Ralston Purina Company

June 10, 1987

U.S. NRC FEE MAIL BRANCH
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Cassandra F. Frazier
Materials Licensing Section
U.S. Nuclear Regulatory Commission Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Ms. Frazier:

We request the following changes be made in our NRC License number 24-08334-02. All necessary information to support these changes has been enclosed.

Items 6-8
Please add the following
Subitem 6.E Phosphorous 32
Subitem 7.E Any
Subitem 8.E 1 millicurie

Item 9 Authorized use - please add Subitem 9.E. to be used for in vitro diagnostic assays.

Item 11. Shall be amended to read Licensed Material in Item 6 above is authorized for use by, or under the supervision of, the following individual(s) for materials and uses as indicated:

John MacDonald	Subitem 6.A. through 6.D.
Judy O'Brien	Subitem 6.E.

I have enclosed a summary of Ms. O'Brien's training and experience with radioisotopic materials.

Also enclosed are the following:

Attachment I.	Rules and Procedures for Working with Radioisotopes
Attachment II.	Waste Disposal Protocol
Attachment III.	Radiation Protection Program
Attachment IV.	Duties of Radiation Safety Officer
Attachment V.	Description and Floor Plan of Radioisotope Lab.
Attachment VI.	Equipment and Calibration.

Log June-13-III
Remitter
Check No. 373040
Amount $120 - 46 refunded
Fee Category 3P
Type of Fee Amd
Date Check Rec'd. 6/18/87
Date Deposited 6/19/87
By: Susan

All other facilities, programs, and conditions in the application dated August 6, 1979, and letters dated July 10, 1984, July 30, 1984, and July 5, 1986 will remain in effect.

8801220438 870807
REG3 LIC30
24-08334-02 PDR

CONTROL NO. 83715

RECEIVED
JUN 15 1987
REGION III

JUN 15 1987

Checkerboard Square
St. Louis, Missouri 63164

Enclosed is the CFR Part 170. 313M amendment fee of $120.00. Any questions concerning this request for amendment should be directed to Kathryn S. Phillips, 4RS, Ralston Purina Company, Checkerboard Square, St. Louis, MO 63164. My telephone number is 314-982-2806.

Sincerely,

Kathryn S. Phillips

Kathryn S. Phillips
Radiation Safety Officer

ss
1572A
Enc.

CONTROL NO. 83715

TRAINING & EXPERIENCE OF PRINCIPAL USERS OF RADIOISOTOPES

NAME Judy O'Brien FACILITY Ralston Purina

ADDRESS Microbiology Department, 4L

1. TYPE OF TRAINING

	WHERE TRAINED	DURATION	ON THE JOB	FORMAL COURSE
A. Principles & Practices of Radiation Protection	Washington University Medical School St. Louis, MO	1978	No	Wash. U. Radiation Safety Course
B. Radioactivity measurement standarization and monitoring techniques and instruments	St. Louis Univ. Medical School St Louis, MO	July-Dec. 1979	Yes	No
C. Mathematics & calculations basic to the use and measurement of radioactivity	St. Louis Univ. Medical School St Louis, MO	July-Dec 1979	Yes	No
D. Biological effects of radiation	Same as "A" above	1978	No	Wash U. Radiation Safety Course

2. EXPERIENCE WITH RADIATION

ISOTOPE	MAXIMUM AMOUNT	LOCATION OF EXPERIENCE	DURATION OF EXPERIENCE	TYPE OF USE
Tritium		St Louis Univ. Medical Sch. Biochemistry Dept. Dr. Robert Olsen	July-Dec. 1979	Vitamin K Radioassay

ATTACHMENT I

TABLE OF CONTENT

RADIOISOTOPE LABORATORY TECHNIQUES

INTRODUCTION

Much of the laboratory apparatus used for work with radioisotopes consists of ordinary standard items. A few rules of common sense are:

1. Respect radioactivity

   Understand and know its potential hazards. From this will stem safe handling of radiosotopes.

   a. For operations involving microcurie quantities of radiosotopes, external radiations present no particular Beta emitting problem, especially if gloves are worn or tongs are used instead of fingers to handle the radioactivity.

   b. For operations involving millicurie quantities of beta and gamma ray emitters with a total radiation energy of 0.3 mev or greater are involved, it is necessary that all operations be carried out at extended distances and with proper shielding.

