Exxon Biomedical Sciences, Inc.

APPLICATION FOR AMENDMENT/RENEWAL

NRC Material License #29-19396-01

April 4, 1985
85SM 85
Revised: 4/26/85

NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER 29-19396-01
- [ ] C. RENEWAL OF LICENSE NUMBER ____________

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip Code)

Exxon Biomedical Sciences, Inc. (EBSI)
Exxon Corporation
P.O. Box 235
East Millstone, New Jersey 08873

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Exxon Biomedical Sciences, Inc. (EBSI)
Exxon Corporation
Mettlers Road (P.O. Box 235)
East Millstone, New Jersey 08873

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Daniel E. Agopsowicz

TELEPHONE NUMBER

(201) 873-6251

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY 3K

AMOUNT ENCLOSED $ 190.00

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR 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.

SIGNATURE—CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
Dennis Poller	Dennis Poller	Vice President, Exxon Biomedical Sciences, Inc.	4/4/85

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

[ ] <$250K	[ ] $1M–3.5M
[ ] $250K–500K	[ ] $3.5M–7M
[ ] $500K–750K	[ ] $7M–10M
[ ] $750K–1M	[ ] >$10M

b. NUMBER OF EMPLOYEES (Total for entire facility excluding outside contractors)

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (dollar and/or staff hours) ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? (NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence)

- [ ] YES
- [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
AMOUNT RECEIVED	CHECK NUMBER		APR 30 1985	DATE

PRIVACY ACT STATEMENT ON THE REVERSE

TABLE of CONTENTS

5. Radioactive Material

	Element/ Mass Number	Chemical and/or Physical Form	Manufacturer/ Model Number	Maximum Amount To Be Possessed At One Time
A	Carbon-14	Solid or Liquid	N.A.	1000 mCi
B	Hydrogen-3	Solid or Liquid	N.A.	1000 mCi
C	Nickel-63	Foil or Plated Detector	Hewlett Packard Model 19303 or Tracor Model 111019-001	5 Detectors, 15 mCi per Detector
D	Krypton-85	Gas, in Sealed Source Deionizer	TSI Model 3077 or 3054	3 Sources, 10 mCi per Source
E	Cesium-137	Sealed Source External Standard	Beckman Scintillation Counter Model 3801	1 Source, 0.03 mCi

6. Purposes For Which Licensed Material Will Be Used

A. and B.) Carbon-14 and Hydrogen-3 will be used for research in the following types of studies or experiments:

- Metabolism or Pharmacokinetic Studies

  - Animal metabolism studies in rodents in metabolism cages or chambers. Studies involved feeding or other exposure for purposes of establishing adsorption, distribution and excretion of radiochemicals. Experiments involve microcurie amounts of C-14 or H-3. Animals are contained in closed systems after exposure, collecting all forms of excreta. Radioactivity in urine, feces and expired air are completely collected or trapped and analyzed by scintillation counting. In some cases metabolites are separated and further analyzed by chromatographic procedures, particularly high performance liquid chromatography. In some cases tissue and feces concentrations of C-14 or H-3 are determined by processing in a Packard 306B tissue combustor, trapping all radioactive combustion products and analyzing by scintillation counting.

  - Bioconcentration studies in fish or invertebrates. Microcurie amounts at low concentration, generally less than 1,000 DPM/ml, of C-14 or H-3 labelled organic chemicals in aqueous solution are used to expose test organisms. Water and whole organisms or tissues are frequently assayed to determine the extent of bioaccumulation of the chemical.

- Environmental Fate Studies

  - Biodegradation in Soil or Water.

    Microcurie or sub-microcurie amounts of C-14 or H-3 labelled organic chemicals are used in closed, small laboratory systems to establish the extent of biodegradation by microorganisms in soil, sediment or water.

  - Physical Fate Studies.

    Microcurie or sub-microcurie amounts of C-14 or H-3 labelled organic chemicals are used in closed systems to evaluate the extent of partitioning or physical degradation of chemicals in simulated environments. Examples of these types of studies are soil adsorption, volatilization, hydrolysis, solvent partitioning behavior, etc. Since the aim of these studies is quantitative analysis of the material, all radioactivity is contained or trapped and analyzed.

- General Analytical Uses

  - Sub-microcurie amounts of radiochemicals may be used for isotope dilution studies to determine purity of standards, for chromatographic purposes to follow liquid chromatographic or thin layer chromatographic elution patterns of chemicals, or for

purposes of standardizing radioactivity measuring instruments such as the biological sample combustor, liquid scintillation counter or radioactive flow detector.

C.) Enclosed foils containing Nickel-63 (15 mCi/foil) are an integral part of the electron capture detector system on Hewlett-Packard Model 5880A gas chromatographs (detector type 19303) and Tracor Model 550 gas chromatographs (detector type 111019-001).

D.) Krypton-85 is incorporated as a sealed source in TSI charge neutralizers.

E.) A sealed source containing 30 uCi of Cesium-137 is used in the Beckman 3801 liquid scintillation counter for purposes of external standard quench correction of LSC data.

7. Individuals Responsible For Radiation Safety Program And Their Training And Experience

The individuals responsible for radiation protection at this facility are the members of the Radiation Protection Committee which reports and is responsible to the Vice President of EBSI.

The site Radiation Protection Officer is a member of the committee and has lead responsibility for the conduct of the radiation protection program. The chairperson of the committee serves as alternate radiation protection officer when he/she is unavailable. Other committee members are research and support professionals in charge of key activities related to the use of radioactive materials at this site. Some members of the Radiation Protection Committee will not personally handle radioactive materials under any anticipated circumstances. Those who are expected to handle radioactive materials are mentioned by name in section 8 of this application.

A.) Radiation Protection Officer

Name: Daniel E. Agopsowicz

Title: Head, Operations Unit, Industrial Hygiene Section

Formal Education:
- B.S., Physics, Seattle University, 1973
- M.S., Radiological Health, Colorado State University, 1974

Additional Pertinent Training:

- N.I.O.S.H. course "Non-Ionizing Radiation", 12/74
- Los Alamos Scientific Laboratory course "Respiratory Protection", 12/74
- N.I.O.S.H. course "Recognition, Evaluation and Control of Occupational Hazards", 1/76
- N.I.O.S.H. course "Safety in the Laboratory", 3/76
- The Operations Council of American Trucking Associations, Inc., course "Hazardous Materials and Wastes Training and Compliance Seminar - 1978-79"
- J. T. Baker Chemical Co. course "The Management and Disposal of Hazardous and Chemical Wastes", 10/80
- Support Consultants and Assoc., Inc. course "Oil Field Radiation Safety" 10/82

Certifications:

- American Board of Industrial Hygiene, Comprehensive Practice, Certificate #1522
- Board of Certified Safety Professionals, Serial #6407

Affiliations:

- American Industrial Hygiene Association
- American Board of Industrial Hygiene
- Health Physics Society

Experience in Radiation Protection

1984 to Present:

Head, Operations Unit, Industrial Hygiene Section. Responsibilities include comprehensive Industrial Hygiene support, including radiation protection, for Exxon affiliate organizations worldwide.

1980-1984:

Senior Industrial Hygienist, Exxon Company, U.S.A., Houston, Texas. Responsibilities included comprehensive Industrial Hygiene support, including radiation protection, for several major departments of Exxon Company, U.S.A. Concurrently served as Radiation Protection Officer for Exxon Company, U.S.A. Work of radiological nature included hazard assessment of radiotracer injection for enhanced oil field recovery, review of refinery radiation protection and emergency plans, evaluation of radioactive catalyst handling and monitoring various research and medical instruments using radioactive sources or generating radiation.

1975-1980:

Associate Health Physicist, Health Protection Unit, Lovelace Biomedical and Environment Research Institute, Albuquerque, New Mexico. Shared responsibility for health physics, industrial hygiene, safety, hazardous waste disposal and environmental protection. Lovelace was a DOE prime contract laboratory conducting biomedical research with multicurie quantities of nuclear by-products and non-strategic quantities of transuranic and special nuclear materials. Supervised and participated in operations including:

- Radiochemical work in hoods, glove boxes and specially shielded configurations.
- Animal exposures to aerosolized radioactive materials including transuranics.
- Decontamination of persons and areas.
- Radioactive waste shipments.
- Monitoring/bioassay activities.
- Radiation and general health/safety training.

1974-1975:

Environmental Engineer, Utah International, Inc., Salt Lake City, Utah.

Responsibility was to evaluate the radiation protection practices of uranium mining and milling properties.

B.) Radiation Protection Committee Chairperson and Alternate Radiation Protection Officer

Name: Dennis Randall Peterson

Formal Education:
- University of Minnesota Institute of Technology: B. Chem., 1964, Major: Organic Chemistry
- University of Minnesota College of Biological Sciences: Ph.D., 1969, Major: Biochemistry; Minor: Organic Chemistry

Additional Pertinent Training:

In graduate school took a course, BIOC 204 "Tracer Techniques", which emphasized research use and measurement and safe handling of radiochemicals. Later, responsible for teaching same course and for the associated disposal of radioactive waste, area monitoring for spills, and the associated record keeping for these activities, and for ordering and receipt of radioactive materials. Materials used included C-14, H-3, P-32 and I-131. Graduate research and thesis project involved use of radioactive materials in synthesis of labelled substrates, enzyme active site labelling, and kinetic studies.

Experience

January 1980 to Present:

Manager, Chemistry and Metabolism, Environmental Health Sciences Laboratory, Bio/dynamics, Inc.

1978-1979:

Manager, Clinical Research, American Cyanamid Co., Shulton Div., Clifton, NJ

1969-1978:

Scientist, Lever Brothers Co. Research Center, Edgewater, NJ

Work Experience With Radioisotopes:

At the Lever Bros. position, our department was responsible for all of the radioactive materials in the facility; assisted the Radiation Safety Officer (E. Mones) in record keeping and giving instruction and training to the staff. Used radioisotopes extensively in research projects dealing with Biodegradation, Bacterial Metabolism, and Animal Metabolism.

Now using radiochemicals to trace routes and rates of animal metabolism. Set up the training and monitoring procedures for this new facility and responsible for all radiation safety in this building.

C.) Radiation Protection Committee Member

Name: John E. Stillman

Formal Education:
- B.S. (Biochemistry), SUNY College of Forestry at Syracuse University, 1967
- M.S.P.H. (Envr. Chem./Biology), School of Public Health, University of North Carolina at Chapel Hill, 1969
- M.A. (Biochemistry), School of Agriculture, North Carolina State University at Raleigh, 1972

Additional Pertinent Training:

- During graduate school (UNC - CH) used radiolabelled C-14 and H-3 for the uptake tracer studies of methane fermentation. Quantification was performed by liquid scintillation of extracted phases.
- NC Department of Human Resources - Health Services (Occupational Health Laboratory). Responsible for operation and maintenance of H-3 and Ni-63 source in electron capture detectors. Performed semi-annual wipe tests. Also supervised personnel responsible for operation and maintenance of ECD sealed sources (1972 - 1979).
- With Exxon, supervised technologists and technicians employing Ni-63 ECD for analytical tasks (1979 - present).

D.) Radiation Protection Committee Member

Name: G. F. Egan

Formal Education:
- St. Francis College, NYC, BS Biology, 1962
- Long Island University, NYC, MS Physiology, 1967
- University of Michigan, Ann Arbor, Michigan, MS Industrial Health, 1971
- University of Michigan, PhD Industrial Toxicology, 1973

Additional Pertinent Training:

In graduate school, attended a course in Radiation Biology which emphasized the biological effects of radiation, the radiation dosimetry and the proper handling of radioisotopes and other sources of radiation. PhD thesis paper project included the use of C-14--labelled acetate and glycine to monitor the metabolism of the heme moiety of various cytochrome-containing enzymes.

Current Position:

Director of Toxicology for Exxon. Responsibilities include providing technical and management guidance for various routine toxicology test programs for a range of specialized metabolism and pharmacokinetic studies at commercial laboratories and for Exxon's own toxicology laboratory at East Millstone.

E.) Radiation Protection Committee Member

Name: Stephen J. Petruska

Education: - B.A. Rutgers University. Trained as an RCRA instructor for collection and disposal of hazardous waste

- o Since 1980, served as site hazardous waste coordinator responsible for ensuring proper handling and disposal of all hazardous waste as well as maintenance of all Material Safety Data Sheets (MSDS) and related information.
- o Arranges for disposal of all radioactive waste for site.
- o Coordinates collection and disposal of hazardous waste.
- o Responsible for training hazardous waste handlers, generators and site management.

F.) Radiation Protection Committee Member

Name: Stanley M. Van Pelt

Current Position: Site Manager

Relevant Experience (1950-1985):

- o Graduate engineer with 35 years of engineering and maintenance experience.
- o At the G.A.F. Corporation, as Superintendent of Technical Services, responsible for the licensing, operation, training and maintenance of all Radiation Operated Process Measuring devices.
- o At the E. R. Squibb Corporation, as Manager of Maintenance and Construction, responsible for all maintenance and construction including Radiological Pharmaceutical Productions. Since this particular production involved significant radiation densities, disaster plans and training were in effect. Ensured all protocols for maintenance personnel were followed.
- o As Chief Operation Officer of a large volunteer fire company, assured that fire fighting personnel were trained in all personnel protective equipment including individual dosimeters and Geiger Counters. Radiation training was provided by seminar and lectures using New Jersey State and Industrially Qualified personnel.

8. Training For Individuals Working In Or Frequenting Restricted Areas

Although the types and quantities of radioactive materials to be used do not create any restricted areas, access will be restricted to the radioisotope lab (Room A-300). Persons authorized to perform non-supervised work or supervise the work of others in the radioisotope lab are the following:

A.) D. E. Agopsowicz - see resume in item 7.

