NRC Form 313 I (12-81) 10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

'83 MAY 19 A11:07

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

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

a. NEW LICENSE

b. AMENDMENT TO: LICENSE NUMBER

c. RENEWAL OF: LICENSE NUMBER — X — 29-00139-02

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.

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

E. R. Squibb & Sons, Inc.

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION

(201) 545-1300, Ext. 2451

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

John P. Gresh

TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION

(201) 545-1300, Ext. 2451

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

P.O. Box 191
New Brunswick, N.J. 08903

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

Rt #1, North Brunswick, NJ 08903
Lawrenceville-Princeton Road
Princeton, NJ 08540
Demonstration Sites - U.S.

See Addendum #2

(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.	See Addendum #1	
b.		
c.		

Applicant...
Check No.. 50660
Amount Fee.. $460-3A
Type of Fe.. Renewal
Date Rec.. 6/1/83
Received By.. John
May 3 Renewal

7. RADIATION PROTECTION OFFICER

John P. Gresh

Attach resume(s) of person(s) named who meet the experience outlined in Items 16 and 17 and describe his responsibilities under Item 15.

See Addendum #3

8. LICENSED MATERIAL

LINE NO.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source)	C MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	See Addendum #2			
(2)				
(3)				
(4)				

RECEIVED BY LFMB
Date 6/7/83
Log May 3 Renewal
By 6/1/83
Orig. To.....
Action Compl. 6/2/83

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REG1 LIC30
29-00139-02 PDR

	DESCRIBE USE OF LICENSED MATERIAL E
(1)	Processing and distribution to authorized recipients under part 33
(2)	Title 10, Research and Development as defined in section 30.4 Title 10 Code of Federal Regulations part 30.
(3)	
(4)	

E/7

Information in this record was deleted in accordance with the Freedom of Information Act. Exemptions 6 FOIA-2011-0053

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9. STORAGE OF SEALED SOURCES

ITEM NO.	A. CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED.	B. NAME OF MANUFACTURER	C. MODEL NUMBER
(1)			
(2)			
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

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

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

Reed Instruments, Inc.
685A Myrtle Avenue
Boonton, NJ 07005 (Quarterly)

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

12. PERSONNEL MONITORING DEVICES

A. TYPE (Check and/or complete as appropriate.)	B. SUPPLIER (Service Company)	C. EXCHANGE FREQUENCY
☒ (1) FILM BADGE	R. S. Landauer, Jr. & Co. Glenwood Science Park Glenwood, Illinois 60425	☒ MONTHLY
☒ (2) THERMOLUMINESCENCE DOSIMETER (TLD)		☐ QUARTERLY
☐ (3) OTHER (Specify):		☒ OTHER (Specify): Weekly

13. FACILITIES AND EQUIPMENT (Check were 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. See Addenda #5 and #6.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

Nuclear Diagnostic Lab., Inc., P.O. Box 791, Peekskill, NY 10566

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.

    a. 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.

18. CERTIFICATE

(This item must be completed by applicant)

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)* Patrick K. Kava
(1) LICENSE FEE CATEGORY:	d. TITLE Director, Quality Control Services
(2) LICENSE FEE ENCLOSED: $ 460.00	e. DATE 5/17/83

ADDENDUM #1

RADIATION SAFETY COMMITTEE MEMBERSHIP

1) Mr. P. A. Rava, Committee Chairman, Director, Quality Conrol Services

2) Mr. F. Golub, Director, Personnel and Industrial Relations

3) Mr. G. Thompson, Head, Radiopharmaceutical Manufacturing

4) Mr. H. R. Harrison, V.P. and Regulatory Counsel

5) Dr. E. Banta, Director, Medical Services

6) Dr. S. Barker, General Manager, Diagnostics

7) Dr. P. P. Roets, Manager, Personnel and Industrial Hygiene and Safety

8) Dr. D. Benson, Manager, Radiopharmaceutical Quality Control

9) Mr. J. P. Gresh, Manager, Health Physics Department

ADDENDUM #2

NEW BRUNSWICK

Byproduct material (element and mass number)	Chemical and/or physical form	Maximum amount of radioactivity which licensee may possess at any one time
Any byproduct material with Atomic Numbers between 3 and 83. inclusive, except Strontium 90	Any	50 Curies total, exclusive of Strontium 90 and the following exceptions:
		Iodine 131 — 150 Curies
		Iodine 125 — 5 Curies
		Phosphorus 32 — 10 Curies
		Chromium 51 — 2 Curies
		Cobalt 60 — 50 Millicuries
		Selenium 75 — 5 Curies
		Molybdenum 99-Technecium 99m — 2000 Curies
Hydrogen 3	Any	5 Curies

LAWRENCEVILLE

Byproduct material (element and mass number)	Chemical and/or Physical Form	Maximum amount of radioactivity which licensee may possess at any one time
Hydrogen 3	Any	5000 Millicuries
Carbon 14	Any	2000 Millicuries
Phosphorus 32	Any	50 Millicuries
Iodine 125	Any	200 Millicuries
Sulfur 35	Any	1000 Millicuries
Sodium 22	Any	5 Millicuries
Calcium 45	Any	5 Millicuries
Chromium 51	Any	100 Millicuries
Chlorine 36	Any	300 Millicuries
Strontium 85	Any	10 Millicuries
Niobium 95	Any	10 Millicuries
Cerium 141	Any	10 Millicuries
Scandium 46	Any	10 Millicuries
Nickel 63*	Any	100 Millicuries
Iodine 129	Any	2 Millicuries

* This includes Nickel 63 sealed sources used in Hewlett-Packard elelctron capture detectors previously described in those pending amendment approval for our biproduct license which expired 6/30/83.

DEMONSTRATION SITES ANYWHERE IN U.S. UNDER NRC JURISDICTION
Radioimmunoassay Kits

ADDENDUM #3

Patrick A. Rava

(b)(6)

EDUCATION: B.S., Pharmacy, St. John's University - (b)(6)

M.S., Radiological Health, Rutgers University - (b)(6)

EXPERIENCE:

November, 1981 to Present	Director, Quality Control Services E. R. Squibb & Sons, Inc.
April, 1977 to November, 1981	Department Head, Environmental Control E. R. Squibb & Sons, Inc.
April, 1975 to April, 1977	Manager, Radiopharmaceutical Quality Control E. R. Squibb & Sons, Inc.
1962 to April, 1975	Manager, Health Physics Department E. R. Squibb & Sons, Inc.
December, 1961 to May, 1962	Assistant Department Head Radiopharmaceutical Quality Control and Health Physics E. R. Squibb & Sons, Inc.
1960 to December, 1961	Health Physics Supervisor Radiopharmaceutical Production E. R. Squibb & Sons, Inc.
1957 to 1960	Supervisor Radiopharmaceutical Production E. R. Squibb & Sons, Inc.
1956 to 1957	Technician Radiopharmaceutical Production E. R. Squibb & Sons, Inc.