2. Decontamination

   It is impossible to work with radioactive materials without contaminating the apparatus in which they are used. In order to use the apparatus again, it is usually necessary to decontaminate it.

   Decontamination can be accomplished by washing with a radioisotope decontamination solution. It is the user's responsibility to insure that all contamination is cleaned up. All questions concerning this should be directed to the Radiation Safety Officer.

3. Waste Disposal

   All waste disposal will be done according to the federal regulations. This is management's responsibility. All questions concerning this should be directed to the Radiation Safety Officer. Persons responsible for isotope use must familiarize themselves and their employees with current regulations prior to beginning experiment to avoid mistakes.

4. Laboratory Rules

   See attached Laboratory Rules.

LABORATORY RULES

1. Only authorized personnel shall handle radioisotope work.

2. All personnel in the radioisotope laboratory must wear personnel monitors at all times (see Radiation Safety Officer).

3. Eating, drinking, smoking and the application of cosmetics in the laboratory are strictly forbidden.

4. a. Lab coats should be worn at all times in the laboratory.

   b. Disposable gloves should be used when handling radioisotopes and must be discarded after use. Hands must be washed with soap and water after handling radioisotopes.

   c. Gloves should not be worn while operating equipment or instruments.

   d. Hands, shoes, and lab coat should be checked for contamination with suitable detector before leaving the laboratory.

   e. Laboratory bench needs to be covered with protective benchkote (an absorbent flexible paper with a polyethylene backing).

5. Mouth pipetting is not allowed.

6. All working radioisotope standards must be stored in double containers. Both containers must be labeled with a radiation warning label and the isotope, amount, date and user's initials.

7. Hood should be on at all times when volatile or airborn material is used in the hood.

8. The public water sewage system should not be used for high level radioactive liquid waste disposal. All radioactive liquids and solids should be placed in labeled, closed containers and a log for the concentrated radioisotope waste should be kept. Wash water solution and radioactive urine, if $\leq$ 10 x background, may be washed down the drain.

9. If contamination is suspected, the area should be checked immediately (survey meter or wipe test). If contamination is found, the area should be decontaminated before further use.

10. Records (wipe test results) from contamination and subsequent cleanup will be logged and submitted to radiation safety officer.

11. The decontamination kit should be available at all times. When items in the kit are used for spill cleanup, the user is responsible for replacement of these items.

12. Anyone using radioisotopes should have knowledge of the location and proper use of survey instruments.

13. In the case a spill occurs, decontaminate it immediately. Radiation spill team should be notified.

14. a. A routine precautionary survey should be made at frequent intervals during projects. A thorough survey must be done at the end of a project. The routine surveys shall consist of daily checks with the survey meter and weekly wipe tests.

    b. All survey results should be logged and a report should be submitted to the Radiation Safety Officer within 2 working days.

15. Lab personnel should be familiar with all emergency procedures.

RADIOISOTOPE RECEIVING PROCEDURE

1. When radioactive material is received at the receiving desk, receiving should immediately call the individual who ordered it. If that individual is not available, one of the following people should be called in the order listed. Page them if necessary.

   Kathryn Phillips, 2806
   Shurla Dickinson, 5913
   Judy O'Brien, 2193
   Les Smoot, 1680

2. The individual contacted shall immediately pick up the package and take it to the isotope lab.

3. The package will be inspected immediately upon receiving for possible damage or leakage. If the package is damaged, call the Radiation Safety Officer or aforementioned personnel immediately.