B.) D. R. Peterson - see resume in item 7.

C.) Name: Linda G. DeLapp

Current Position: Senior Technician-in-Charge, Department of Analytical and Metabolic Chemistry

Education: Currently attending Somerset County College; Somerville, NJ. Expected date of graduation is December 1985, A.S. Chemistry. Completed Chemistry and Physics course work dealing with radioisotopes. Attended annual radioisotope training seminars held at Bio/dynamics East Laboratory 1980 to present.

Related Job Experience:

Employed at Bio/dynamics for 9 1/2 years. For five years, worked at the Bio/dynamics West Laboratory in the Metabolic Chemistry Department. While there gained hands-on experience in performing aerobic and anaerobic C-14 labelled soil metabolism studies. Performed distribution and pharmacokinetic studies in laboratory animals such as mice, rats, monkeys, rabbits, and dogs and economic animals such as pigs, goats, and chickens. Administration of labelled materials was employed including IV, oral, dermal, rectal suppository, and inhalation routes. Sampling techniques, surgical techniques such as bile cannulation surgery, and sacrifice, as well as routine sampling procedures such as urine, feces, volatiles, and CO2 collection all involving radioisotopes. Experience in metabolite isolation and identification techniques.

Subsequently, transferred to the Bio/dynamics East Laboratory in the Analytical Chemistry and Metabolism Department. Additionally, responsible for the receipt and logging of all radioisotopes used on site, as well as the preparation of radiolabelled materials for use primarily in animal studies. Experienced in handling levels of radioactivity ranging from 1 uci to 150 mCi.

Responsible for generation of and adherence to metabolic standard operating procedures and good laboratory practices. Responsible for reviewing raw data and writing reports as well as scheduling the department workload.

D.) Name: Ralph K. Markarian, Ph.D.

Current Position: Manager Environmental Toxicology Department

My experiences with radioisotopes started with my M.S. level course work at Washington State University. While at the University, completed a course in radiation ecology which involved the application and use of radiolabelled compounds in the area of biological investigations.

Training: - Graduate level course in Radioecology from Washington State University

Experience:

Performed C-14 radiochemical studies with algae. Studies involved dosing phytoplankton in small bottles in the field and suspending the bottles in the stream for productivity analysis via CO2 uptake. During these studies, performed a number of radiological analyses with a scintillation counter and followed safety rules in the radioisotopes as prescribed by the University.

E.) Name: John K. Schupner

Current Position: Technician-in-Charge, Environmental Toxicology

Formal Education: - B.S. degree in Biology from the State University of New York College at Brockport, 1977

Experience and Training in the Handling of Radioisotopes:

- Assisting with model ecosystem biomagnification studies at Union Carbide Environmental Sciences in Tarrytown, New York. Responsibilities included: stock solution preparation of C-14 labelled pesticides, sampling of water and fish, and post study sanitization.

- Additional experience was gained while assisting with similar studies while employed as a Research Technician at Cornell University in Ithaca, NY. Training in the handling of radioisotopes, documentation of disposition, and disposal of wastes was given by the University Life Safety Department and by the project supervisor. Responsibilities included: sampling of water and animals, analysis for C-14 using a biological tissue oxidizer and trapping cocktails, and liquid scintillation techniques, performing wipe tests for radiologic contamination, waste disposal, and post study sanitization.

The following persons are authorized to perform non-supervised work or supervise the work of others with regard to sealed radioactive sources incorporated into instruments. Unless stated elsewhere, these persons are not authorized to conduct operations with radiochemicals in the Radioisotope Laboratory (A-300).

F.) D. E. Agopsowicz - see resume item 7

G.) J. E. Stillman - see resume item 7

H.) D. R. Peterson - see resume item 7

I.) Name: Frank ?. Thomas

Formal Education:
- B.E. (Ch.E.) Vanderbilt University, 1971. Course work included one 3-hour course--Nuclear Engineering
- M.P.H. (Env. Sci.) Tulane University, 1978. Course work included one 3-hour course--Radiation Protection

Certifications:

- Certified Safety Professional - Examination, 1977
- Certified Industrial Hygienist - 1978 Comprehensive Practice
  - 1981 Engineering

Relevant Experience:

Served as Radiation Safety Officer, Exxon Chemical Americas, Bayway Chemical Plant, 1980-1982.

9. Facilities and Equipment

A.) GENERAL DESCRIPTION

Exxon Biomedical Sciences Incorporated (EBSI) is an affiliate of Exxon Corporation, a multinational petroleum and petrochemical company registered in Delaware with headquarters in New York, New York. Located in East Millstone, New Jersey (approximately 15 miles to the north of Princeton), the site consists of two buildings situated on 74 acres of land in Franklin Township of Somerset County. EBSI provides toxicology, industrial hygiene and epidemiology support to Exxon Corporation.

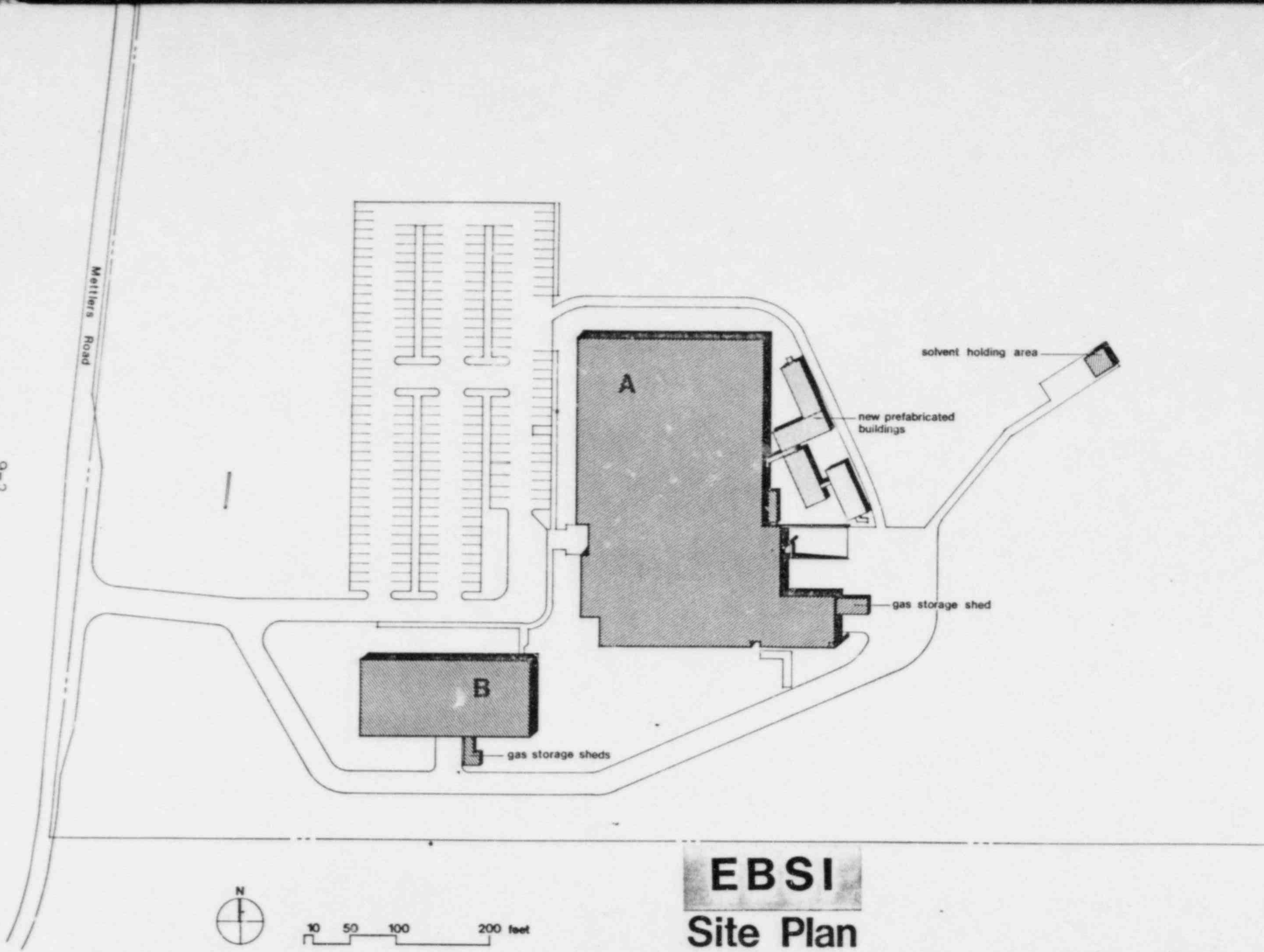
The site consists of two buildings, A and B. Building A is largely devoted to toxicological research with the majority of space devoted to laboratories and animal housing. Building B is predominately occupied by office space but includes an Industrial Hygiene Analytical Laboratory accredited by the American Board of Industrial Hygiene.

B.) RADIOACTIVE MATERIAL USE/LOCATION

The following pages display schematic drawings of all major areas where radioactive material use is anticipated. Specifications are given of floor/countertop material, room ventilation and other design features wherever that information seems appropriate.

The following points of information help describe the radionuclide use at EBSI:

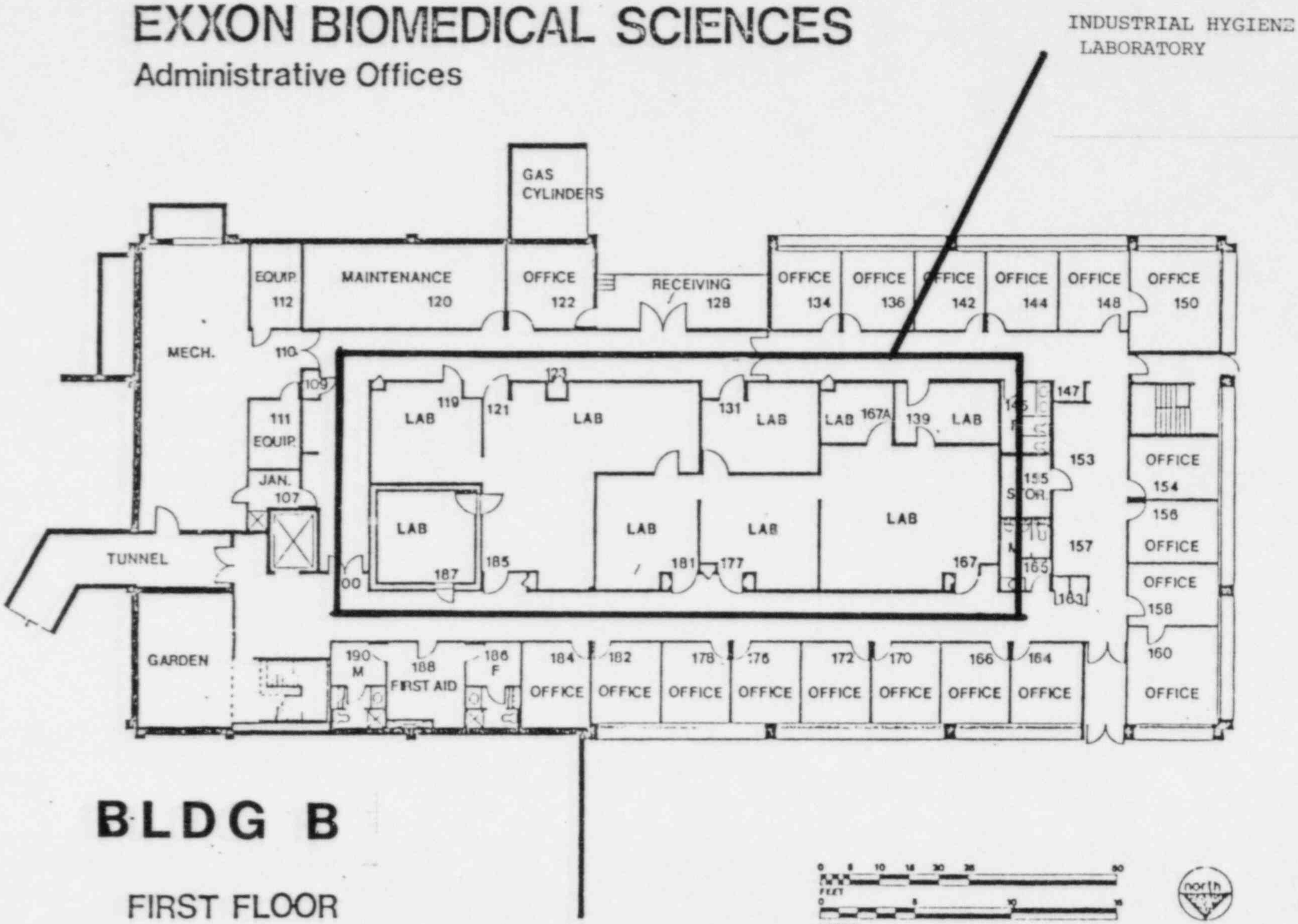
- Only sealed sources are to be used/stored in Building B.
- All radioisotope work is conducted in Building A.
- Quantities in excess of 1 mCi C-14 or 10 mCi H-3 will be allowed only in room A300, a room designed and constructed for radioisotope use.
- No more than 1 mCi C-14 or 10 mCi H-3 at any one time in any one location will be allowed outside room A300.