ADDENDUM #3

JOHN P. GRESH

Personal Data

Address: (b)(6)

Marital Status: (b)(6)

Date of Birth: (b)(6)

Height: (b)(6) Weight: (b)(6) Physical Defects: (b)(6)

Education

College: Rutgers The State University

Curriculum: Biological Science and Marketing

Degree: Bachelor of Science

In addition, I have completed the following graduate level courses:

Imperial College, London, England

Summer School in Health Physics, (b)(6)

Contamination Control, Philadelphia, Pa.

Radiological Health - Dept. HEW, (b)(6)

I am a member of the Nuclear Medicine Society, the Health Physics Society and the N-14 Committee (ANSI) representing the Radiopharmaceutical Industry of the Atomic Industrial Forum. I am currently an active member on the PMA Subcommittee on Low Level Radioactive Waste Materials.

Employment

1. April 1975 to present

   Manager, Health Physics Department

   E. R. Squibb & Sons, Inc.

   Direct the company's Health Physics Department which provides radiation safety services for radiopharmaceutical production, quality control, marketing, distribution and research and development. Included in administrative duties are budget planning and control, supervisory training, organizing and

directing radiological health studies, investigations and procedures, providing a liason between company and regulatory authorities (State and Federal) and the direction and supervision of essential records and files.

2. September, 1969 to April, 1975

Health Physics Supervisor
E. R. Squibb & Sons, Inc.

Supervised Health Physics functions in the production and testing of radiopharmaceuticals. Duties included internal as well as environmental monitoring of radioactive liquids and gaseous and controlling radiation and contamination levels in operational areas. In addition, coordinated research projects, testing organic compounds tagged with ^{3}H and ^{14}C and setting up laboratories to handle these compounds safely.

3. August 1968 - September, 1969

Radiopharmaceutical Production Supervisor
E. R. Squibb & Sons, Inc.

Supervised and organized operations involved in the manufacturing, packaging and shipping of radioactive materials.

4. December, 1966 to August, 1968

Research Technician
E. R. Squibb & Sons, Inc.

Assisted in the development and biological testing of new compounds tagged with ^{131}I Iodine and ^{99m}Tc Technetium.

5. 1962 to 1967

Quality Control Technician
E. R. Squibb & Sons, Inc.

Tested radionuclides for final approval. Gained experience in using a Victoreen electroscope, gamma ray spectrometer and spectrophotometer.

6. 1958 - 1962

Manufacturing Technician
E. R. Squibb & Sons, Inc.

Manufactured and filled radiopharmaceuticals.

ADDENDUM #4

RADIATION DETECTION INSTRUMENTS

A. FORTY-FIVE (45) PORTABLE IONIZATION-TYPE SURVEY INSTRUMENTS

1. Fourteen (14) Eberline Model PIC6A ionization chamber survey meters; gamma; 1 mr/hr to 1000 R/hr

2. One (10) Eberline RO-2 ion chamber; beta-gamma, x-ray; >1 mr/hr to 5000 mr/hr

3. Three (3) Teletector Model #6112 and #6112D; beta-gamma; 0.1 mr/hr to 1000 R/hr

4. Seven (7) Victoreen Model #497 survey meters; beta-gamma; 1 mr/hr to 1000 mr/hr

5. Two (2) Victoreen Model #471; beta-gamma, x-ray, alpha; 0.1 mr/hr to 300 R/hr

6. Three (3) Victoreen Model 470A; beta-gamma, x-ray; <1 mr/hr to 1000 R/hr

7. Two (2) Ludlum Model L-1 and L-4 survey meters; beta-gamma, x-ray; <1 mr/hr to 1 R/hr

8. One (1) Nuclear Chicago Model #2650 survey meter; gamma; 1 mr/hr to 1 R/hr

9. One (1) Keithley Model 36100 survey meter; beta-gamma, x-ray; 0.1 mr/hr to 20 R/hr

10. Two (2) Nuclear Associates Minimonitor; beta-gamma, x-ray; 0 to 5K cpm

B. SEVENTY (70) GM-TYPE SURVEY AND MEASURING INSTRUMENTS

1. Fourteen (14) Eberline Model E-120 with end window GM probes; gamma, x-ray; 0 to 50K cpm

2. Thirty (30) Eberline Model RM-14 with end window GM probes; beta-gamma, x-ray; 0 to 500K cpm

3. Five (5) Baird Atomic Model 441A rate meter with window GM probes; beta-gamma, x-ray; 0 to 500K cpm

4. Four (4) Eberline Models HFM-2, HFM-2A and PMC-4B hand and foot counters; beta-gamma; 0 to 500 cpm

5. Two (2) Eberline Model FM-12 beta gamma floor monitor; beta-gamma; 0 to 50K cpm

6. One (1) Eberline Model MS-2 scaler rate meter with end window GM tube; beta-gamma, x-ray; 0 to 500K cpm

7. One (1) Eberline Model MS-2 with alpha scintillation detector; alpha; 0 to 500K cpm

8. One (1) Packard Model 34-29 scaler timer with end window GM tube; beta-gamma; 0 to 900K cpm

9. Seven (7) Eberline Model PRM-6 pulse rate meter with plutonium gamma probes; beta-gamma, x-ray; 0 to 500K cpm

10. Five (5) Eberline Model RM-19 rate meter with LEG-1 probe; beta-gamma; 0 to 500K cpm

C. EIGHTY-EIGHT (88) SCINTILLATION-TYPE DETECTORS AND COUNTERS

1. Twenty-four (24) area monitors Nuclear Measurements Corporation with gamma alarm system with rate meters and twenty-four point recorders; gamma; 0.1 mr/hr to 100 mr/hr

2. Three (3) Keithley Model 35056 Transport Index Monitoring systems; beta-gamma; 0 to 999 mr/hr

3. One (1) Canberra Model 8180 multichannel analyzer with GeLi detection system; gamma; E02 to E06 cpm

4. One (1) Nuclear Data Model 4420 multichannel analyzer with computer and 2 GeLi detectors; gamma; E02 to E06 cpm

5. Three (3) Baird Atomic Model 530 spectrometers with sodium iodide well-type crystal; gamma; E02 to 9.9E06 cpm

6. Three (3) Nuclear Model 300 spectrometers with sodium iodide well-type crystal; gamma; E02 to 9.9E06 cpm

7. One (1) Medotope Model 210 spectrometer with sodium well-type crystal; gamma; E02 to 9.9E06 cpm

8. One (1) Nuclear Chicago single channel analyzer with well-type sodium iodine crystal; gamma; E02 to E06 cpm

9. One (1) Searle Analytic Model 1197 spectrometer with sodium iodine well-type crystal; gamma; E02 to E06 cpm

10. One (10) Packard multichannel analyzer Model 9042 with well-type sodium iodide crystal; gamma; E02 to E06 cpm

11. Three (3) Intertechnique Model #SL4000 liquid scintillation counters; beta; E01 to E06 cpm

12. Two (2) Beckman Model #LS7500 Liquid scintillation counters; beta; E01 to E06 cpm

13. One (1) Ludlum Model 2200 spectrometer with well-type sodium iodide crystal; gamma; E02 to E06 cpm

14. Three (3) Baird Atomic ADC Models 345 and 300 amplifier analyzer thyroid uptake counting system with 1 x 1/2" sodium iodide crystal; gamma; E02 to E06 cpm