4. The radiation should be measured directly on the surface and 3 feet away from the package by using Geiger counter.

5. Vessel containing radioactive material should be removed properly from the package and a wipe test of the outside container should be performed for possible leakage. If it is not contaminated, store it in the double container with proper shielding and label. If it is contaminated, decontamination procedure should be followed immediately. All survey and wipe test results are to be recorded on the isotope receipt form.

6. The packaged material should be checked for possible radiation before disposal.

7. Isotope receipt form should be completed and sent to Kathryn Phillips, 4RS.

To: Kathryn Phillips, 4RS

Isotope Receipt

Date

Isotope -

Supplier -

Amount -

Physical Form -

Package Condition -

Package Leak Test Results -

Container Condition -

Container Leak Test Results -

Storage Location -

Projected Usage -

Project # -

Date Start -

Expected Date Finished -

Expected Date of Disposal -

Amount Left After Project -

Name

Signature

INVENTORY OF RADIOACTIVE COMPOUNDS

Page _____

ound _____

r No. _____

Received _____

Source _____

Quantity _____

ate	Description	Use	Balance	Waste Disposal

To: Kathryn Phillips, 4RS

Survey Results

Date -

Area Surveyed (Be specific - include graph of area below) -

Isotope of Concern -

Location of Raw Data -

Conclusions -

Comments:

Name

Signature

DECONTAMINATION OF RADIOISOTOPE

1. Preparation
2. Decontamination
3. Follow up.

I. PREPARATION:

A. Assemble a decontamination kit
- Sign
- Glove
- Plastic bags, Large and Small
- Grease Pencil
- Tongs, Forceps
- Paper bag for sharp things
- Gauze sponge
- Paper towel
- Decontaminated detergent
- Ajax
- Identification tags
- Filter paper #1
- Scissors
- Disposable Diaper to cover whole area

B. Establish clean-up procedure
- Do not panic
- Initiate action

II. CLEAN-UP PROCEDURE (See decontamination procedure)

A. Protect personnel: evacuate laboratory personnel
B. Determine nature of accident
C. Confine Contamination
D. Notify Radiation Safety Officer
E. Get help (Immediate Supervisor)
F. Documented

III. FOLLOW UP

A. Keep records
B. Replace decontamination kit

PERSONNEL DECONTAMINATION PROCEDURE

Any counts above background is cause for concern but NRC regulations should be consulted for exact levels (see Radiation Safety Officer).

I. CLOTHING CONTAMINATION

If clothing becomes contaminated:

a. Low level - handwash with soap in sink.

b. High level - dispose of clothes.

II. SKIN CONTAMINATION - SMALL AREA

1. Flush area immediately with water.

2. Wipe test area.

   a. If still contaminated, proceed to procedure 3.

   b. If not contaminated, cease procedure.

3. Wash area with Rad-Con Foam or 2% Radiac Wash for 2-3 minutes and rewipe the area.

   a. If still contaminated, proceed to procedure 4.

   b. If not contaminated, cease procedure.

4. Soak area in 2% Radiac Wash for 5-10 minutes, then rinse and rewipe area.

   Note: Radiac Wash is corrosive and care should be taken to watch for rashes or any detrimental action on the skin. Cease soaking and rinse off with warm water if so noted.

   a. If uncontaminated, cease procedure.

   b. If contaminated but significantly lowered, repeat procedure 4.

   c. If contaminated but unchanged, proceed to 5.

5. If contamination is unresponsive to washing and soaking, it is because the contamination is in the pores, therefore, causing the area to sweat is usually beneficial. In the case of hand contamination, cover with plastic gloves and allow the area to sweat. In the case of other portions of the body, cover with plastic wrap and allow to sweat.
   Note: If this does not remove contamination or contamination is in the area of a wound, contact Radiation Safety Officer who should advise on Nuclear Regulatory Commission procedures.

III. SKIN CONTAMINATION - LARGE AREA

1. Contact Radiation Safety Officer.

2. Remove clothing, place clothing in a plastic bag then put on disposable uniform and booties.

3. Proceed to shower, remove clothing and shower your entire body with soap and hot water, taking care to rinse contaminated area with water before using soap.