EBSI
Site Plan

EXXON BIOMEDICAL SCIENCES

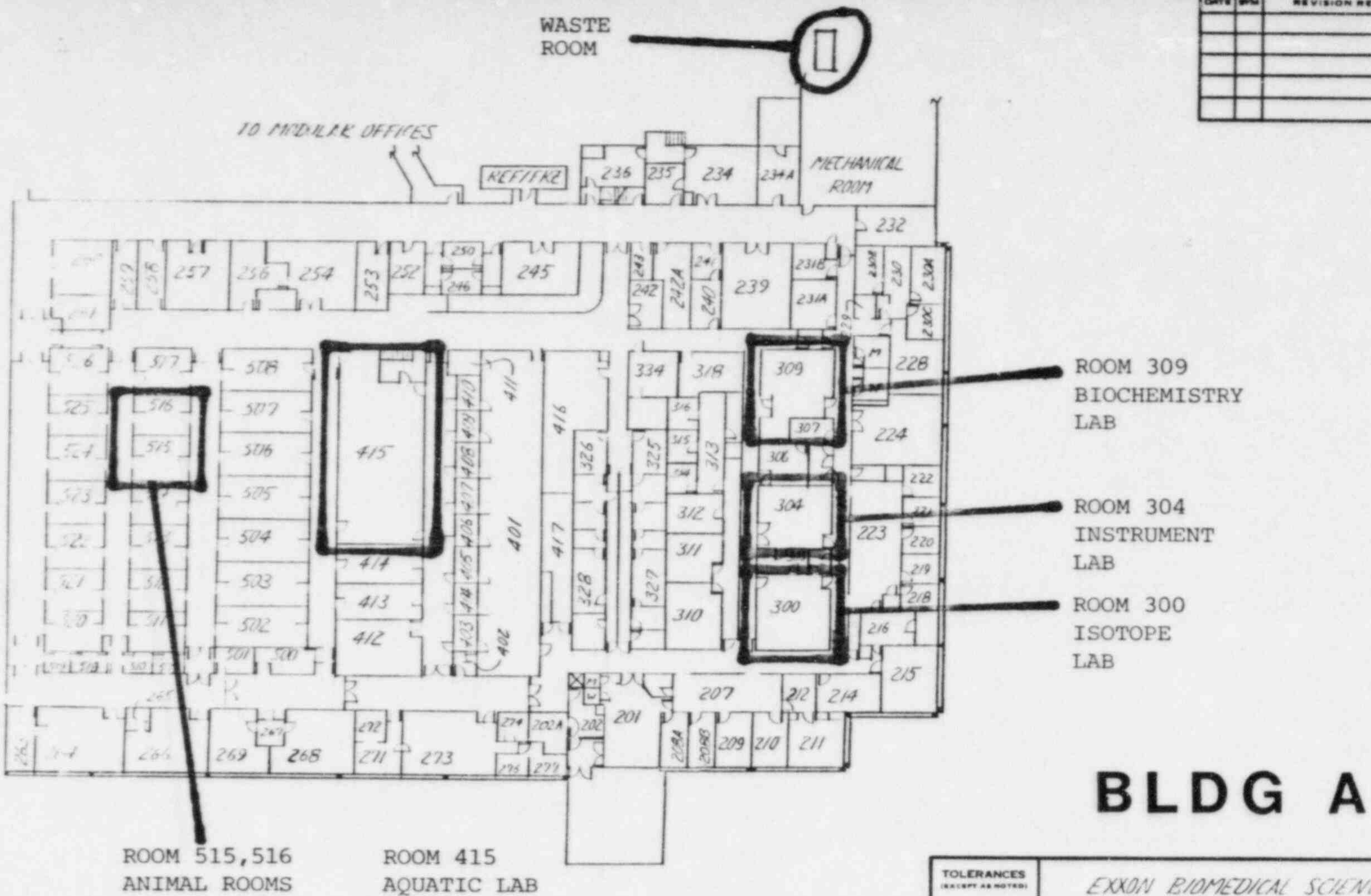
Administrative Offices



BLDG B

FIRST FLOOR

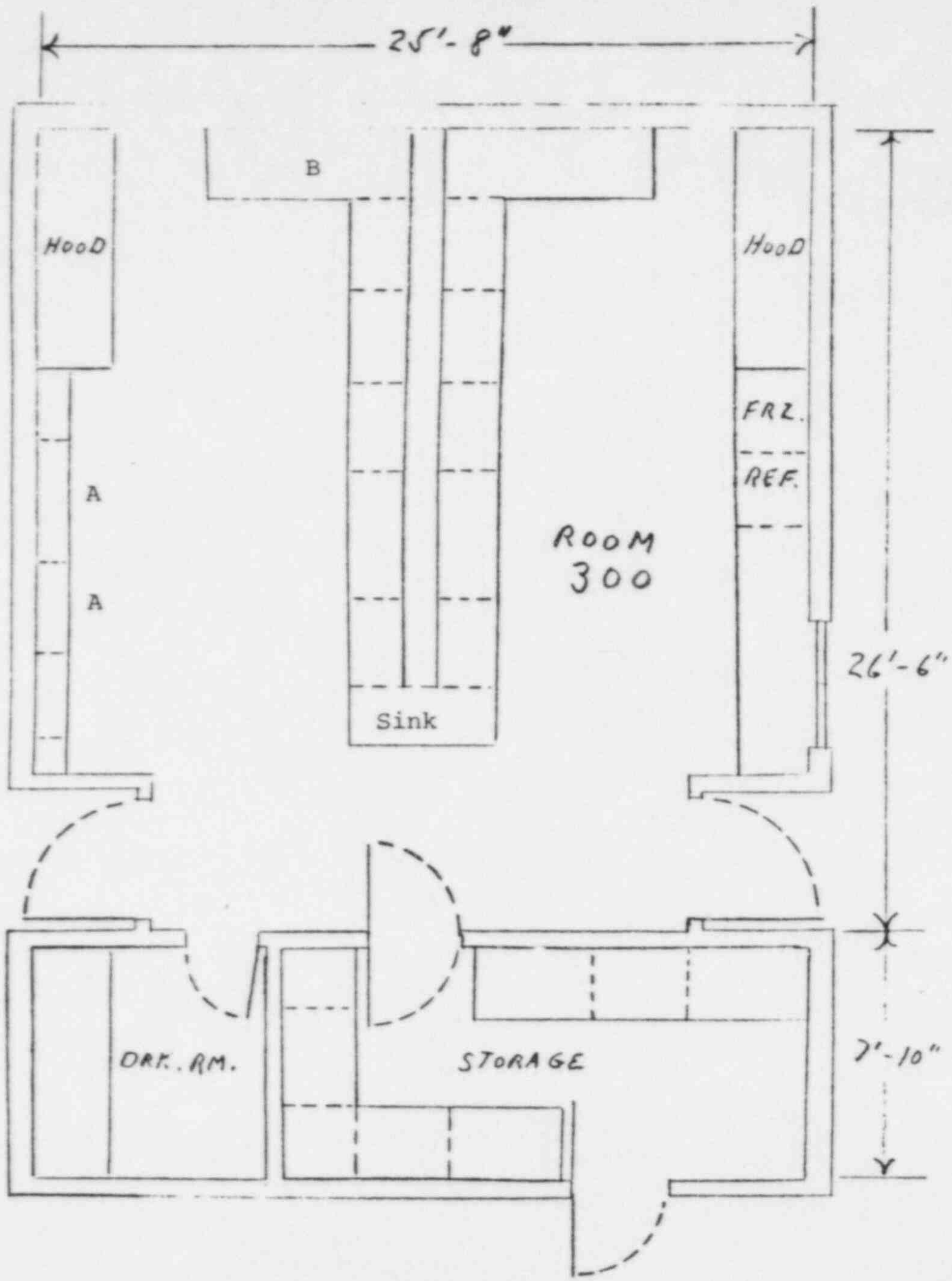
DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.



TOLERANCES (EXCEPT AS NOTED)	EXXON BIOMEDICAL SCIENCES		
DECIMAL ±		SCALE NONE	DRAWN BY John Corcoran
			APPROVED BY [signature]
FRACTIONAL ±	TITLE BUILDING A - ROOM NUMBER PLAN		
ANGULAR ±	DATE 10-9-84	DRAWING NUMBER	

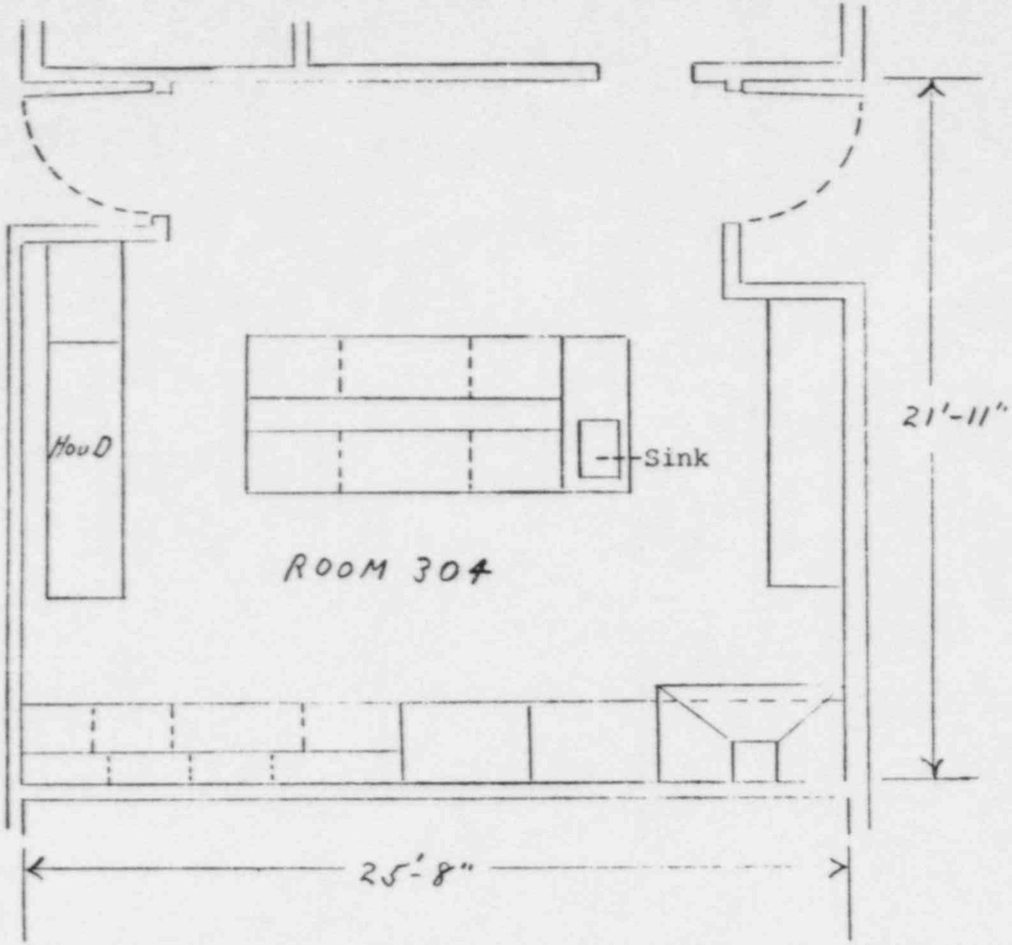
K+E CRYSTALENE 11x17 ENGINEERS STANDARD FORM

MADE IN U.S.A.



RADIOISOTOPE LABORATORY (A300)

All floor and wall surfaces in A300 are covered with a chemical resistant, strippable plastic material (mipolam[R]). All seams in this covering are heat fused and the floor and wall covering are fused. Lab benches are sealed to the floor with plastic cove base. The painted metal laboratory benches have a non-porous, molded epoxy resin top (Char Chem). In addition, benches are generally covered with plastic backed paper. The refrigerator and freezer are explosive proof and lockable. Scintillation counters (A) are located along a wall and the sample oxidizer (Packard 306) (B) is located en a bench top and vented to a hood.

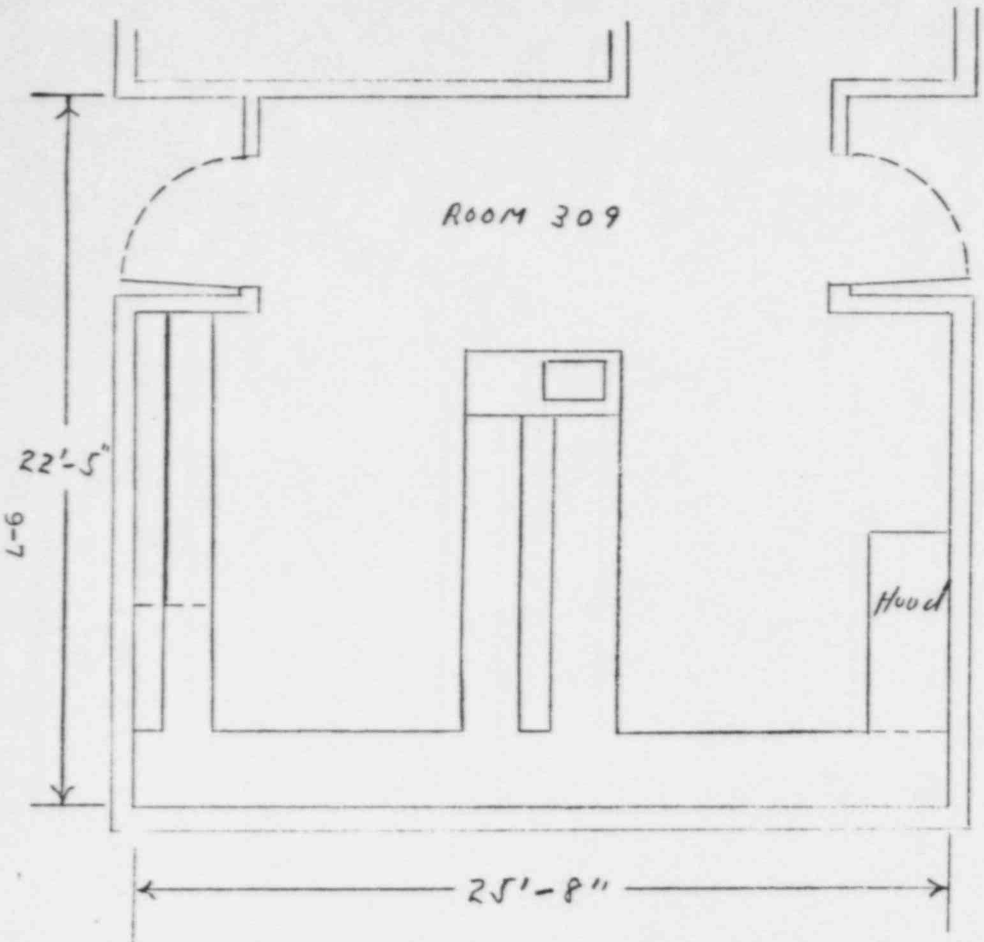


INSTRUMENT LABORATORY (A304)

Floor covering is chemical resistant, strippable plastic (Mipolam[R]).

