes which threaten these levels to be exceeded.

REFERENCES:

(1) Kocher, David C., Radioactive Decay Data Tables, Springfield: National Technical Information Service, 1981 DOE/TIC-11026
(2) Calculated with Computer Code 'Gamma' Utilizing Decay Scheme Data from Kocher and Mass Attenuation Coefficients for Lead and Mass Energy Absorption Coefficients for Air from the Radiological Health Handbook, Washington: Bureau of Radiological Health, 1970. The HVL reported here is the initial HVL for narrow beam geometry.
(3) 10 CFR 20—Standards for Protection Against Radiation.
(4) Recommendations of the International Commission on Radiological Protection, ICRP Publication 2, Pergamon Press, London, 1959.
(5) Calculated using ICRP2 methods with a quality factor of 1.
(6) Evaluation of Radiation Doses to Body Tissues from Internal Contamination Due to Occupational Exposure, ICRP Publication 10, Pergamon Press, 1968.