4. Stay in shower and wipe test the affected areas plus random wipe test of entire body and shower.

   a. If uncontaminated, dress in clean clothes.

   b. If contaminated but significantly lower, repeat 3 & 4.

   c. If contaminated but no change in level, proceed to 5.

5. Wash contaminated areas with Rad-Con Foam or 2% solution of Radiac Wash. Shower with soap and hot water. Wipe test.

   a. If uncontaminated, cease and dress in clean clothing.

   b. If contaminated, repeat step 5 using as much hot water as possible.

   If contamination is not reduced to safe levels after three repeats of step 5, call Radiation Safety Officer for further information.

IV. PERSONNEL INJURY WITH INTERNAL CONTAMINATION (Bites by radioactive animals, cuts by radioactive glassware, etc.)

1. The injured person should immediate ask for assistance from another person in the area.

2. First aid must be administered immediately if an injury is serious. Assess the situation and determine whether first aid or decontamination is most critical; proceed accordingly.

3. Flush the contaminated area with water to remove as much surface contamination as possible. Spreading cut edges with isotonic irrigant (Saline) to stimulate bleeding.

4. Determine the type and quantity of isotope involved. Follow an appropriate procedure for monitoring body burden, for example:

   Fe - blood and fecal samples
   I_2 - Thyroid scan, urine samples
   ^{32}P - urine samples

   Samples will be taken at regular intervals until the person reaches background level. (The sampling intervals will be 2 days or less.)

5. The Emergency Message Center, Ext. 3999, and company physician will be notified and appropriate accident forms completed. The company physician will, in consultation with a nuclear medical authority, supervise any internal decontamination if this is necessary.

If the level of contamination is high enough to be life threatening or hazardous to other people, the individual should be hospitalized and assistance sought from the nuclear medicine staff of the hospital.

AREA DECONTAMINATED PROCEDURE

An area is considered contaminated if:

1. An accident involving radioactive material has occurred (no matter how small the occurrence), the area is considered contaminated until proven otherwise.

2. Periodic wipe tests show contamination.

Procedure:

1. Restrict traffic into the suspected area. Notify project leader and Radiation Safety Officer.

2. Mark off the contaminated area with grease pencil and identification tags.

3. Monitor the area and confirm the contamination.

4. Remove any broken glassware with tongs and forceps, place into paper bag.

5. Wipe area with paper towel moistened with Radiac Wash.

6. Wash surface with 10% Radiac Wash; use moistened paper towels for application, allow only clean paper towels to contact the wash solution.

7. Wipe test area, subdividing the area into small sections to localize the contamination, cover the area with disposal diaper while counting the wipes.

   a. If the contamination levels have lowered significantly, then repeat procedure 6 and 7.

   b. If the contamination level remains unchanged, proceed to step 8.

   c. If the area is decontaminated, remove the radioactive identification tags and traffic restrictions and cease procedure.

8. Scrub the surface with scouring cleanser, water, and gauze sponge.

9. Rewipe and count the area again.

   a. If the area is decontaminated, remove identification tags and traffic restriction and cease procedure.

b. If it is still contaminated but the counts lowered significantly, repeat steps 8 and 9.

c. If the contamination remains unchanged, proceed to next step.

10. Wash surface with a solvent which is known to remove the specific chemical form in which the spilled isotope was incorporated. For example, $CHCl_3/CH_3OH$ (2:1) for ^{14}C - oleic acid or concentrated NH_4OH for ^{3}H or ^{125}I protein. If this treatment does not remove the contamination then proceed to #11. If the contamination is reduced repeat until acceptable limits are attained.

11. Wash surface with increasingly harsh cleaners then rewipe and count after each. A series of increasingly harsh cleaners are:

a. 30% HNO_3

b. Conc HCl

c. $K_2Cr_2O_7 + H_2SO_4$

12. If severe treatment does not remove contamination, dispose of the surface. If disposal of surface is not feasible, seal the surface with Krylon or epoxy spray.