Walls are concrete block, sealed, and epoxy painted.

Bench tops are non-porous composite material.



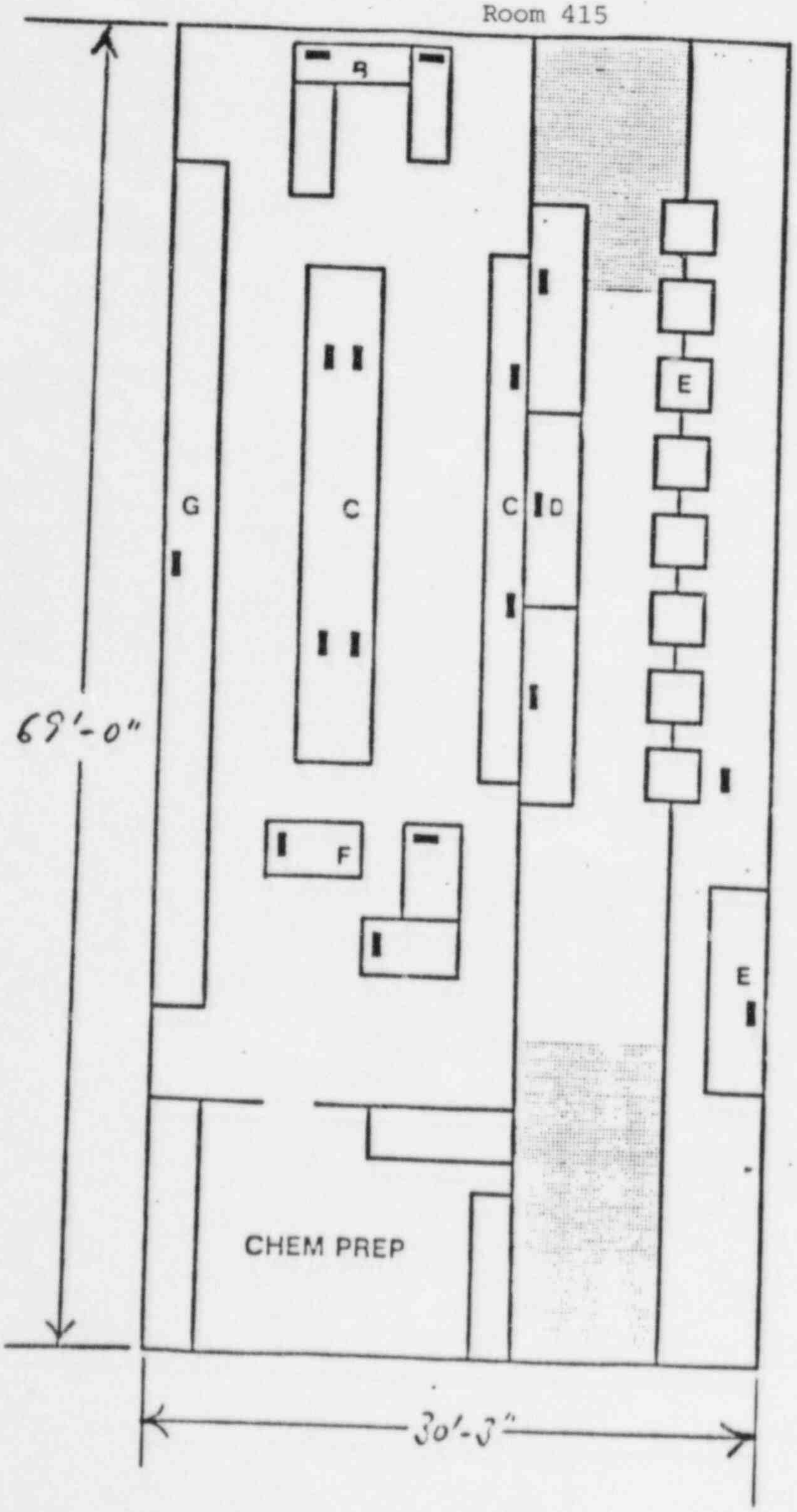
<u>BIOCHEMISTRY LABORATORY (A309)</u>

Floor covering is chemical resistant, strippable plastic (Mipolam$_R$).

Walls are concrete block, sealed, and epoxy painted.

Bench tops are non-porous composite material.

AQUATIC
LABORATORY
Room 415



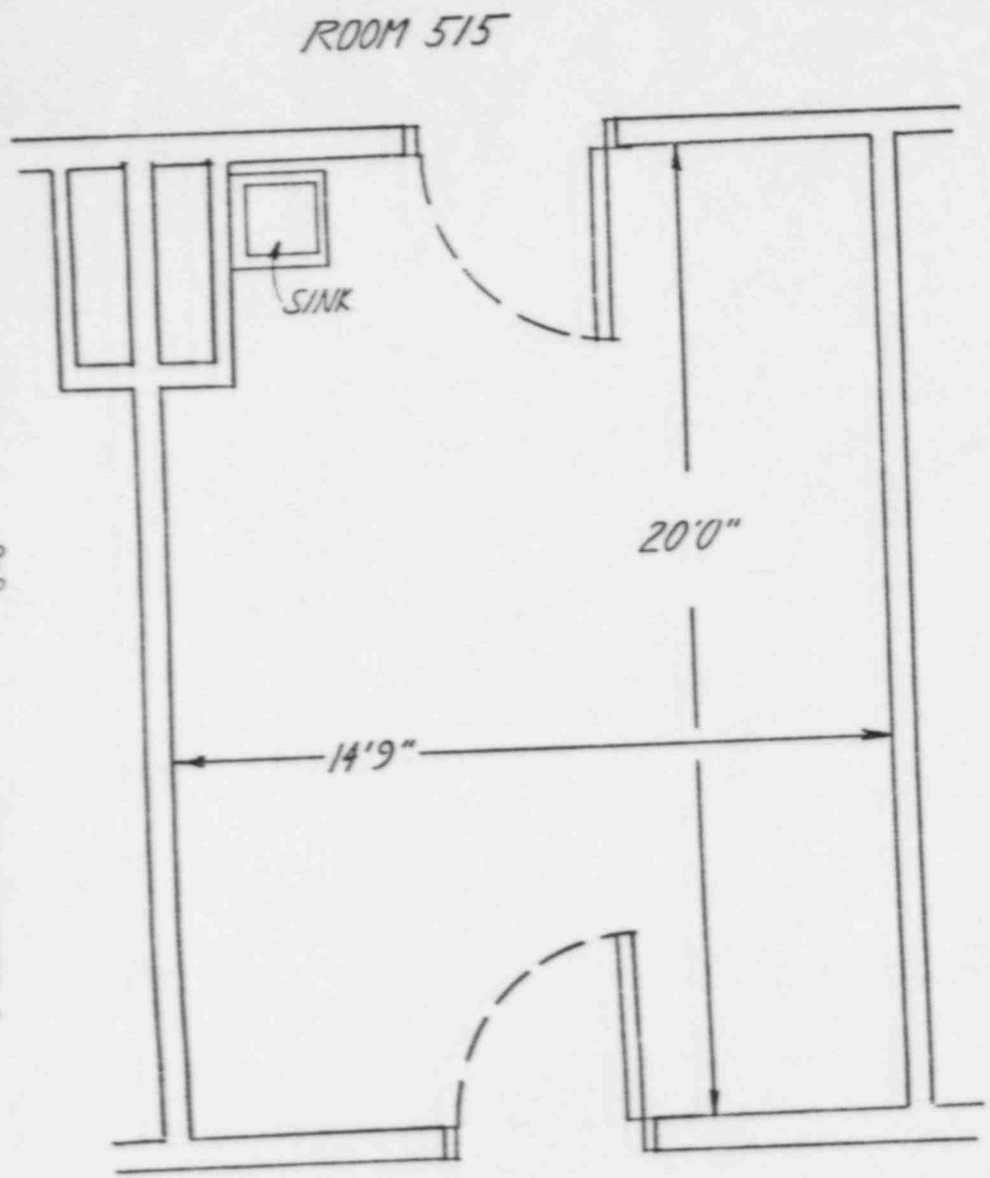
CONSTRUCTION

Floors are non-skid Mipolam[R] covered with all seams heat sealed.

Walls are latex painted concrete block.

Bench tops are non-porous man-made material.

- A MEZZANINE (5) (Not shown)
- B RESEARCH (2)
- C FLOW-THROUGH TESTS (6)
- D STATIC TESTS (3)
- E FISH HOLDING AND REARING (2)
- F <u>Daphnia</u> TESTS (3)
- G GENERAL LAB WORK (1)



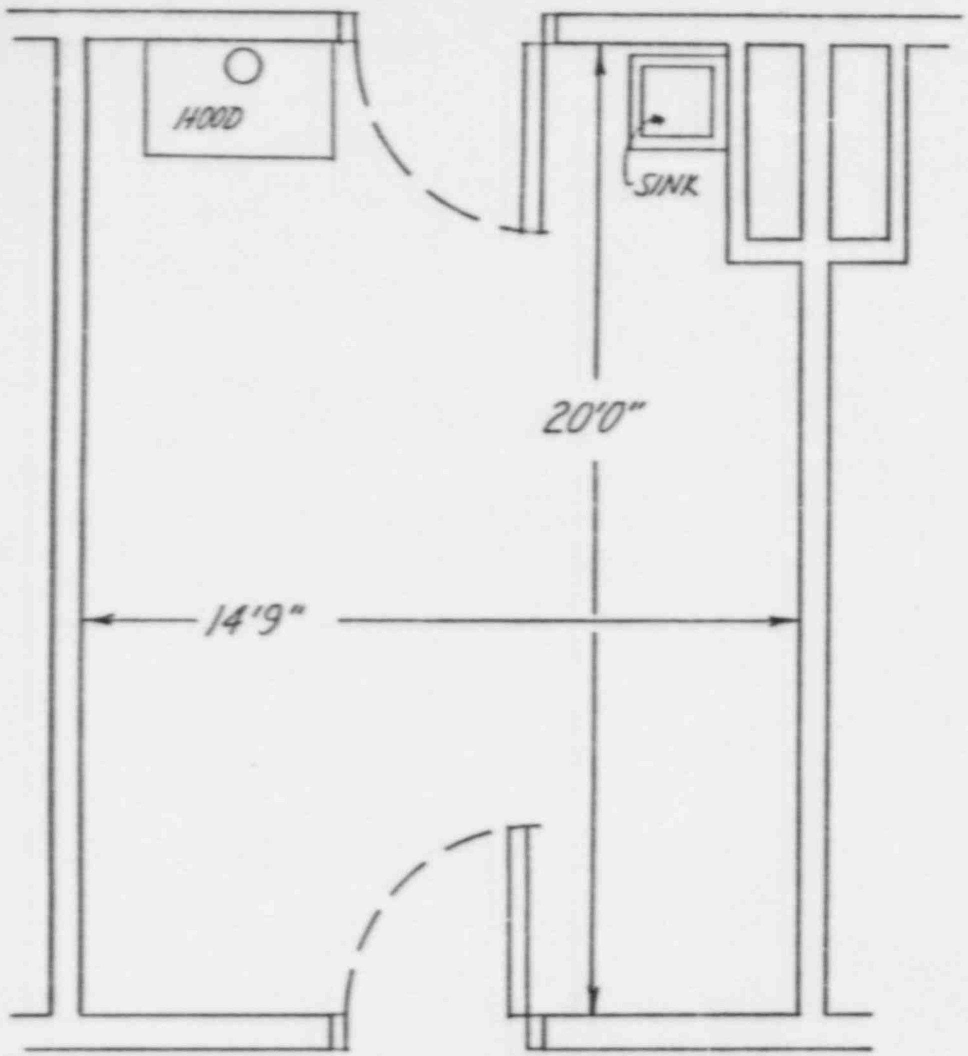
ANIMAL ROOM

Floor is synthetic terrazzo.

Walls are concrete block, sealed and epoxy painted.