15. One (1) Tennelec Model TC-940 spectrometer with sodium iodide well-type crystal; gamma; E02 to E06 cpm

16. Two (2) Beckman Model LS-100C liquid scintillation counter; beta; E01 to E06 cpm

17. Two (2) Packard Model #2425 liquid scintillation counter; beta; E01 to E06 cpm

18. One (1) Packard Model #930 spectrazoom multichannel analyzer; gamma; E02 to E06 cpm

19. One (1) Beckman Model LS-300 liquid scintillation counter beta; E01 to E06 cpm

20. One (1) Packard Model 2405 liquid scintillation counter; beta; E01 to E06 cpm

21. One (1) Packard Model 3310 liquid scintillation counter; beta: E01 to E06 cpm

22. One (1) Packard Model 5385 liquid scintillation counter; beta; E01 to E06 cpm

23. One (1) Beckman Model LS-355 liquid scintillation counter; beta; E01 to E06 cpm

24. One (1) Beckman Model LS-150 liquid scintillation counter; beta; E01 to E06 cpm

25. One (1) Beckman Model LS-250 liquid scintillation counter; beta; E01 to E06 cpm

26. One (1) Beckman Model LS-254 liquid scintillation counter; beta; E01 to E06 cpm

27. One (1) Nuclear Chicago Model #4320 autogamma counter; gamma; E02 to E06 cpm

28. One (1) Searle Model #4320 autogamma counter; gamma; E02 to E06 cpm

29. One (1) Nuclear Enterprise Model 16 auto spectrometer with well-type sodium iodide crystal; gamma; E02 to E06

ML10

30. One (1) Nuclear Enterprise Model 1186 auto spectrometer with well-type sodium iodide crystal; gamma; E02 to E06 cpm

31. One (1) Atomic Development Model 955-151 scaler timer with sodium iodide crystal; gamma; E02 to E06 cpm

32. Three (3) Packard Model #LS7500 liquid scintillation counters; beta; E01 to E06 cpm

33. One (1) Atomic Development I-131 capsule sorting machine with sodium iodide flat faced crystals; gamma; E02 x 9.9E05

34. One (1) Atomic Development Co-57 capsule sorting machine; gamma; E02 to 9.9E05

35. One (1) Tennelec Model 246 spectrometer with sodium iodide crystal; E02 to E06 cpm

36. Two (2) Packard radiochromatographic scanners; gamma; E01 to E06 cpm

37. One (1) Packard Model 3375 liquid scintillation Counter; beta; E01 to E06 cpm

38. One (1) LKB Rackbeta Model 1215 liquid scintillation counter; beta; E01 to E06 cpm

39. One (1) LKB Rackbeta Model 1211 liquid scintillation counter; beta; E01 to E06 cpm

40. One (1) Beckman Model 8000 well-type gamma counter; gamma; E02 to E06 cpm

D. TWELVE (12) IONIZATION-TYPE MEASURING INSTRUMENTS

1. Two (2) Victoreen Model 888 source calibrators; gamma; .05 mCi to 2E3

2. One (1) Capentec Model CRC6 source calibrator; gamma; 0.5 mCi to 2E3

3. One (1) Capentec Model CRC10N source calibrator; gamma; 0.5 mCi to 2E3

4. Five (5) Capentec Model CRC10R source calibrators; gamma; 0.5 mCi to 2E3

5. One (1) Capentec Model CRC17 source calibrator; gamma; 0.5 mCi to 2E3

6. Two (2) Medotopes Model 238-2 source calibrator; gamma; 0.5 mCi to 2E3

E. SEVENTY-EIGHT (78) PORTABLE AND STATIONARY AIR SAMPLERS

1. Twenty-six (26) MSA Model G part #456058 breathing zone air samplers with multichange units part #456690

2. Two (2) high volume air samplers Unico Model #550

3. Two (2) Neptune dyno pumps Model 4K for room air sampling

4. Forty-eight (48) stationary room air samplers with Gelman #190036 flow meters in each room

ADDENDUM #5

Radiopharmaceuticals are manufactured by E. R. Squibb and Sons, Inc. in New Brunswick, New Jersey. This manufacturing facility includes provisions for the storage of raw materials, intermediate products and finished products. Sterile areas are provided for all aseptic operations and sanitary areas are provided for all nonaseptic phases of operation.

This facility (see Figures #1, #2, and #3) was specifically designed and constructed for the handling of radiopharmaceuticals. Processing of radioactive materials is carried out in gloveboxes equipped with leaded glass windows. In all cases, shielding is adequate to prevent exposure of operating personnel to excessive radiation levels. Rooms and gloveboxes are provided with forced ventilation to protect operators from volatile radioactive materials.

Each glovebox is equipped with a damper which will prevent the spread of a fire through the ventilation system. Any smoke or water vapor released by the fire and not stopped by the local fire damper will be contained in the glovebox. In addition, smoke detectors have been encased in the ducts of each filter bank system. When activated, valves located on each side of the filter bank will close automatically, and releases of airborne activity would be contained within the ducts of the ventilation system.

The hot cells are constructed of steel and concrete equivalent to four inches of lead for I-131 Iodine and eight inches of lead for the Mo-99 Molybdenum operations.

The steel and concrete used in the walls, flooring and ceiling of the hot cell's range from 14 inches to more than three feet in thickness.

The facility layout is such that movement of supplies, equipment and materials into processing areas does not interfere with adjacent work areas. The layout provides for easy access for purposes of maintenance and efficiency of operation. No unnecessary movement of materials is permitted through areas in which exposure to radiation could occur. Personnel movement in the facility does not require passage through radiation areas to gain access to nonradioactive materials areas.

Holding tanks and storage facilities for the radioactive materials to decay are remotely located, and are not in the normal path of travel of personnel or equipment.

Clean areas, radiation areas and high radiation areas are situated and segregated so that no unnecessary exposure is received by personnel. This layout also provides for contamination control. A personnel monitoring area and a protective clothing change room is located adjacent to the

radioactive materials area. Shower and locker room facilities are also provided. The layout of the facility is such that the products progress in sequence of operations from the manufacturing, filling and packaging areas to the final holding area for shipment. The loading dock is adjacent to the holding area. By use of conveyor belts and by judiciously locating the various stations in the complete manufacturing process, contact with and handling of any radioactive material is minimal.

Selected portions of the production and storage areas are monitored by use of a "built in" area monitoring system. An indicating and alarm panel is located in the Health Physics Office, thus assuring access to information regarding any unusual dose rates in the monitored areas and rapid response with corrective actions. The instrument ranges from 0.1 mr/hr to 100 mr/hr. Local alarms are provided with visual and audible alarms to alert persons entering these areas of any abnormal condition. The instrumentation provided has the capability of detecting the highest anticipated radiation levels with positive readout at the lowest possible levels. To assure optimum coverage of all areas, the detector locations have been chosen with great care.