13. The initial and final wipe test of the area of concern are logged into the log book, and a report made to the Radiation Safety Officer.

PROCEDURE FOR WASHING RADIOACTIVE GLASSWARE

1. Dump any remaining liquid into liquid waste barrels. If possible, items containing high specific activity should be disposed of rather than washed.

2. Soak in a 5% solution of Radiac Wash for 2 hours. Be sure that all glassware is totally immersed and free of bubbles. Start with hot water.

3. Dump solution down drain and flush with tap water.

4. Rinse glassware batchwise 2 to 6 hours in sink under running water. Alternative procedure is to rinse by hand immersing each item three times in clean water.

5. Remove and wash glassware in a regular dishwasher twice; separated from all other glassware.

6. Spot check 5-10% of glassware by rinsing with fluor or wipe testing. Check all items that had contained significant levels of isotope. Use appropriate counter and energy level for isotope of interest.

7. If no counts are found, glassware may be put away. Repeat from step 2 if counts on glassware are greater than twice background. Identify the glassware and log counts.

8. Chromic acid or concentrated base may be used to remove residual activity. Dispose of permanently contaminated glassware. (Note: certain isotopes, notably ^{3}H stick to glassware and cannot be completely removed. Scintillation vials used with this isotope must never be returned to stock.)

WASTE DISPOSAL

1. Liquid Waste - Liquid waste will be disposed of by release into the sewerage system through the deep sink described in item 3 of the facilities description. Concentration of radio isotope in the liquid waste will be less than 50 uCi/liter. Output of this building into the sewerage system is 60,000 gallons per day. If concentration of the waste is above 50 uCi/liter it will be held until it decays to this level. A log will be maintained in this area at all times to ensure compliance.

2. Solid Waste - Solid waste will be held in an appropriately labeled container until radioisotope has decayed to background levels. This will be monitored with a Geiger counter prior to disposal through the normal trash disposal.

3. Sealed sources - All sealed sources will be returned to the manufacturer for disposal.

RADIOISOTOPE QUESTIONNAIRE

(All personnel are required to complete this prior to working with radioisotopic material.)

SPECIFIC:

1. List all isotopes that you have experience using.
2. List the isotopes you will be handling in your current position.
   a) What type of emitters are these isotopes and what are their associated energies?
   b) In what physical form will you be using this isotope?
3. List precaution that you will take when handling these isotopes.
4. How should these isotopes be stored?

GENERAL:

1. List the three common types of radiation.
2. What are the characteristics of each radiation?
3. The greatest risk of damage from internal exposure is associated with what type of radiation?
4. The greatest risk of damage from external exposure is associated with what type of radiation?
5. Define exposure and how it is measured. What are the units of exposure?
6. List the three factors involved in minimizing exposure when handling radioisotopes.
7. What is contamination?
8. How would you survey an area for contamination?
9. What instruments are used for monitoring?
10. What should you do in case of a spill or contamination?
11. What should you do in case of volatile or airborne contamination?

SUGGESTED ANSWERS FOR THE RADIOISOTOPE QUESTIONNAIRE

GENERAL:

1. Alpha, Beta, and gamma.

2. Alpha - a helium atom stripped of its electrons; possessing low energy, usually a few inches of air is enough shielding.

   Beta - a charge particle emanating from the nucleus; generated by nuclear particle charge conversions; moderate energy, adequate shielding is usually provided by cardboard or a few feet of air.

   Gamma - short wavelength electromagnetic energy similar to X-ray released by excited atoms after α or β decay; energy ranges from moderate to high, adequate shielding may require several inches of lead.

3. Alpha radiation presents the greatest internal hazard due to its high relative biological effectiveness.

4. Gamma radiation presents the greatest external hazard due to its ability to penetrate.

5. Exposure is the quantity of radiation over a time duration which a surface has been subjected.

6. Exposure is measured by the number of ionizing particles per volume.

   Standard units are:

   Roentgen - the amount of ionizing radiation per volume of air.