Sink is stainless steel

ROOM 516

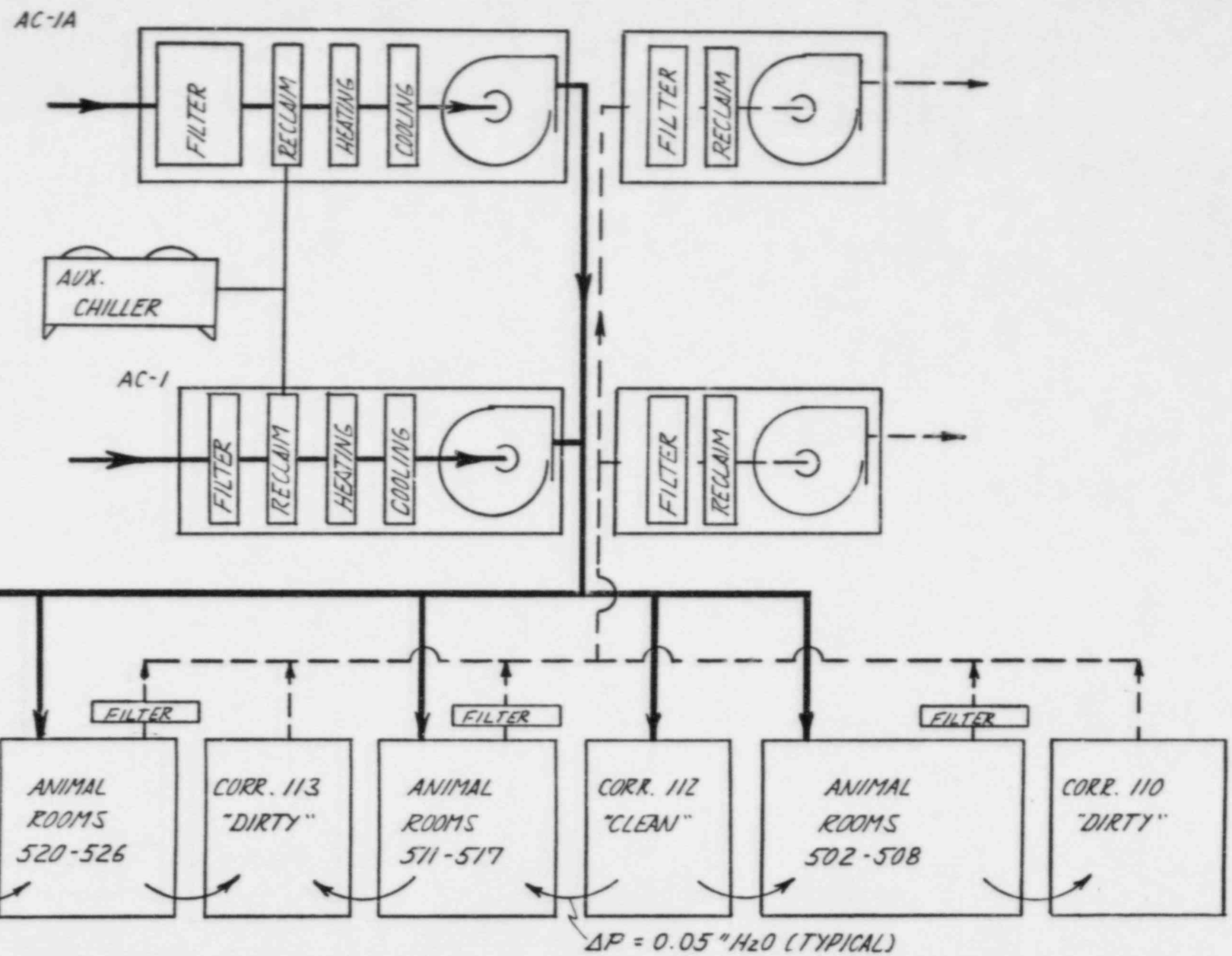


Floor is synthetic terrazzo.

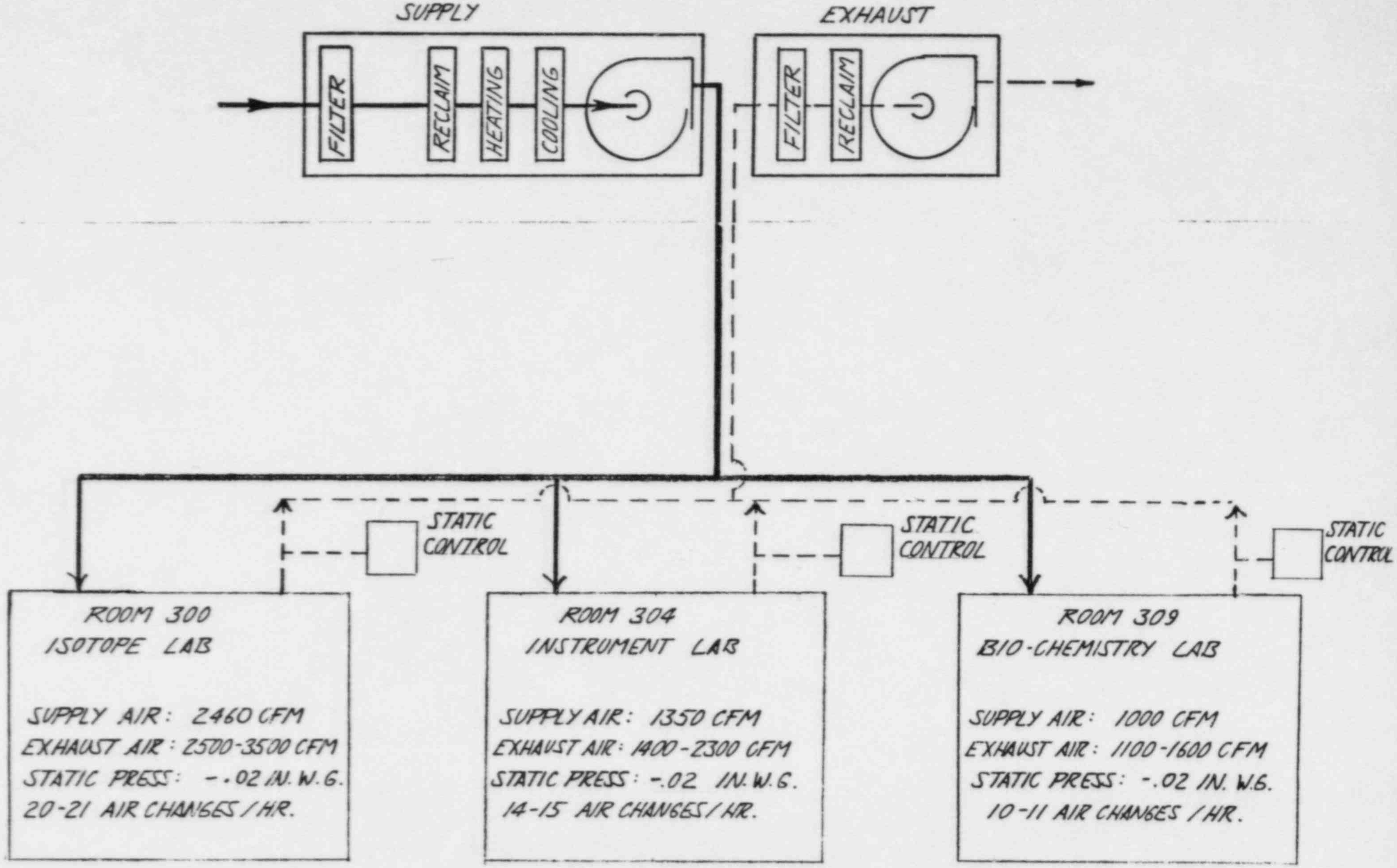
Walls are concrete block, sealed and epoxy painted.

Sink and hood are stainless steel.

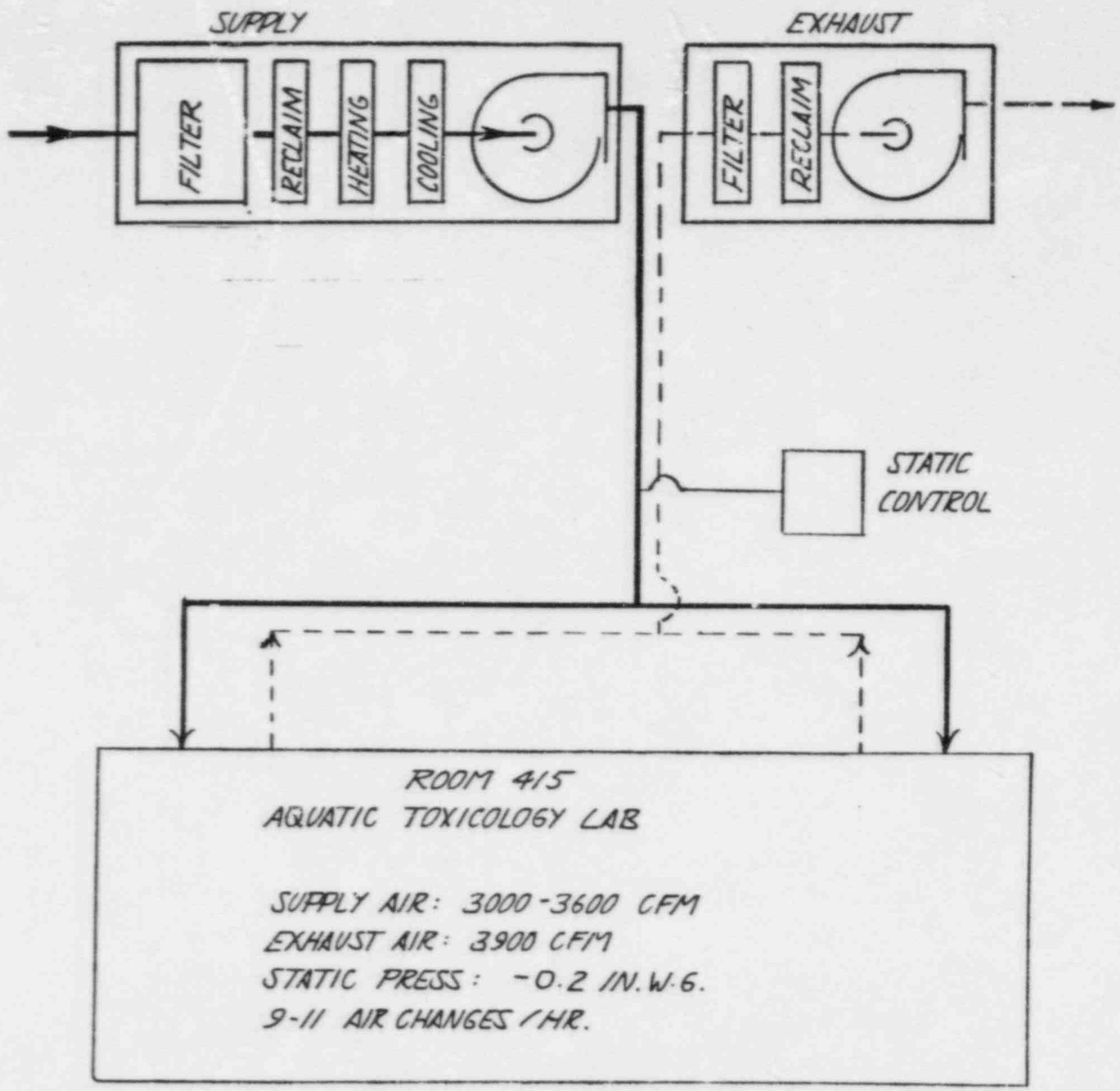
ANIMAL AREA HVAC SYSTEM



AC-5 HVAC SYSTEM



AC-3B HVAC SXSTEM



10. Radiation Safety Program

A.) STATEMENT OF ALARA (AS LOW AS REASONABLY ACHIEVABLE)

- No measurable personnel exposure to penetrating ionizing radiation is expected to result from any activities conducted at EBSI per NRC license.

- No measurable uptake of radioisotopes (C-14 or H-3) by personnel is expected to be experienced from any activities conducted at EBSI per NRC license.

All precautions/procedures described in the EBSI Radiation Safety Program are aimed at:

- Minimizing (to zero) any exposures to radiation and any uptake of radioactive material.

- Ensuring that any unplanned (i.e., catastrophic) exposure to radiation or uptake of radioactive material is minimal and poses no health risk.

B.) GENERAL PROCEDURES

- Any individual proposing to work with radioactive materials or purchase such materials must request such use in writing. The written request should include: justification of the need for radioactive material use, justification for the proposed amount of radioactive material to be purchased, the chemical and physical form of the radioactive material to be purchased, the planned area in which the work will occur, the names of personnel to participate in the work, and the proposed personnel, area and effluent monitoring procedures to be used. The request will be made through the Radiation Protection Officer (RPO) who will forward the request to the Radiation Protection Committee. The committee will meet quarterly and as needed to review and approve all new uses of radioactive materials. If license amendments would be necessary for the proposed use, the RPO will ensure that the NRC license is properly amended prior to such uses being initiated.

- All radioactive material work will be done by trained individuals under the supervision of one of the persons named on the NRC license as responsible for such work. The work must be done in one of the areas specified in the license and according to the conditions and restrictions contained in the license. The license is available for examination in the office of the RPO (as posted on the bulletin board together with form NRC-3).

- Lab coats, gloves and safety glasses must be worn at all times when working with radioactive samples. Other apparel which may be worn under certain circumstances, depending on the compound's toxicity, may include respirators, face masks, disposable clothing, hoods and boots. The appropriate protection will be delineated in the standard operating procedures for routine tasks and will be defined by the supervisor and RPO for non-routine work.

- A major concern is to prevent the spread of radioactive materials.

Whenever possible, work should be done in a fume hood regardless of the volatility of the material being used. The work area should be covered with plastic backed absorbent paper or work should be done in trays lined with paper.

- No drinking, eating, or smoking is allowed in the laboratory areas. Pipetting by mouth is prohibited. No food, coffee cups, etc., are to be brought into areas where radiochemicals are used. Workers shall remove and discard gloves and wash hands before leaving the laboratory area where radiochemicals are being used.