The manufacturing areas are served by a nonrecirculating air conditioned supply system utilizing all outside air introduced through a prefilter and a high efficiency particulate filter. A general system exhausts the various spaces through filtration equal to that of the supply system. Fume hoods, wherein particulate matter is the expected contaminant, are exhausted through an F-85 and a HEPA filter followed by a 1" high efficiency carbon filter to arrest any possible gaseous contaminant. The Mo-99 - Tc-99m cave is exhausted through an F-85 and a HEPA filter and three 1" charcoal filters. Certain manufacturing gloveboxes are also exhausted through an F-85, a HEPA and 3 one inch high efficiency carbon filters. Other manufacturing gloveboxes where less volatile radionuclides are processed are exhausted through an F-85 and a HEPA filter followed by 2 one inch high efficiency carbon filters.

Each of the twelve fume hood system filter bank service from one to five fume hoods or other ancillary equipment. Each fume hood system has a manual air bypass to be used during filter changes.

Each glovebox filter bank services up to five glovebox units or similar equipment. Each glovebox system has access to an auxiliary system offering identical filtration. There are no bypasses to allow passage of unfiltered exit air. There are eleven glovebox systems and six auxiliary systems available for use during filter changes or maintenance.

Filtration for three hot cells is accomplished by employing two identical exhaust systems. One is in continuous operation, while the other exhaust system serves as an auxiliary system when the primary is shut down for decay prior to filter changes or maintenance. Each system is filtered by three Flanders roughing,

three Flanders HEPA and nine one-inch equivalent MSA activated charcoal filters. There are no bypasses to allow passage of unfiltered cave system air.

Each filter bank is equipped with before and after continuous sample tubes used to check charcoal filter efficiencies. They are changed on a weekly basis. The sample tubes are counted and an evaluation is made as to which bank should be changed, if applicable. There is no definite filter change criterion. Each system is examined individually to provide the most effective reduction in effluent.

The combination of particulate and gaseous filters described serves to reduce the effluent of other radionuclides such as Se-75, Mo-99, etc. to the lowest practicable level.

All exhaust systems are discharged to the effluent exhaust stack. The system used for sampling exit air from the stack is comprised of six one-inch lines within the exit duct. Each of these hold six pitot tubes facing upstream. The one-inch lines connect to two two-inch lines that pass through the main exhaust duct, then combine into a six-inch line. The system is drawn by a fan that exhausts to another exit duct prior to entry back to the main duct exhaust. The effluent air sample drawn from the six-inch line post fan, runs continuously at 10 liters per minute and is changed daily. The radioactivity collected in the sampler is constantly measured by the stack alarm detector which will sound an alarm in the Health Physics operations area should the maximum allowable activity for I-131 Iodine specified in Appendix B, Table II, Column I of 10CFR20 is exceeded.

Fire protection is provided at each branch connection to gloveboxes and fume hoods, etc. by means of a spring-loaded fusible link fire damper. Carbon filters are protected by means of ionization-type detectors in the duct work. Generally, detectors will isolate a filter fire from the air stream by closing metal-seated shutoff valves and transfer the effluent to the standby filters, or stop the fan, depending on the type system involved.

The plant is also equipped with an auxiliary generator which will automatically engage in the event of an electrical power failure. The generator is capable of maintaining the air systems and emergency lighting for the plant.

ADDENDUM #6

The following described the radiation protection program at E. R. Squibb & Sons, Inc.

Squibb's radiation safety program extends into all areas which use, store or receive radioactive materials. These areas are located at designated buildings (see plot plans) in Lawrenceville and New Brunswick. The Radiation Safety Committee is responsible for assuring that all operations involving radioactive materials are carried out in total conformance with our overall radiation safety program under the control of the Radiation Safety Officer.

The committee has the authority and responsibility for the approval or disapproval of all proposals for radionuclide use prior to purchase of the materials. The committee reviews and assesses the adequacy of the facilities and the equipment which will be used by individuals handling radioactive materials. Furthermore, the committee has (1) established operating, handling and general emergency procedures as well as a Radiological Contingency Plan and, (2) insured through the Health Physics Department that the individuals have been adequately trained and well experienced in the proper handling of radionuclides and are knowledgeable of the radiation safety operating procedures.

To this extent, Squibb has developed Health Physics training films unique to the total operation.

The Radiation Safety Committee consists of a chairman and members as follows (see Addendum 1 for Organizational Structure):

Director, Quality Control Services (Chairman)
Director, Medical Services
Director, Personnel and Industrial Relations
Regulatory Counsel
Radiation Safety Officer
Manager, Radiopharmaceuticals
Manager, Radiopharmaceutical Quality Control
General Manager, Diagnostics
Manager, Personnel and Industrial Hygiene and Safety

With the concurrence of the committee, alternates may attend committee meetings.

The committee shall meet on a regularly scheduled basis at least once every three months and more frequently, if necessary or desirable. Special meetings may be called by any member of the committee. Any five of the nine members or their designees will constitute a quorum for purposes of conducting committee business. Any five of the nine members or their designees will constitute a quorum for purposes of conducting committee business.

Minutes of the committee meetings will be kept by a secretary chosen from the membership by the chairman, and copies will be provided to all members of the committee as well as to management.

Responsibilities of the Radiation Safety Committee are as follows:

1. The main responsibility of the committee is radiation safety at all E. R. Squibb & Sons, Inc. sites designated in the byproduct license.

2. Any rules, regulations and decisions of the committee will be binding for any users of radioisotopes as specified in the byproduct license.

3. The implementation of these rules, regulations and decisions will be carried out by the radiation safety officer, who is responsible to the committee as a whole, that his duties are carried out as described in the Radiation Safety Manual.

4. Proposals for use and distribution of licensed materials within the licensed sites must be approved by the Radiation Safety Committee.

5. The committee will order removal of any person who has been exposed to a higher radiation dose than regulations permit, or which is deemed excessive to good operations.

6. The committee chairman will submit reports required by the Nuclear Regulatory Commission in accordance with Title 10 CFR Part 20.

7. Each member of the committee shall be thoroughly familiar with all federal and state regulations pertaining to radiation safety and radioisotope operations.

8. The committee shall continuously review the enforcement of radiation safety rules as set by federal and state regulations.

Primary responsibility and authority for radiation safety shall lie with the Radiation Safety Committee which shall delegate this responsibility and authority to the Radiation Safety Officer (Health Physicist) for implememtation.

The main responsibility of the Radiation Safety Officer is:

I. AREA, PROCESS AND PERSONNEL MONITORING

To properly assess the duties of the Radiation Safety Officer, a distinction should be made between area and process monitoring.

A. PROCESS MONITORING

When a new procedure is instituted or an established procedure modified, the Radiation Safety Officer must be called in to insure radiation safety of the process. Once operational, monitoring procedures will be established by the Radiation Safety Officer. The responsibility for implementation of these procedures ("self-policing") will rest with the operating group. However, the Radiation Safety Officer has the duty to spot check at any time to see that operational monitoring is being carried out properly.

B. AREA MONITORING (RESTRICTED AND UNRESTRICTED AREAS)

It is the responsibility of the Radiation Safety Officer to establish survey and monitoring schedules, execute or supervise the monitoring operations, evaluate the results of these operations, maintain adequate records and spot check at any time to insure that operational area monitoring is adequate.