   Rad - the amount of absorbed radiation per volume.

   Rem - the exposure in Rad times the RBE (relative biological effectiveness) of the particle.

   Exposure is measured by ionization detectors or scintillation detectors.

6. Time, amount of isotope and distance are the three factors to take into account when minimizing exposure.

7. Contamination is a number of disintegrations per unit time above background. There are various levels assigned per isotope depending on hazard and natural abundance.

8. Survey quickly an area with a G-M detector, taking care to protect feet with booties.

   The initial high risk survey would be followed by a random wipe test of the area.

9. There are two general types of refined sample monitors; scintillation and Geiger-Mueller.

   Personnel monitors include film and/or crystal badges and dosimeters.

10. In case of a spill, the following actions should be taken:

    a. Insure the safety of yourself and personnel in the area. Have someone call Radiation Safety Officer.

    b. Confine the spill.

    c. Remove obvious hazard.

    d. Decontaminate (see decontamination procedure).

11. In case of volatile or airborne contamination, the following actions should be taken:

    a. Remove all personnel to safe area and turn on radiation hoods.

    b. Notify Radiation Safety Officer.

    c. Take names and approximate exposure times for individuals.

    d. Furnish everyone with booties and bags, then everyone is required to take a shower and wash hair with soap. All clothing would be placed in bags and treated as contaminated.

    e. Sample air until clear. Wear protective mask and clothing while in area.

    f. Wipe test the area and decontaminate where necessary.

    g. Return personal belongings after checking for contamination.

    h. Check air filter, if it is highly contaminated, then exchange the air filter.

jal
3/22/82

ATTACHMENT II

WASTE DISPOSAL

1. Liquid Waste - Liquid waste will be disposed of by release into the sewerage system through the deep sink described in item 3 of the facilities description. Concentration of radio isotope in the liquid waste will be less than 50 uCi/liter. Output of this building into the sewerage system is 60,000 gallons per day. If concentration of the waste is above 50 uCi/liter it will be held until it decays to this level. A log will be maintained in this area at all times to ensure compliance.

2. Solid Waste - Solid waste will be held in an appropriately labeled container until radioisotope has decayed to background levels. This will be monitored with a Geiger counter prior to disposal through the normal trash disposal.

3. Sealed sources - All sealed sources will be returned to the manufacturer for disposal.

ATTACHMENT III

RADIATION PROTECTION PROGRAM

1a. All personnel working with radioisotope will be monitored using TLD-XBG badges and TLD finger rings. The XBG film in the badge will be exchanged monthly. The entire badge (TLD & XBG) and finger rings will be exchanged quarterly.

1b. All personnel working in the area, but not using the isotope, will be monitored using TLD badges exchanged quarterly.

2. The badges and rings will be supplied and analyzed by Radiation Detection Co., Sunnyvale, CA.

3. Restriction of unauthorized personnel - signs using conventional colors and symbols will be posted on doors of radioisotope laboratory, and unauthorized persons including maintenance and cleaning crews will be admitted only under supervision. The area in which radioisotopes are used will be locked when not in use.

4. Individuals who have not worked in the radioisotope laboratory at Ralston Purina are given thorough indoctrination to our safety program, and supervised at least initially, whether they have had previous experience or not.

5. Detection systems will be wipe tested for contamination at intervals not to exceed 6 months according to manufacturers instructions. The presence of 0.005 microcuries or more of radioactive material shall be deemed to constitute a radiological hazard and the detector will be removed from service and returned to the manufacturer for decontamination. Leak tests will be conducted under the director of the radiation safety officer using kits provided and analyzed by Varian Instrument Group, Walnut Creek, CA.

ATTACHMENT IV

DUTIES OF THE RADIATION SAFETY OFFICER

1. Personnel Monitoring Program - including badges and bioassays if needed.

2. Supervision of isotope use by all other persons named in the license.

3. Maintenance of all records associated with this license including acquisition, use, and disposal of all isotopes, and maintaining inventory, conducting leak tests, and insuring that all sealed sources are used in a safe and approved manner.