- Contaminated glassware, equipment, work surfaces, etc., shall be cleaned or discarded as radioactive waste each day if possible. Alternately, such contaminated equipment must be segregated and labelled as radioactive or brought to the radioisotope laboratory for storage. Once glassware is decontaminated, any "radioactive" labels must be removed or defaced.

C.) MATERIALS CONTROL

- Storage and Handling

  All stock solutions and dilutions of radiochemicals (C-14 or H-3) shall be stored in the Radioisotope Laboratory (Rm A300) in either the locked refrigerator or locked freezer. Individual amounts removed at any one time from this laboratory for experimental purposes may not exceed 0.1 mCi of C-14 or 1.0 mCi of H-3. Preparation of dilutions of stock solutions shall also be done in the Radioisotope Laboratory. Each removal of radiochemical from containers of that chemical must be entered in the radiochemical log. Each container of each chemical has a separate log page and the removals and amount of radiochemical remaining in each container is calculated. In generating a new solution, a new log page is produced. The total of all radiochemicals derived from each isotope may thus be calculated by adding the bottom balance of each log page. The log is also used to document the location, use and ultimate disposition of chemicals removed for studies.

- <u>Labelling</u>

  All containers of radiochemicals shall be assigned an inventory number corresponding to that on the log page. (Detailed instructions on numbering are contained in the log.) Additionally, labelling shall indicate the concentration of the chemical and the radioactivity in the container, the identity of the chemical, the isotope, the date prepared, and the preparer's name or initials. If the contents are greater than 0.1 mCi of C-14 or 1.0 mCi of H-3 the container must also be prominently labelled with tape bearing the radiation symbol and the words "CAUTION--RADIOACTIVE MATERIAL".

- Transporting to Other Laboratories

  A primary concern is to prevent the spread of radioactivity or contamination of areas with radioactivity; all procedures are aimed at minimizing the amounts of radioisotopes used and limiting the areas of

use. Transport of even the smallest amounts of radioactive material from the radioisotope laboratory shall be in sealed containers and protected by an outer carrying container to reduce the likelihood of breakage and spill. Transport should be by the most direct route. Radiochemical usage in other licensed areas shall be confined to as small an area as practical. Solutions will be handled and used only by individuals authorized to do so. No greater than 0.1 mCi of C-14 or 1.0 mCi of H-3 will be used or stored in any other areas.

- <u>Receiving</u>

Purchase orders for radiochemicals must be approved by the RPO, and the fact that they are radioactive must be clearly indicated on the order. When these shipments are received they must not be opened by the receiving clerk. The responsible licensee will be promptly notified and the package transported by him to the radioisotope laboratory. All packages will have their exterior surface monitored by swipe testing. If removable radioactivity on these packages exceeds 0.01 microcuries per 100 cm^2, the RPO must immediately be notified.

D.) PERSONNEL MONITORING

All persons working with radiochemicals or frequenting areas where radiochemicals are used will be monitored by urine sampling and scintillation counting. For individuals with only infrequent work on short studies involving radiochemicals, a urine sample will be taken before beginning work and again within 48 hours of the completion of the work. For persons working continuously with radiochemicals on long-term or multiple studies, monthly urine samples will be taken.

Urine samples will be transferred to the chemistry group, then labelled with the name of the individual and the sampling date. These samples will be aliquoted into scintillation vials, scintillation cocktail added, and their radioactivity determined by liquid scintillation counting.

If any count exceeds twice background after accurate counting, the person will be immediately notified and another sample taken. If the count remains elevated, the RPO will immediately be notified. The person involved will be removed from all areas where radio-active materials are used until the RPO evaluates the possible causes and potential health hazards of the exposure. The person involved will not be allowed to return to radiochemical work until urine radioactivity has decreased to below twice background and until the source of exposure is identified and removed.

Besides urine monitoring, thermoluminescent badges (TLDs) may be used for individuals working with radiation producing devices or radioactive materials likely to produce radiation in excess of 0.5 mr/hr. At present, survey meter measurements 12 inches from the surface of sealed sources or instruments containing sealed sources of Ni-63, Cs-127, or K-85 show no detectable radiation above background levels. Thus, at present, TLDs are not used.

Records of personnel monitoring will be regularly transmitted to the RPO and will be maintained by him (see Record Management).

It is the responsibility of each area supervisor or study director to see that these personnel monitoring procedures are followed.

E.) SURVEY PROGRAM

- <u>Area Monitoring</u>

Before any study that involves the use of radioactive materials is begun in a restricted entry area (the radioisotope lab or an animal room), it will be the duty of the supervisor to: 1) determine the study area is authorized for use per NRC license, 2) ascertain that the room is clean and free from debris, and 3) post "RADIOACTIVE MATERIALS" signs and 4) request housekeeping personnel or security guards not to enter the area.

Swipe tests are performed by rubbing moistened filter disks across the surface of the test area, placing in appropriately labelled scintillation vials and transferring to the chemistry unit for scintillation counting. Swipe testing is to be done by those handling the radioactive materials.

Any areas having a count rate of more than twice background will be considered contaminated. These areas will be promptly cleaned with solvent or a commercial cleaning solution (e.g., Count-Off). A more extensive swipe test of the vicinity will be repeated. This process is continued until no evidence of contamination is found. The wash water will be saved and, if level of radioactivity warrants, will be treated as radioactive waste.

At the completion of each study that involves the use of radioactive materials, the study technicians will immediately collect and store or dispose of all gross biological specimens and debris according to current standard operating procedures. Cage washings and extensive swipe tests will then be made of the room and its contents and the room will be closed and signs left up until the results of the tests of the cage washes and swipe tests are known. If the test results are negative, all equipment and cages will be removed and cleaned according to current standard operating procedures governing the cleaning of animal rooms where radioactive materials are <u>not</u> used. "RADIOACTIVE MATERIAL" signs will be removed. Housekeeping personnel will be informed that the room may be cleaned as usual. The room is then cleaned and/or sanitized in the same manner.

All radioactive refuse and discarded samples collected during or after each study are packed and prepared for collection by a licensed scavenger or otherwise disposed according to State and Federal laws and regulations (see Waste Disposal).

If the swipe test results are positive and show contamination, the study technicians, using the washing and swipe test results as a guide, will wash and clean the cages, equipment and room. All washing and cleaning materials will be saved and tested for radioactivity as before. This procedure will be repeated until the

test results are negative and standard cleaning procedures can be initiated. All positive washings and used cleaning materials will be disposed in the same manner as other radioactive samples. The study director or supervisor will describe the steps taken to decontaminate the room and its contents, attach the results (new data) of the decontamination tests and enter it into the Room Monitoring records.

The study director or supervisor with concurrence of the RPO will determine if decontamination test results are "positive"; however, no count in excess of twice background will be considered negative.

The radioisotope laboratory is swipe tested weekly, when radioisotopes are in use. In addition, those areas where radiochemicals are used or stored will be swipe tested on a frequent basis. Ancillary laboratory areas are swipe tested at the conclusion of each study or experiment using radiochemicals (or at least monthly for studies of longer than one month duration). The particular locations for swipe tests in these areas would depend upon the location of the work in the area, but as a minimum would include exposed work surfaces and immediately adjacent floor area together with the floor area in front of entrance and exit doors.

When volatile or potentially volatile radiochemicals are to be used outside of containment systems, the level of airborne radioactivity will be evaluated in preliminary or initial experiments regardless of the use of respirators. This monitoring will generally consist of air samples taken immediately above the work area or in the workers' potential breathing zone. The type of trapping device used depends upon the chemical nature of the radioisotope but would ordinarily be charcoal tube sampling for organic vapors. Scintillation counting of the trapped chemical together with the air sampling rate and duration will be used to calculate airborne levels, if any, of radioactivity. This information will be used by the RPO to determine the need for specific posting of the area, potential for worker exposure and potential for airborne effluent to unrestricted areas.

Monitoring will be conducted in rooms housing animals exposed to or dosed with volatile radioactive chemicals. Sample media, as above, will be chosen based on the chemical used. Air samples from animal rooms will be analyzed promptly to aid in the determination of room status and the need for respiratory protection.

- <u>Area Surveys</u>

All areas where sources of penetrating radiation are used will be surveyed with a survey meter at least twice yearly. Such a survey will include bench tops and storage areas where radioactive sealed sources are handled and stored and the immediate vicinity of instruments containing sealed sources (within 12 inches of each source). Appropriate records of all area surveys will be kept on file by the RPO.

- <u>Sealed Source Swipe Testing</u>

All Ni-63 GC detectors will be swipe tested at least every six months

on the surface and exit port of the detector. Also, a physical inventory/inspection of all sealed sources will be made every six months. This monitoring is to be done by the RPO or his designee and appropriate records maintained.

Swipe tests of Ni-63 sources will be analyzed by:

Hewlett-Packard
Avondale Division
Route 41
Avondale, Pennsylvania 19311
ATTN: EC Detector Service

Alternately, swipe samples of Ni-63 sources will be analyzed on site using the instrumentation itemized in section 10-G. On-site liquid scintillation counting on swipe tests will be conducted with energy discrimination wide open. Any counts recorded more than twice background will be considered positive.

All swipe tests shall be performed, regardless of analysis, according to the instructions offered by Hewlett-Packard in Attachment 10-A.

F.) RESPIRATORY PROTECTION

Most routine uses of radioactive material at EBSI will not warrant the use of respiratory protection. Only one type of routine work shall always be conducted with respiratory protection.

- Handling stock solutions of radiochemicals in Room A300 for purposes of making dilutions, transporting solution, etc., where more than 1.0 mCi of either C-14 or H-3 is involved. Respiratory protection will be worn regardless of the volatility of the radiochemical and regardless of other protective measures.

Other non-routine activities, which would require the use of a respirator may include:

- Performing any work with any quantity of volatile radiochemical if preliminary testing indicates the likelihood of airborne radioactivity.

- Work in animal rooms if any detectable airborne radioactivity is measured.

- Decontamination of a spill, as directed by the RPO.

- Other unforeseen activities, if determined by the RPO to warrant respiratory protection.

The normal respiratory protection recommended would be a half-face air-purifying respirators with HEPA and/or organic vapor cartridges as directed by the RPO. Full-face air-purifying respirators are available for use if/when necessary. (Other respirators, i.e., disposable paper filter masks, may be used independent of these requirements for different purposes, i.e., protection from animal dander.)

All personnel who may be in a position to wear respiratory protection are trained in the use of respirators. Standard Operating Procedures, with which all employees must become familiar, cover the use of respirator for protection against all the airborne agents which may be encountered in the laboratory environment including chemicals, radioactive materials, animal dander, etc.

G.) INSTRUMENTATION

The following instruments are available on site and will be used for area surveys:

- Eberline ESP-1 survey meter (2 each) with Eberline HP-260 beta-gamma probe (2 each).

- Victoreen 470 panoramic survey meter (1 each).

The purpose of the ESP-1/HP-260 survey device is to detect beta-gamma radiation with emphasis on contamination detection. The Victoreen 470 will be used to estimate potential exposure rates to personnel from sources.

Calibration of the Eberline and Victoreen instruments will be performed not less than twice per year by:

- Eberline Analytical Services
  Albuquerque, New Mexico 87109

  New Mexico by-product license #N.M.-EBE-BL-00 with Certificate of Registration for Calibrating Radiation Measuring Instruments and Devices #012-13.

The counting of swipe samples for the detection of C-14 and H-3 will be performed on site by the EBSI Analytical Lab. Instrumentation for this purpose is:

- Intertechnique Liquid Scintillation Counter Model SL-4000.
  - Standardized on each day of use by means of sealed C-14 and/or H-3 standards. Chemical quenching is automatically corrected by computerized external standard channel ratio quench correction.

- Beckman Liquid Scintillation Counter Model LS-3801.
  - This unit is automatically calibrated at each use with internal standards.

H.) RECORDS MANAGEMENT

All records pertaining to the Radiation Protection Program will be kept (or copies will be kept) by the Radiation Protection Officer in a secured file. The records kept by the RPO will include but not limited to:

- Survey Reports

- Bioassay Reports
- Swipe Test Reports
- Instrument Calibration Certification
- Radiochemical Log Summary
- Incident Reports
- Original and all amendments of NRC and State of N.J. license/registration documents
- Training Records

I.) INSTRUCTIONS TO PERSONNEL

Training in radiation protection will be given to all personnel handling radioactive material, frequenting areas where radioactive materials are used or operating instruments containing sealed radioactive sources. Training will be no less than annual for all employees involved. The training will include lecture and written communication covering, but not limited to the following topics:

- Worker Rights
- Nature of Radiation and Radioactive Materials
- Biological Effects of Exposure to Radiation
- Radiation Protection Practices
- Use of Radiation Protection Instruments
- Survey Techniques
- Standard Work Procedures
- Labelling and Storage of Radioactive Material
- Waste Disposal Procedures
- Records Retention
- Area Posting/Access Requirements
- Animal Handling Procedures
- Emergency Procedures
- Committment to ALARA

The training described above will be conducted by the RPO or his/her alternate. Records of attendance will be kept by the RPO.

J.) EMERGENCY PROCEDURES

In the event of a radiochemical spill, the area must be decontaminated immediately. Depending on the severity of the spill, it may be necessary to evacuate the area, turn off ventilation systems and obtain a respirator and protective clothing for decontamination. The RPO or alternate RPO will be contacted immediately to supervise re-entry into contaminated areas and provide the additional personal protection as required. Decontamination can usually be obtained by washing the area with "Count-Off" and water followed by methanol. Any paper towels, absorbent paper, or remaining liquid shall be disposed as radioactive waste. Swipe tests will be done on the area immediately. If decontamination is incomplete per swipe test results, further cleaning will follow until the area is clean (i.e., all swipe samples less than twice background).