C. PERSONNEL MONITORING

The Radiation Safety Officer monitors, evaluates and keeps records of personnel as follows:

II. RECORDS

The Radiation Safety Officer must maintain legal records as required by federal and state agencies and reports of radiological activities. Representative reports are: daily logs, periodic summary reports, unusual incident reports special work permits, minor injury reports, requests for medical service, records of radioactive material or shipments, and a record of all locations where radioisotopes are used at all Squibb facilities.

In addition, the Radiation Safety Officer must:

A. Be thoroughly familiar with all state, federal and management regulations pertaining to processing and handling of radioisotopes and radiation producing devices.

B. Advise supervisors and personnel in all aspects of the radiation protection program.

C. Evaluate hazardous operating conditions and suggest to supervision safe procedures to be followed.

D. Control the movement of all radioactive materials within the facility.

E. Establish emergency procedures for all dangerous operations.

F. Supervise decontamination.

G. Supervise waste disposal procedures.

H. Educate workers in the principles and hazards of ionizing radiation and the various steps taken for their protection.

I. Perform studies and research, whenever possible, in particular areas of the radiation protection field.

In order to accomplish the above program, the Radiation Safety Officer should have a secretary, experienced health physics supervisors and technicians, as assistants. The assistants shall perform the majority of the routine duties which include the following:

A. Thyroid counting

B. Area contamination surveys

C. Area radiation surveys

D. Air contamination surveys

E. Personnel monitoring issue and receipt

F. Special work permit handling

G. Investigational surveys

The majority of the Radiation Safety Officer's time should be concerned with the following:

A. Training

B. Hazard evaluation and elimination

C. Consultation and review of all new experiments or procedures involving radiation and radioisotopes

D. Supervision of waste disposal procedures

E. Advise supervisors in all aspects of the radiation protection program

F. Performed studies and research

G. Maintain all records pertinent to our license

H. Inform the Radiation Safety Committee of all aspects of the program

I. Insure that adequate and calibrated monitoring devices are available

J. Spot contamination surveys

K. Recordkeeping - isotope inventory, etc.

Reed Instruments, a subcontractor for Bionucleonics, calibrates and maintains certain surveying equipment for Squibb. See Addendum #4 for a list of radiation detection instruments employed in our operation.

There are scintillation-type detectors and counters which are not calibrated by Reed Instruments. These are standardized with certified reference sources prior to use by operating technicians.

All of our calibrated survey equipment is calibrated every three months and/or after each repair.

The following criteria are used in assessing the areas and operations which mandate the usage of personnel monitoring devices. Personnel monitoring devices are issued to all of the following:

1. Individuals handling or testing radioactive materials in excess of exempt quantities.

2. Persons operating radiation producing machines.

3. Individuals who have access or enter a "High Radiation Area." This is an area where there exists a level of radiation such that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

4. Individuals entering a "restricted area" under the circumstances whereby it is possible to receive 25% of the applicable quarterly value as specified in 10CFR20:101.

5. Individuals entering or working in a restricted area. This is an area where there exists a level of radiation such that a major portion of the body could receive a dose of 2 mr/hr or a 100 mrem to the whole body in any seven consecutive days.

6. Individuals entering or assigned duties in a "radiation area." This is an area in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 millirem or in any 5 consecutive days or dosage in excess of 100 millirems.

7. Any individual that Health Physics feels should be issued a personal monitoring device.

Once it is determined that a monitoring device is required, the Health Physics Department shall be responsible for its issuance and submittal to a film badge processor for exposure evaluations.

Our primary type of monitoring device is the whole body film badge. These are issued either weekly or monthly. Weekly badges are issued to individuals involved with the manufacturing and testing of radioactive products. Monthly badges are issued to individuals involved in low-level research and development operations. Any deviation in the frequency at which personnel monitoring devices are exchanged is determined by the Health Physics Department.

All people involved in the manufacturing and testing of radioactive products are issued and required to wear ring TLD's. Once again, any deviation from this practice is determined by the Health Physics Department. The basis for the issuance of any special rings to any other monitoring device is determined after a health physics evaluation is conducted on the manufacturing and chemical processes. The type of radionuclide, amount of radioactivity and unique isotope characteristics also are primary factors determining the need of special monitoring equipment.

Individuals are made aware that personal monitoring is required by the radiation signs posted to designate restricted, radiation and high radiation areas. They are also reminded through regularly scheduled radiation safety talks as well as through standard health physics procedures and policies. For example:

1. The procurement and inventory of isotopes is controlled by the Health Physics Department. Before any work begins or film badges issued, testing and manufacturing procedures are evaluated and individuals are advised of safe-handling techniques.

2. Maintenance can be performed in a controlled area only by issuance of a Special Work Permit by Health Physics personnel. The particular job is reviewed and cleared by the Health Physics Department before film badges are issued to maintenance personnel.

3. Individuals responsible for using radioactive material shall notify their subordinates of the necessity of monitoring devices. These people are referred to the Health Physics Department before film badges are issued.

4. Training seminars are also utilized to inform personnel of the necessity of personal monitoring devices.

The following procedures have been established for evaluating radiation exposures:

1. All radiation exposure reports are reviewed upon receipt.

2. A notification level of 1.2 Rem has been established with our supplier (R. S. Landauer, Jr. and Co.). If, by chance, one of our personnel exceeds the limit, that individual would be informed immediately and the following action taken.

   a. The individual would be immediately removed from the controlled area.

   b. Past work records for the exposure period would be evaluated and reviewed. From this information, a probable cause would be determined and preventative measures taken to avoid a recurrence of this type.

The Health Physics bioassay program consists of thyroid uptake evaluations and urine analysis by all individuals manufacturing, testing or using radioactive materials in excess of exempt quantities.

Thyroid uptakes are normally required when individuals work with more than exempt quantities of I-125 or I-131, depending on the chemical or physical form, type of equipment, type of process and handling procedures.

Thyroid measurements for I-125 and I-131 are required biweekly. Squibb investigational limits for I-131 iodine have been established as 0.07 uCi. The investigational limit for I-125 iodine is 0.05 uCi. The maximum permissible dose to the thyroid, however, is outlined in 10CFR20:103.

If any individual should receive a dose to the thyroid in excess of these limits, he or she is prohibited from working with any I-125 or I-131. An investigation is performed to determine the probable cause of the thyroid dose and action is taken to prevent a recurrence.

Urinalyses are normally required when individuals work with millicurie quantities of I-125 and I-131, depending on the chemical form, type of equipment, type of process and handling procedures.

Manufacturing personnel are required to submit urine samples for monthly analysis. Nondetectable amounts of activity are recorded as <E-05 uCi/cc.

Any detection of significant amounts of activity in urine samples shall be questioned to determine the cause of ingestion. If body burdens are approached or exceeded, the individual shall be removed from the controlled area and a full report submitted in accordance with 10 CFR Part 20:403.

In addition, training seminars are given to groups at unspecified demonstration sites using low activities of Iodine-125. It is desirable that Squibb have the authorization to allow its representatives to possess at any one time up to the maximum of 100 microcuries of I-125 iodine in the form of IN-VITRO Radioimmunoassay Kits for demonstrations and use at temporary locations throughout the country.