4. Responsible for insuring that quantities of radionuclides on hand do not exceed license quantities.

5. Supervision of environmental monitoring program.

6. Conducting a regular wipe test program in all areas in which radioisotopes are used.

7. Conducting classes in radiation safety and radioisotope use procedures for groups within the company which have little experience with radioisotopes.

Attachment V

Isotope Lab: 460, 4RS, Checkerboard Square address

1.a

1) Isotope hood: 1000 ft^3/min air flow capacity, explostion - proof motor, stainless steel construction. Fitted with absolute filter: pressure drop less than .84" W.C.
D.O.P. penetration. 012%
Retention capacity - 0.3 micron, 99.995%

Manufacturer:
a) Hamilton Ind.

Hood vents are located on roof. All building air intakes are on sides of building.

2) Outlets on steel bench - silicone sealed to prevent leakage (modules are raised off counter).

3) Deep sink: this has foot control for water faucet to prevent faucet contamination.

4) Liquid waste disposal: 30 gal. drum under the lab bench.

5) Solid waste disposal: 55 gal. drum stored under the lab bench.

6) Deep sinks - all stainless steel surrounded by stainless steel counter-tops. All faucets equipped with valves to prevent backflow.

7) Emergency exit - doors opens from inside lab only.

8) Solvent storage: approved wood solvent storage cabinet located under bench top.

9) Doors to lab: these are locked except during working hours to keep unauthorized personnel from entering the lab.

10) Stainless steel bench: ridged around outer edge to prevent spills from draining onto floor. Splash guards extend 10" up wall.

11) Shower facilities are located approximately 100 feet down the hall. A large spill clean-up kit is located in the laboratory.

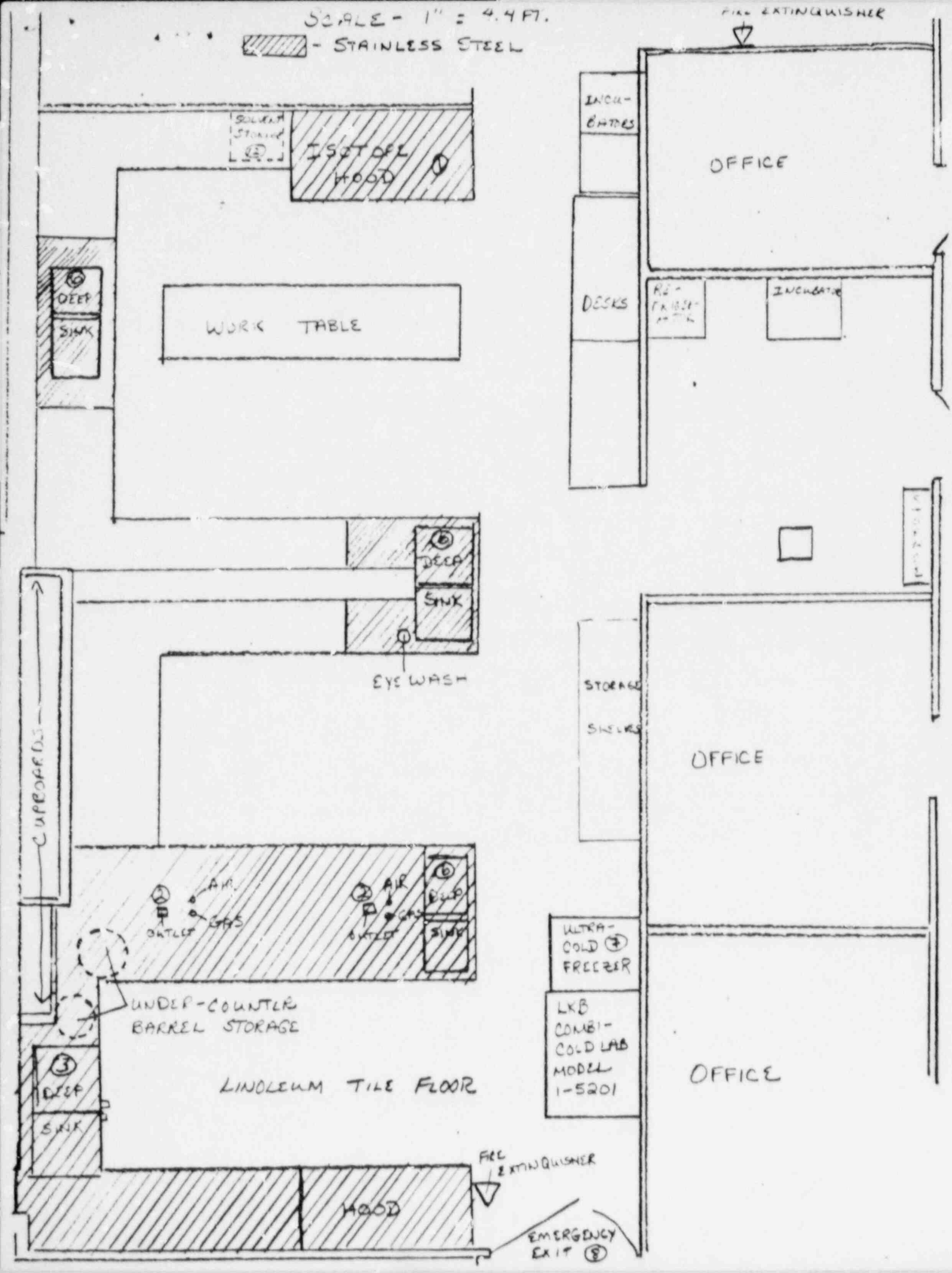
1b. Storage Facilities, etc.