Biomonitoring will be performed on all individuals involved in any contamination incident. Each incident will be investigated by the RPO and a report given to the Radiation Protection Committee.

11. Waste Management

A.) By-product material waste is removed from EBSI and disposed by Teledyne Isotopes, Inc. Teledyne is licensed (NRC #29-00055-14) for these activities in conformance with 10 CFR part 20.301 (e).

B.) Radioactive waste is collected, packaged and disposed of in accordance with Teledyne Isotopes, Inc., Packaging Procedures, (Attachment 11-A). The waste from each laboratory is handled as follows:

- Radiochemistry

  All radioactive waste (animal carcasses, scintillation vials, disposables, etc.) are segregated and accumulated in containers provided by Teledyne Isoptopes. All radiochemical waste is inventoried and logged. Waste material is segregated into the following categories:

  i. Dry Solid Material (DSM)

  ii. Small Volume Liquid (SVL)

  iii. Large Volume Liquid (WLVL)

  iv. Animal Carcasses (DWAC)

  When a drum is filled, it is labelled, dated, and stored in a locked storage area. This area is labelled with appropriate warning signs and has 24-hour surveillance. None of this material is placed in the trash, incinerator, or flushed into the sanitary sewer system.

C.) All planned releases of radioactive material from EBSI will originate from the Aquatic Environmental Laboratory (A415) and will consist of microcurie quantities of C-14 released to the sanitary sewer. All planned releases will be for below all limits specified in 10 CFR Part 20.303: Worst case, unplanned releases to the sanitary sewer would still be in compliance with 1 CFR Part 20.303 because of the quantities of C-14 to which activities will be limited. Total annual release is anticipated at less than 0.2 mCi.

D.) Ultimate disposal by Teledyne is made at Richland, Washington. The EBSI Site Use Permit for the facility at Richland is shown in Attachment 11-B. Renewal of this Site Permit is pending and the renewal application is shown in Attachment 11-C.

SERVICE NOTE

NICKEL 63 ELECTRON CAPTURE DETECTOR (RADIOACTIVE LEAK) WIPE TEST KIT INSTRUCTIONS

A. GENERAL

In the United States, the N.R.C. (or State agency in "Agreement States") requires Hewlett-Packard Ni63 Electron Capture Detectors to be tested for radioactive leakage and/or contamination at intervals not to exceed six (6) months. It is essential that this test be performed in order to assure regulatory compliance. Owners in other countries should check local and national regulations for equivalent requirements. The user's first leak test should be performed no later than six months from the date on the HP wipe test certificate which accompanies the detector. This test certificate and all subsequent leak test records must be retained as evidence of regulatory compliance.

WARNING: Ni63 is a beta emitter with an energy maximum of 0.067 MeV. (It is generally considered that greater than 0.070 MeV is required to penetrate the protective layer of skin). However, Ni63 may be injurious if ingested even in microgram quantities, and adequate measures to prevent ingestion must be taken, including the use of disposable plastic gloves, good laboratory practice, and good personal hygiene (cleanliness).

B. SERIAL NUMBER BREAK

This note is applicable to any Hewlett-Packard instrument which has a Nickel-63 Electron Capture Detector, factory or field installed.

AVONDALE DIVISION . Route 41, Avondale, Pennsylvania 19311

HEWLETT PACKARD

C. LEAK (WIPE) TEST KIT 18713-60050

Contains the following:

ITEM	DESCRIPTION	PART NUMBER	QTY.
1	Information Card	18713-90040	12
2	Filter Paper #41	3152-0035	12
3	Plastic Bags 4" x 8"	9222-0308	12
4	Envelope-Wipe Test Kit	05750-80036	4
5	Service Note 5700A-5	5950-3586	1

D. PERFORMING THE LEAK(WIPE) TEST

The test should be performed as follows:

1. Select three information cards (Item 1) and fill out completely.
2. Select three pieces of filter paper (Item 2) and label them with a pencil as follows:

   Sample 1 - Det. Entrance Fitting
   Sample 2 - Det. Housing
   Sample 3 - Det. Exit
3. Disconnect the column from the EC Cell.
4. Wipe the inside and outside of the detector entrance fitting (including column and adapter connections) with the piece of filter paper labelled "Det. Entrance Fitting, Sample 1", see Figure 1-A, B, C and D. Immediately insert it and a filled-out information card into one of the plastic bags (Item 3).
5. Wipe the detector housing (outside case) with the filter paper labelled "Det. Housing, Sample 2", see Figure 2-A, B, C and D, and insert it and filled-out information card into a second plastic pag.
6. Disconnect the exit tube, if removable (tube where vent line is attached), from the detector. Wipe the inside of the metal detector exit tube and/or the inside of the vent line with the filter paper labelled "Det. Exit, Sample 3", see Figure 3-A, B, C and D, and insert it and a filled-out information card into a third plastic bag.

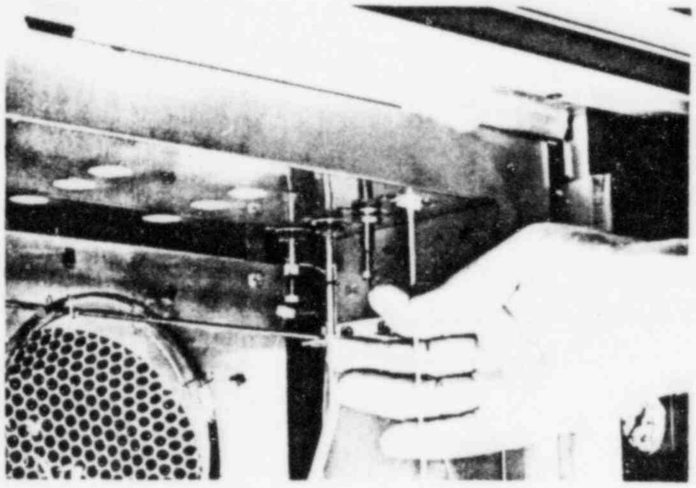
7. Place the three plastic bags into one of the envelopes (Item 4) addressed to Nuclear Radiation Developments Inc., along with your purchase order to cover the cost of the test.

   Nuclear Radiation Developments Inc.
   2937 ALT Blvd.
   Grand Island, NY 14072

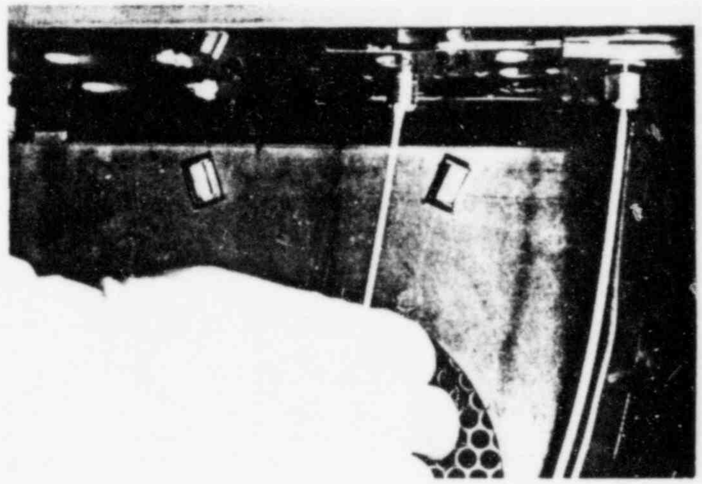
   PHONE: 1-716-773-7634

8. Sufficient material is supplied in each kit to perform four wipe tests. Extra Leakage Test Kits (Part No. 18713-60050) can be purchased from Hewlett-Packard by calling the local HP Sales Office.