The following products and typical of the kits which will be used at these training sessions:

T4 Squibb I-125

T4 CLASP I-125

T3 U-SQUIBB I-125

Digoxin-Squibb I-125

Digoxin-CLASP I-125

T3-SQUIBB I-125

Cortisol-SQUIBB I-125

Estriol-SQUIBB I-125

Angiotensin I-125

All of these are IN-VITRO I-125 iodine products.

The Squibb representatives, responsible for these training seminars, have had extensive training in radiation safety and the handling of radioactive materials.

All radioactive waste generated at such demonstrations will be appropriately packed with materials furnished by our trained shipping personnel. Any liquid radioactive waste will be contained in enough absorbent material to absorb twice the quantity of liquid. This material is returned to E. R. Squibb & Sons, Inc. in New Brunswick, N.J.

The demonstrations are conducted on tables covered with absorbent paper. Upon completion, surveys are made with a low range gamma-beta survey meter.

Licensed materials, when not in use, will be secured against unauthorized removal by storage in a locked room.

No pipetting by mouth is permitted and personnel handling radioactive materials will wear gloves.

The following Standard Operating Procedures for these Customer Training Courses are:

1. All procedures with radioactive materials must be performed over absorbent paper and in trays.

2. All personnel handling radioactive materials must wear a protective clothing (i.e., lab coat) including rubber gloves.

3. There shall be no pipetting by mouth allowed at any time.

4. The area containing the radionuclide will be locked when no one is in attendence.

5. All radionuclides not in use must be stored in a safe manner in a locked or otherwise inaccessible area.

6. There shall be no eating, drinking, smoking or storing of food in the area which contains the radionuclide.

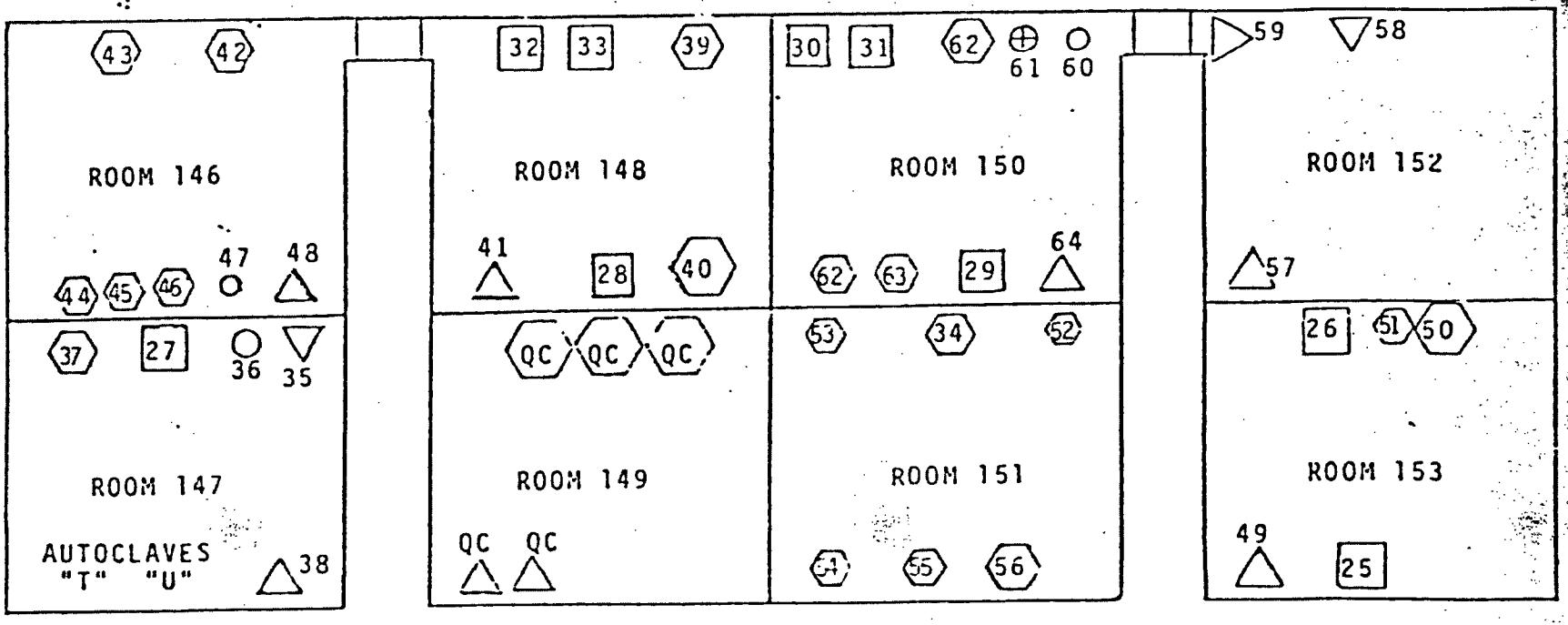
7. No liquid radioactive waste will be placed into any sanitary sewer system.

8. All radioactive waste will be properly packaged and shipped to the New Brunswick, N.J. Radiopharmaceutical Manufacturing facility for proper disposal.

9. The Squibb representative working in the area which contained the radionuclide must survey the area for radioactive contamination using an end window Geiger-Muller tube with a 2 mg/cm2 windkow.

The Squibb representative must assure that the area is completely free (no d/m above background) of contamination before he releases the area back to the general public.

FIGURE #1



▽ - FUME HOOD

○ - OVEN

□ - MODIFIED GLOVE BOX WITH PASS THRU

⬡ - GLOVE BOX WITHOUT PASS THRU

⊕ - INCUBATOR

MEDOTOPES, BUILDING #124
MANUFACTURING ROOMS

1967

EQUIPMENT & ROOM IDENTIFICATION LIST

FIGURE #1

MANUFACTURING ROOMS BUILDING #124

ROOM #146

42 - Lucite Glove Box - R & D
43 - Glove Box - R & D
44 - Lucite Glove Box - Not in use
45 - Lucite Glove Box - Not in use
46 - Lucite Glove Box - Not in use
47 - Oven - Rubratope Capsule Drying
48 - Fume Hood - Rubratope Co-57 Capsule Manf. & Filling

ROOM #147

35 - Fume Hood - Rubratope Co-60 Capsule Manf. & Filling
36 - Depyrogenation Oven - Not in use
27 & 27A Modified Glove Box - Not in use
37 - Glove Box - Robengatope Manufacturing
Autoclave "T"
Autoclave "U"
38 - Fume Hood - R & D

ROOM #148

32 & 32A Modified Glove Box - Albumotope I-131 Inj. Manufacturing
33 & 33A Modified Glove Box - Albumotope I-131 Inj. Manufacturing
39 - Glove Box - Diagnostic Capsule Dejunking & Counting
40 - Glove Box - Diagnostic Capsule Manufacturing & Filling
28 & 28A Modified Glove Box - Not in use
41 - Fume Hood