1) Lucite containers are available for storage of isotope.

2) Disposable gloves, lab coats, body suits, foot covers and lab bench covers are available in all areas.

1c. Small dust masks and charcoal filter masks are available in all areas. Biopak 45-self-contained rebreathing respirators are located in all hallways in the buildings at Checkerboard Square address. These have dedicated oxygen tanks with a 45 minute oxygen supply. Manufactured by Biomarine Industries. NIOSH Approval # TC-13F-27.

Scale: 1" = 44 ft


SCALE - 1" = 4.4 FT.
- STAINLESS STEEL
FIRE EXTINGUISHER
INCU-BATORS
OFFICE
SOLVENT STORAGE (12)
ISOLATOR HOOD (1)
DECKS
INCUBATOR
DEEP SINK (6)
WORK TABLE
DEEP SINK (6)
EYE WASH (5)
CUPBOARDS
STORAGE SHELVES
OFFICE
AIR
GAS
OUTLET
DEEP SINK (6)
ULTRA-COLD FREEZER (7)
LKB COMBI-COLD LAB MODEL 1-5201
UNDER-COUNTER BARREL STORAGE
DEEP SINK (3)
LINOLEUM TILE FLOOR
OFFICE
HOOD
FIRE EXTINGUISHER
EMERGENCY EXIT (8)

ATTACHMENT VI

EQUIPMENT AND CALIBRATION

1. Gene-Trak Beta Detector (contains 2 Geiger-Muller tubes)
   Manufacturer - Radiation Monitoring Services, Inc.
   44 Hunt Street
   Watertown, MA 02172
   Distributor: Integrated Genetics, Inc.
   31 New York Avenue
   Farmingham, MA 01701
   Calibration: By manufacturer
   Schedule: Yearly

2. Geiger Counter - Eberline Model E530
   with HP 210 probe and speaker
   - Window thickness 1.4-2.0 mg/cm^2
   Window area - 15 cm^2 (1.75" diam.)
   sensitivity (Co60) - 5000 cpm/mR/hr
   efficiency (C-14) - 10%
   Calibration: R. M. Wester and Assoc., Inc.
   St. Charles, MO
   Schedule: Every 6 months.

CONTROL NO. 88715