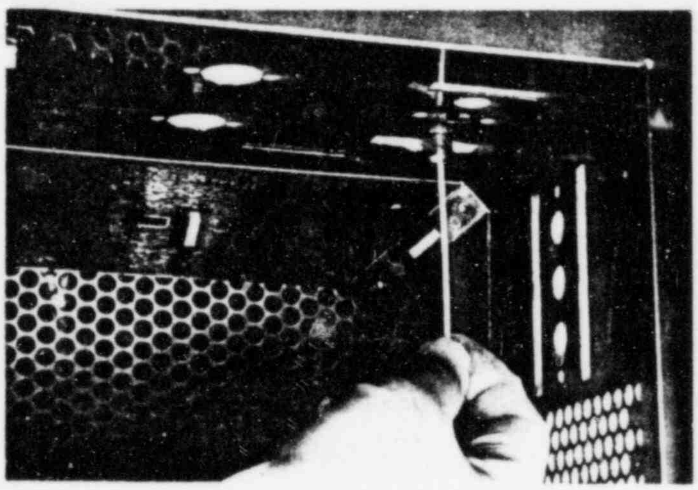
MW/swb



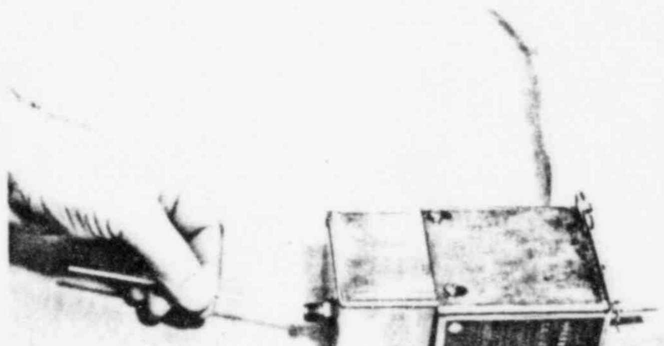
A - 5880



B - 5830/40

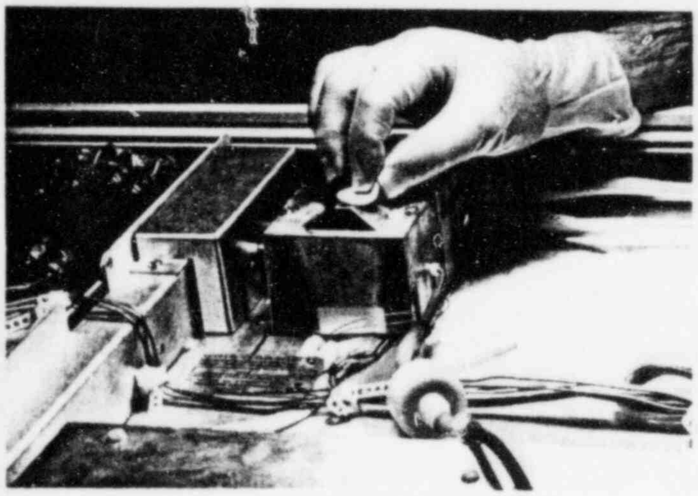


C - 5710/30

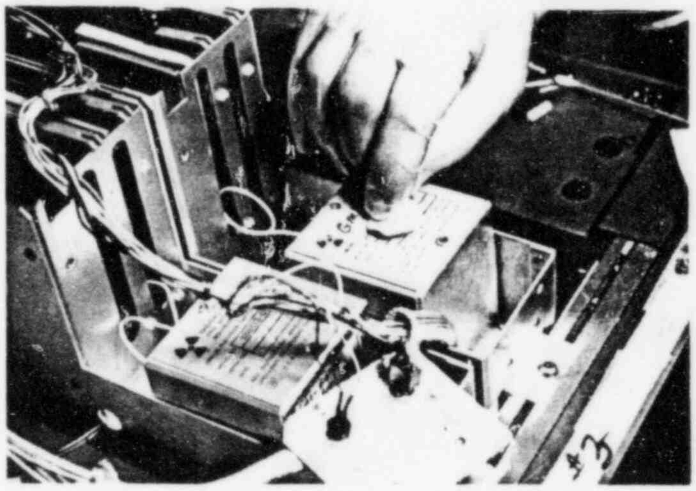


D - Older Instruments

FIGURE 1
DETECTOR ENTRANCE FITTING SAMPLE

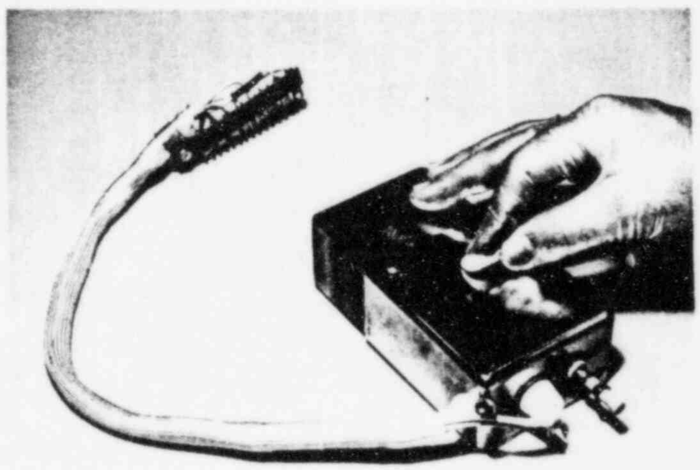


A - 5880



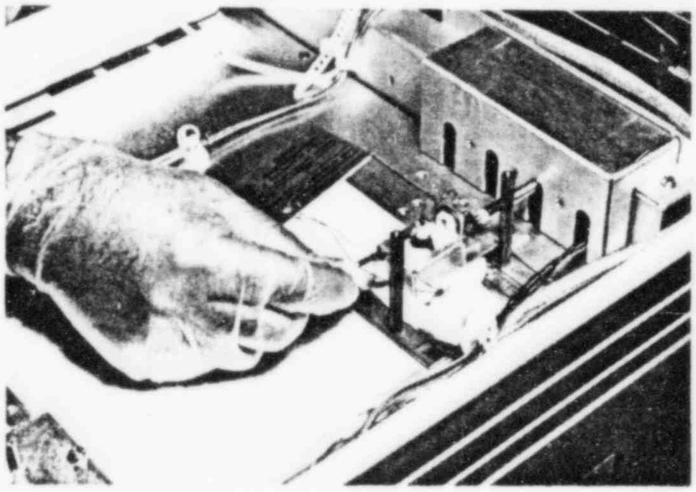
B - 5830/40

C - 5710/30

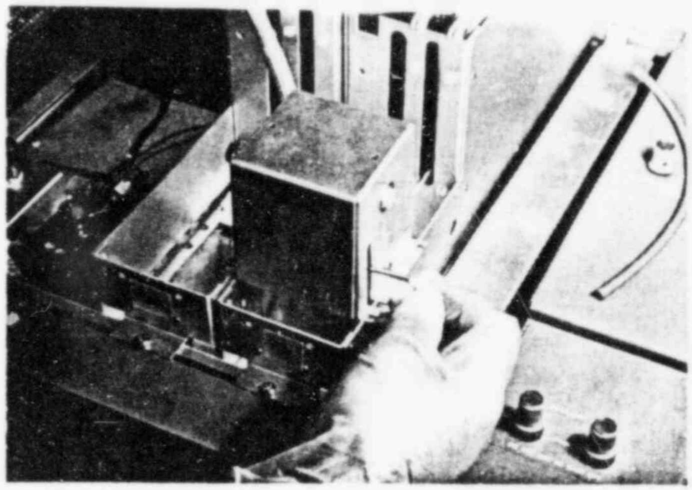


D - Older Instruments

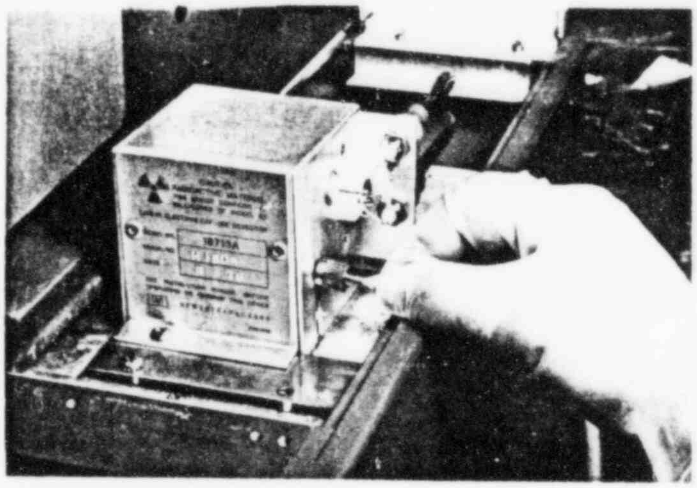
FIGURE 2
DETECTOR HOUSING SAMPLE



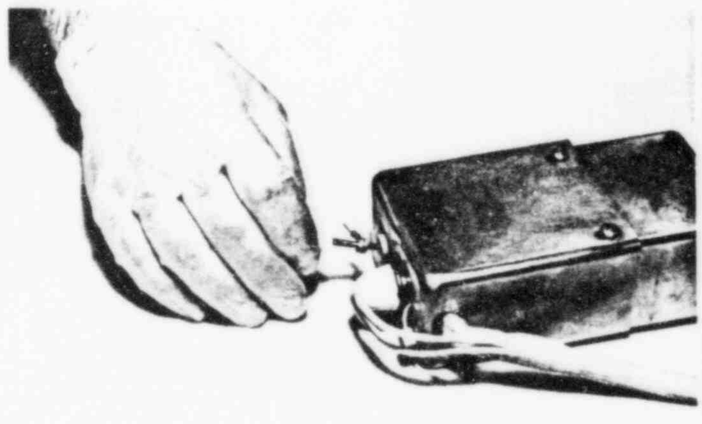
A - 5880



B - 5830/40



C - 5710/30



D - Older Instruments

FIGURE 3
DETECTOR EXIT SAMPLE

TELEDYNE ISOTOPES

PACKAGING PROCEDURES FOR RADIOACTIVE WASTE

I.0 GENERAL

I.1 Seven Categories

- Dry Solid Material (DSM)
- Small Volume Liquids (SVL) Scintillation vials only
- Small Volume Liquids (SVL) Other than scintillation vials
- Large Volume Liquids (DWLVL-A) 50 ml or greater of aqueous liquids
- Large Volume Liquids (DWLVL-S) 50 ml or greater of scintillation type liquids
- Animal Carcasses (DWAC) or biological waste
- Dry Solid Compactibles (DSC)

I.2 Items in different categories cannot be mixed.

I.3 The packaging procedure that is used is to be marked on the drum (e.g. DSM-2/83).

I.4 Transuranic waste in excess of 10 nanocuries per gram is not acceptable.

I.5 Gaseous tritium waste must meet certain provisions. Please see the burial site's license for details or call the Radiological Services Department Office.

I.6 Special Nuclear Material requires specific approval and will be accepted only upon special request to the Radiological Services Department Office.

I.7 DO NOT EXCEED THE FOLLOWING WEIGHTS UNLESS SPECIFICALLY AUTHORIZED:

5 gallon container - 100 lbs.
30 gallon container - 300 lbs.
55 gallon container - 480 lbs.

I.8 Special Note:

The chemical composition of the materials disposed must be compatible with the procedures which follow. Any additional hazards of the material must be evaluated to determine if additional packaging is required. If materials are listed in N. Irving Sax's "Dangerous Properties of Industrial Materials", Fifth Edition, Van Nostrand Reinhold, as having a THR=HIGH via any route, except IP or IV, specific approval must be obtained from the State of Washington Radiation Control Program. Contact Steven Black for details.

II.0 <u>DRY SOLID MATERIAL (DSM-2/83)</u>

II.1 Select a 5, 30 or 55-gallon drum.

II.2 Fill to capacity with only dry solid materials. Do not exceed the following weights: 100, 280 or 400 lbs respectively for 5, 30 and 55-gallon drums.

II.3 Secure drum cover.

II.4 Label drum DSM-2/83, to designate that the drum has been packaged according to these directions.

III.0 <u>SMALL VOLUME LIQUID WASTE (SVL-2/83), Scintillation Vials or Other SVL's</u>

Liquid should not be absorbed directly onto the absorption media (e.i. <u>do not open vials</u>). Any tool or device which contains <u>any</u> amount of liquid (e.g. syringes or test tubes) must be considered small volume liquid waste.

III.1 Select only a 30 or 55-gallon drum; 5-gallon pails are <u>not</u> allowed.

III.2 Line the drum with 4 ml thick poly liner. (See special notes following this section.)

III.3 Using an approved absorbant, alternate layers of absorbant with layers of waste. (See special notes following this section.)

III.4 Twist and seal liner.

III.5 Secure drum cover.

III.6 Label drum SVL-2/83, to designate that the drum has been packaged according to these instructions.

TELEDYNE ISOTOPES

III.7 Special Notes

Two 2 ml liners may be used in place of a single 4 ml liner.

Instead of lining the whole drum, individual 4 ml (or double 2-ml) bags may be substituted, provided each bag is layered as above.

Approved absorbants:

Diatomaceus Earth (Medium Grade)
Super Fine (Diatomite)
Speedi Dry
Hi-Dry
Celatom (M-P78)
Floor Dry 85 Superfine
Instant-Dri
Safe-T-Sorb (Petrasorb)
Vermiculite - Industrial Grade 4 (Zonolite #4)

When layering, the absorbant must be the first layer on the bottom and the last layer on the top. Proper volume ratios must be determined by the generator to be used for the different absorbants.

The amount of absorbant must be capable of absorbing twice the amount of liquid present.

IV.0. LARGE VOLUME LIQUID WASTE (DWLVL-A-2/83 or DWLVL-S-2/83)

All items containing 50 ml or more of liquid may not be disposed in an SVL drum. The liquid must be packaged as follows while the container itself must be either (1) dried and placed in a DSM drum or (2) placed in an SVL drum once the bulk of the liquid is removed.

Note that aqueous and scintillation type fluids are not to be mixed in the same drum. If they are, the drum will be considered a DWLVL-S-2/83 and charged accordingly.

IV.1 Select only the 55-gallon double-walled container for liquid waste.

IV.2 Remove the 55-gallon drum cover.

IV.3 Loosen and remove the bung from the 30-gallon drum which has been filled with Zonolite #4.

IV.4 Pour up to 10 gallons of liquid (ph-6.0 - 9.0) into the absorbant in the 30-gallon drum through the 2-1/2" opening.

IV.5 Replace bung and tighten.

IV.6 Twist and seal poly liner.

IV.7 Secure cover of 55-gallon drum.

IV.8 Label drum DWLVL-A - 2/83 or DWLVL-S - 2/83 (depending on the liquid: A designates aqueous, S designates scintillation type liquids) to designate that the drum has been packaged according to these instructions.

V.0 <u>ANIMAL CARCASSES OR BIOLOGICAL WASTE (DWAC-2/83)</u>

Animal carcasses or biological waste must be disposed using a double-walled container. Be sure when ordering to specify a 55-gallon double-walled container for <u>animal carcasses</u>.

V.1 Select only a 55-gallon double-walled drum.

V.2 Remove inner 30-gallon container and absorbant.

V.3 Line 30-gallon drum with 4 ml poly liner. See Section III.7.

V.4 Package waste into liner using at least one part slaked lime for every 10 parts of absorbant. See approved absorbant list in III.7. Fill completely.

V.5 Twist and seal liner.

V.6 Seal 30-gallon drum.

V.7 Place 30-gallon drum into 55-gallon drum.

V.8 Place absorbant around and covering 30-gallon drum.

V.9 Secure 55-gallon drum cover.

V.10 Label drum DWAC-2/83 to designate that drum has been packaged according to these instructions.

TELEDYNE ISOTOPES

VI.0 DRY SOLID COMPACTIBLES (DSC-2/83)

VI.1 Select a 5, 30 or 55 gallon container.

VI.2 Place waste into double 4 mil plastic liners. (Note: For 55 gallon drums, use two sets of double 4 mil bags, each set approximately 27 gallons. If heavy materials are used, please use additional double 4 mil liners and decrease the quantity put into each.)

VI.3 Twist and seal liners.

VI.4 Place double 4 mil bags into the selected container.

VI.5 Replace lid and ring.

VI.6 Secure ring. DO NOT BOLT.

VI.7 Label drum DSC-2/83 to indicate it was packaged in accordance with these instructions.

NOTE: DO NOT DISPOSE OF SHARP OBJECTS.

NOTE: DO NOT DISPOSE OF NON-COMPACTIBLE ITEMS SUCH AS LEAD PIGS OR OTHER METAL OBJECTS IN THESE TYPES OF CONTAINERS.

Attachment 11-B

State of Washington Department of Social and Health Services
HEALTH SERVICES DIVISION
RADIATION CONTROL PROGRAM

RMIT NO. 2953

EXPIRES: 03/31/85

Site Use Permit
Low Level Radioactive Waste

REGISTRANT

EXXON BIOMEDICAL SCIENCES, INC
METTLERS ROAD
P.O. BOX 235
EAST MILLSTONE NJ 08873

The person or firm to whom this certifica
is issued is subject to the provisions
Chapter 70.98 of the Revised Code
Washington.

HS 13-437 Rev. 6/80

PERMIT DOES NOT IMPLY APPROVAL

Attachment 11-C

STATE OF WASHINGTON

APPLICATION FOR USE PERMIT LOW LEVEL RADIOACTIVE WASTE DISPOSAL SITE

Richland, Washington

FOR OFFICE USE ONLY do not write in this space	
Permit #	2953
Date Issued	
Date Expires	
Date Renewed	
Date Fee Received	

NAME OF COMPANY Exxon Biomedical Sciences, Inc.

ADDRESS Mettlers Road

P.O. Box 235

CITY East Millstone STATE N.J.

ZIP CODE 08873

APPLICANT OR CONTACT PERSON Stanley M. Van Pelt (RSO)

TITLE Site Manager PHONE (area code) 201 873-6123

NRC LICENSE NUMBER 29-19396-01 OR AGREEMENT STATE LICENSE # ______ OR-

WASHINGTON STATE LICENSE # (for Washington State Companies) ______

DOES YOUR COMPANY ACT AS A BROKER, AS DEFINED IN WAC 402-19-530(1)? (OVER) YES ___ NO X

IF NOT, DO YOU USE A BROKER? X YES ___ NO IF YES, PLEASE IDENTIFY Teleclyne Isotopes, Inc.

X CONTINUAL SERVICE — $80.00 FEE REQUIRED NEW ___ RENEWAL X

___ ONE TIME ONLY SHIPMENT (NON-RENEWABLE) $50.00 FEE REQUIRED

"PREPAYMENT FOR YOUR SITE USE PERMIT IS REQUIRED. NO INVOICE WILL BE SUBMITTED."

MAKE CHECK PAYABLE TO: WASHINGTON STATE — DSHS

TYPE OF WASTE BY PERCENTAGE

FUEL CYCLE ______ % INDUSTRIAL ______ %

INSTITUTIONAL (non-medical) ______ % MEDICAL 100 %

OTHER (define) ______ %

The State of Washington reserves the right to suspend or revoke this permit for violation of any applicable state or federal regulation. Applicant agrees to comply with all regulations and conditions for disposal of low level radioactive waste in the State of Washington.

APPLICANT'S SIGNATURE Stanley M. Van Pelt

DATE February 25, 1985

PLEASE MAIL APPLICATION AND PERMIT FEE TO:

WASHINGTON STATE — DSHS
ADMINISTRATIVE SUPPORT SERVICES
MAIL STOP ET-26
OLYMPIA, WASHINGTON 98504

FOR QUESTIONS CONCERNING THIS APPLICATION CALL PATRICIA MORSE (206) 753-4497