ROOM #149 - Quality Control Chemist's Lab

ROOM #150

60 - Oven - Sethotope
61 - Incubator - Sethotope
62 - Glove Box - Sethotope Manufacturing
31 & 31A Modified Glove Box - at vendor
30 & 30A Modified Glove Box - Not in use
62 - Glove Box - Cesium 137 Ref. Std. Manufacturing & Filling
63 - Glove Box - Cobatope Co-60 Ref. Std. Manf. and Filling
29 & 29A Modified Glove Box - Not in use
64 - Fume Hood - Sethotope Glassware

EQUIPMENT & ROOM IDENTIFICATION LIST

FIGURE #1

MANUFACTURING ROOMS BUILDING #124

ROOM #151

52 - Glove Box - Cobatope Co-57 Ref. Std. Manf. &.Filling
34 - Glove Box - Not in use
53 - Glove Box - Not in use
54 - Glove Box - R & D
55 - Glove Box - Sethotope Liquid Waste Evaporation
56 - Glove Box - Hipputope Manufacturing

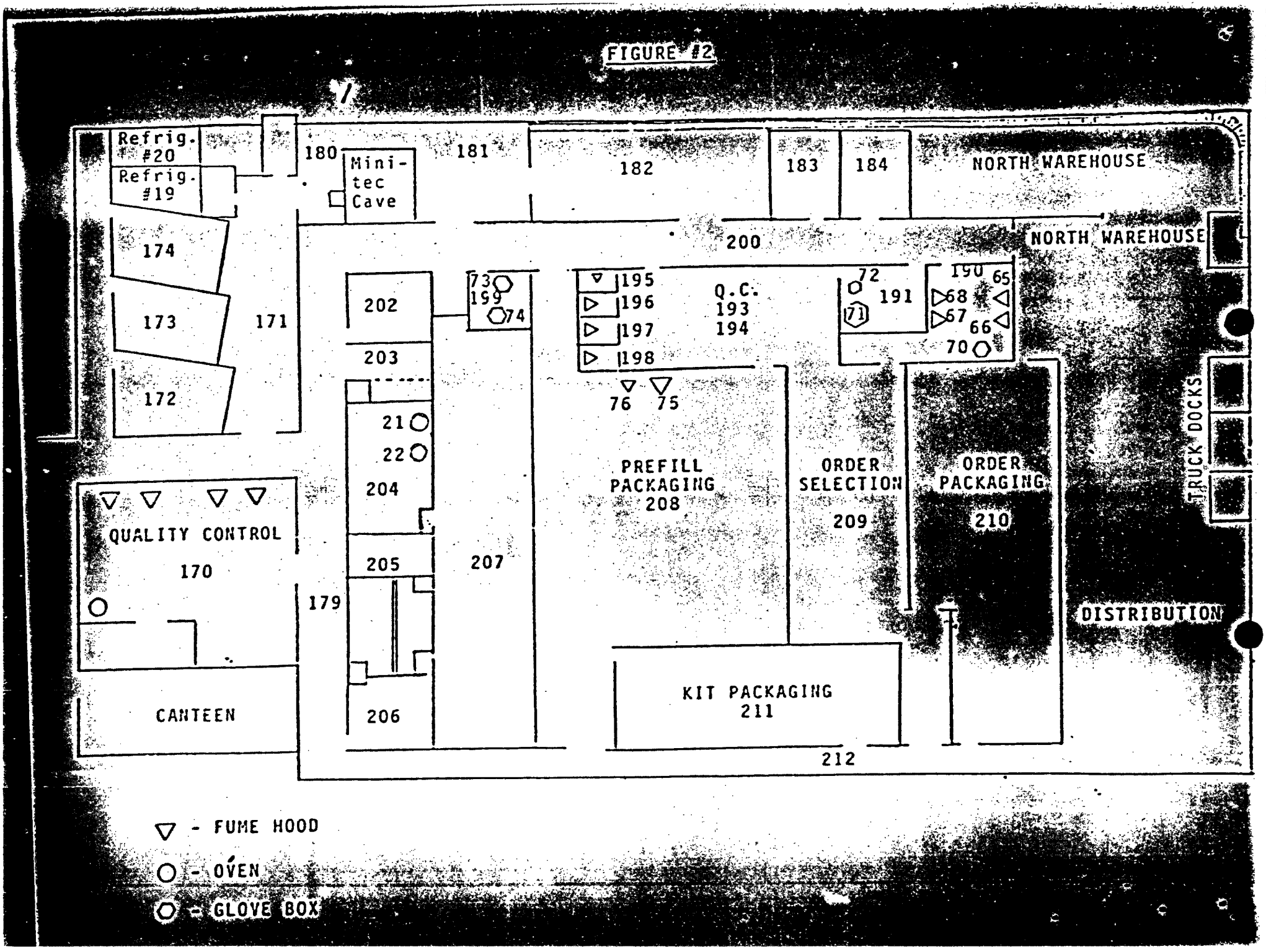
ROOM #152

57 - Fume Hood - Raw Material Dispensing
58 - Exhaust Hood - Raw Material Dispensing
59 - Weighing Exhaust Hood - Raw Material Dispensing

ROOM #153

49 - Fume Hood - In Service
25 & 25A Modified Glove Box - Not in use
50 - Glove Box - Not in use
51 - Shaker Hood - Not in use
26 & 26A Modified Glove Box - Not in use

FIGURE #2


Refrig. #20
Refrig. #19
180
Mini-tec Cave
181
182
183
184
NORTH WAREHOUSE
200
NORTH WAREHOUSE
174
173
172
171
202
203
73
199
74
195
196
197
198
Q.C.
193
194
72
71
191
190
65
68
67
66
70
76
75
TRUCK DOCKS
21
22
204
PREFILL PACKAGING
208
ORDER SELECTION
209
ORDER PACKAGING
210
QUALITY CONTROL
170
205
207
179
DISTRIBUTION
CANTEEN
206
KIT PACKAGING
211
212
▽ - FUME HOOD
○ - OVEN
⬡ - GLOVE BOX

EQUIPMENT & ROOM IDENTIFICATION LIST

FIGURE #2

ROOM #170 - Quality Control Lab

CORRIDOR #171 - Behind Caves

ROOM #172 - Cave (Hot Cell)
A. Iodotope Therapeutic Oral Manufacturing and Filling
B. Bulk I-131 Storage and Dispensing

ROOM #173 - Cave (Hot Cell) Research

ROOM #174 - Cave (Hot Cell)
Iodotope Therapeutic Capsule Manufacturing and Filling

REFRIGERATORS #19 & #20

A. Storage for prefills prior to packaging
B. Storage of Water for Injection and some raw materials
C. Storage of Co-57 and Co-60 with B_{12}

CORRIDORS - 179, 200 and 212

ROOMS - 204, 205, 206 and 207 (See Figure #3)

ROOM #202 - Supervisors Office

ROOM #203 - Storage of empty lead containers and spare Minitec Generators

ROOM #180 - Behind Minitec Cave

ROOM #181 - Front of Minitec Cave - Manufacturing, Filling and Sourcing of Minitec

ROOM #182 - A. Minitec Packaging
B. Assembly of Minitec Columns into wings

ROOM #183 - Mens Room

ROOM #184 - Prime Container Allocation Room

ROOM #190 - 65, 66, 67, 68 - Fume Hoods - Storage of Iodotope Therapeutic Capsules.
70 - Glove Box - Storage of empty pigs for Therapeutic Capsules.

EQUIPMENT & ROOM IDENTIFICATION LIST

FIGURE #2

ROOM #191 - 71 - Glove Box - Iodotope Diagnostic Capsules Manufacturing and Filling
72 - Glove Box - Vacuum Cleaner for Iodotope Diagnostic Capsules

ROOMS 193 thru 198 - Quality Control

ROOM #199 - 73 - Lucite Glove Box - Research
74 - Lucite Glove Box - Research

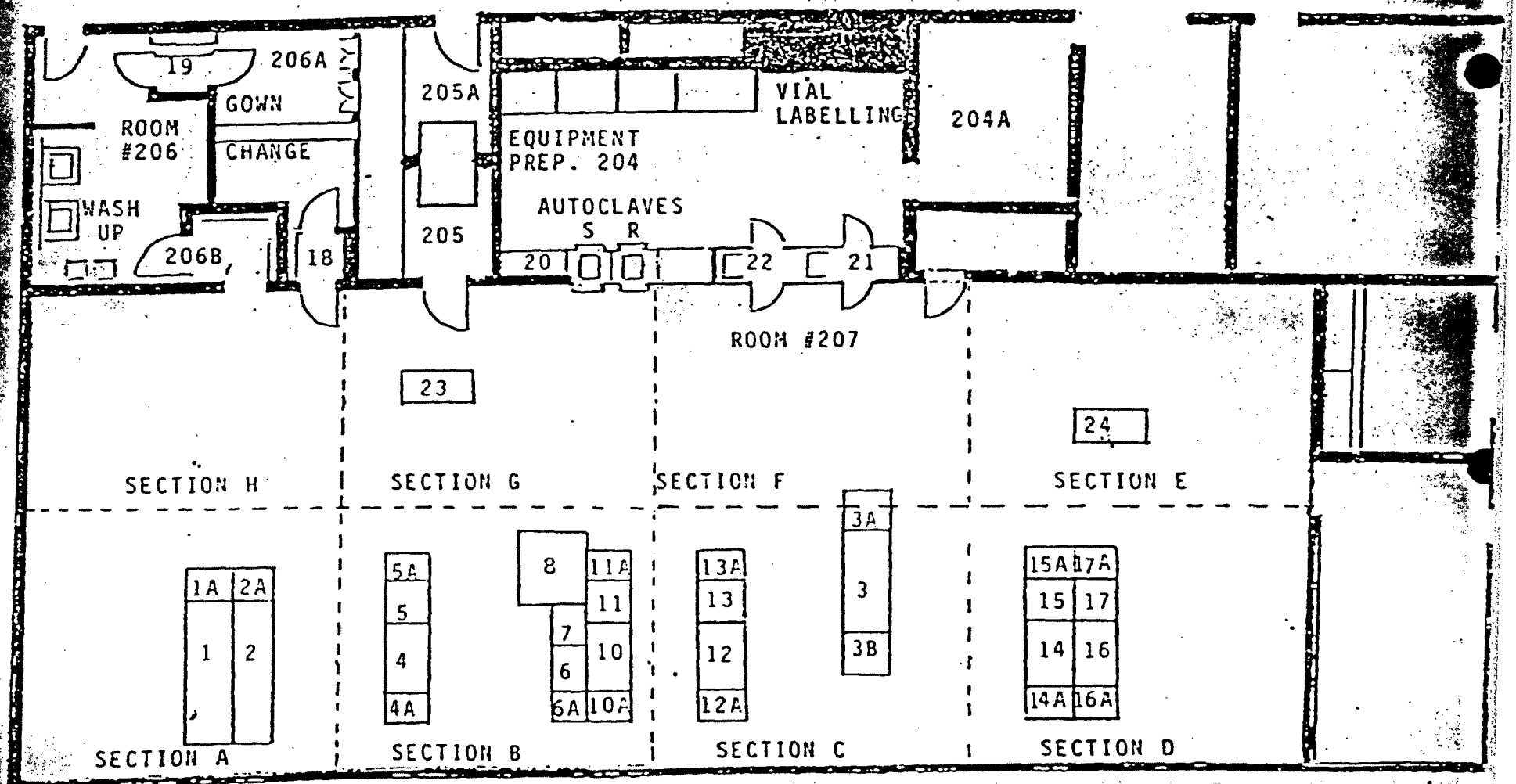
ROOM #208 - Prefill Packaging Room
75 - Fume Hood - Diagnostic Capsule Packaging
76 - Fume Hood - Diagnostic Capsule Packaging

ROOM #211 - Kit Packaging Room

ROOM #209 - Order Selection Room

ROOM #210 - Order Packaging Room

FIGURE #3


19
206A
GOWN
ROOM
#206
CHANGE
WASH
UP
206B
18
205A
205
EQUIPMENT
PREP. 204
VIAL
LABELLING
204A
AUTOCLAVES
S R
20
22
21
ROOM #207
23
24
SECTION H
SECTION G
SECTION F
SECTION E
1A
2A
1
2
5A
5
4
4A
8
11A
11
7
10
6
6A
10A
13A
13
12
12A
3A
3
3B
15A
17A
15
17
14
16
14A
16A
SECTION A
SECTION B
SECTION C
SECTION D

EQUIPMENT & ROOM IDENTIFICATION LIST

FIGURE #3

ROOM #206 - Wash Up Room

ROOM #206A - Gown Change Room

ROOM #206B - Exit from Room #207

ROOM #205 - Equipment Pass-Thru

ROOM #205A - Equipment Pass-Thru

ROOM #204A - Entrance to Vial Labelling and Equipment Prep Room

ROOM #204 - Vial Labelling and Equipment Preparation Room
- 20 - Laminar Flow Hood
- 21 - Depyrogenation Oven
- 22 - Depyrogenation Oven

ROOM #207 - Filling Room
- 1 & 1A - Not in use.
- 2 & 2A - Albumotope I-131 Syringe Assembly Hood and Pass-Thru
- 3A - Albumotope I-131 Syringe Dilution Hood and Pass-Thru
- 3 - Albumotope I-131 Syringe Filling
- 3B - Pass-Thru
- 4 & 4A - Chromitope Sodium Filling Hood and Pass-Thru
- 5 & 5A - Chromitope Sodium Manufacturing and Dilution Hood and Pass-Thru
- 6,6A,7 & 8 - Not in use
- 10 & 10A - Robengatope Filling Hood and Pass-Thru
- 11 & 11A - Robengatope Dilution Hood and Pass-Thru
- 12 & 12A - Sethotope Filling Hood and Pass-Thru
- 13 & 13A - Sethotope Dilution Hood and Pass-Thru
- 14A - Albumotope (I-131) Inj. Filling Hood and Pass-Thru
- 15A - Albumotope (I-131) Inj. Dilution Hood and Pass-Thru
- 16 & 16A - Hipputope Filling Hood and Pass-Thru
- 17 & 17A - Hipputope Dilution Hood and Pass-Thru
- 23 - Laminar Flow Transfer Cart
- 24 - Laminar Flow Transfer Cart

MLIB