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PORT HURON HOSPITAL
1001 Kearney Street
Port Huron, Michigan 48060

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17 December 1984

United States Nuclear Regulatory Commission
Region III, Office of Materials Licensing
799 Roosevelt Road
Glen Ellyn, Illinois 60137

ATTENTION: Bruce Mallett, Ph.D.

RE: Request for amendment to NRC License No. 21-20137-01.

We hereby request the following change to our NRC License.

1. Change in location of our Nuclear Medicine Department. Item 11 provides a diagram of the location. Item 21 (included) provides pertinent information for Xe-133 use. A decontamination survey of the old facility is provided.

2. Change our present frequency of dose calibrator accuracy testing, currently listed as quarterly in our License application to an accuracy testing frequency of annually (1/year) as suggested in Appendix D-Section 2 of Regulatory Guide 10.8.

3. Change the membership of our Medical Isotopes Committee to reflect current status (included).

4. Change survey meter annual calibration to Medical Physics Consultants whose source License Number is 21-20153-01.

5. Modify our Area Survey Procedures with the following statement, "Items 1b. and 6. should be changed to read that, Any areas indicating removable contamination upon wipe testing, will be cleaned. (eliminating the 200 DPM per 100 cmz statement)."

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21-20137-01 PDR

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If you have any questions concerning these changes, please do not hesitate to contact us. We appreciate your concern in this matter. Attached is the $120.00 amendment fee.

Sincerely,

Administrator
Port Huron Hospital

APPENDIX M
INFORMATION IN SUPPORT OF XE-133 USE

1. QUANTITIES TO BE USED

A. Patient information

(1). 15 studies per week
(2). 10 milliCuries (average) per study

B. 500 milliCuries possession limit

2. USE AND STORAGE AREAS

A. Xenon-133 will be stored in the Storage Area of the Hot Lab and used (i.e., administration, imaging, and trapping/exhaust) in the Imaging Area.

B. Ventilation: A(n) 651 CFM Fume Hood in the Hot Lab and 658 CFM Exhaust system in the Imaging Department deliver(s) air directly to OUTSIDE air on the facility roof, carrying a major portion of any Xe-133 contamination, and is (are) situated well away from any intake vents (30 feet minimum). Total exhaust is therefore 1309 CFM. A 10% negative pressure will be maintained at all times. Airflow will therefore come from the hallway via the door(s). No air is recirculated.

C. In the case of exhaust fan shutdown, Xe-133 studies will not be performed.

3. PROCEDURES FOR ROUTINE USE

A. When stored in the Hot Lab, Xe-133 is contained in unit dose ampules inside 1/8" lead shipping tubes behind lead bricks. Individual doses will be assayed in the dose calibrator and admininstered using the NEN Calidose Gas Dispensing System. The seal will be broken only in the Imaging Area. Thus, no significant leakage is expected in the Hot Lab Area.

B. Xe-133 will be administered to the patient and collected using the Atomic Products Model 130-500 Xenon Delivery and Trap System. For each patient study, the technologist will check the tubing of the xenon delivery system for defects and will familiarize the patient with the study.

C. Nose clamps will be used to reduce leakage.

4. EMERGENCY PROCEDURES

A. Notify persons in the room that a release has occurred.

B. All persons should vacate the room at once.

C. Close the room door(s) to prevent entry.

D. Notify the Radiation Safety Officer immediately.

E. Re-enter the room(s) after 15 minutes (5 turnovers of room air).

F. Perform an exposure rate survey with a GM survey meter.

5. AIR CONCENTRATIONS OF XE-133 IN RESTRICTED AREAS

A. Activity used (A) = 10 mCi x 15 exams/wk x 1E3 uCi/mCi
= 1.5E5 uCi/wk

B. Loss rate (f) = 0.20

C. Ventilation required (V) = (A x f) / (1E-5 uCi/ml)

$$= \frac{1.5E5 \text{ uCi/wk} \times 0.20}{1E\text{-}5 \text{ uCi/ml}}$$

= 3.0E9 ml/wk

Assuming a 40-hour week:

$$V = \frac{(3.0E9 \text{ ml/wk}) / (40 \text{ h/wk})}{1.7E6 \text{ ml/h-CFM}}$$

= 44.1 CFM

Thus, the airflow in the area of interest, 658 CFM in the Imaging Department and the 651 CFM Fume Hood are adequate.

6. AIR CONCENTRATIONS OF XE-133 IN UNRESTRICTED AREAS

A. Charcoal-trap adsorption (Reg. Guide 10.8, Appendix M, 6.b) via the Atomic Products Model 130-500 Xenon Delivery and Trap System.

B. Ventilation required (V) = $\frac{(1.5E5 \text{ uCi/wk}) / 0.20}{3E\text{-}7 \text{ uCi/ml}}$

= 1.0E11 ml/wk

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Assuming a 168-hour week:

$$V = \frac{(1.0E11\ ml/week)\ /\ (168\ h\text{-}wk)}{1.7E6 ml/h\text{-}CFM}$$

$$= 350.1\ CFM$$

Thus, 658 CFM in the Imaging Department and the 651 CFM Fume Hood are adequate. Duct(s) on-time will be approximated from the following equation and recorded:

$$\text{Duct(s) On-Time} = \frac{(n/10) \times 168h \times 350.1\ CFM}{1309\ CFM}$$

where:
n = number of 10 mCi-equivalent patient studies

C. Trap monitoring

(1) Effluent from the trap exhaust will be collected in a test balloon weekly and counted on a Gamma Camera with the collimator removed and the PHA set for Xe-133. The procedure for xenon trap evaluation is included. Care will be taken to assure that no extraneous radiation sources interfere with the measurements. Given a 10 mCi dose and assuming a 95% trapping efficiency and no residual Xe-133, a 500 uCi action level for trap removal is deemed reasonable. However, experience dictates that effluent is significantly less than 500 uCi in properly operating systems. Thus, an action level of 200 uCi will be set, which is a small fraction of the assumed 20% leakage from all sources.

(2) Saturated filters will be sealed (per manufacturer's instructions) to prevent leakage. These will be then stored in the "Decay-to-Background" Radioactive Waste Storage Area or returned to the supplier.

(3) An optional method for checking effluent from the trap exhaust will be used if a XenAlert Xe-133 Room Air and Trap Monitor System is purchased. This device will be used weekly and will be calibrated annually as outlined in the manual provided with each unit. A similar action level (mentioned above) will be used.

(4) Velometer readings will be taken semi-annually to assure air flow through supply and exhausts systems have remained stable.

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PROCEDURE FOR XENON TRAP EVALUATION

METHOD

1. Determine the background count rate in counts per minute by counting for five minutes and dividing the total counts by (5) five.

2. Place a known activity of xenon-133 (50-100 uCi's) in front of an uncollimated gamma camera at a fixed distance. The fixed distance should approximate the radius of the testing balloon. The window should be centered at the 81 keV photopeak.

3. Collect at least (1) one million counts from the xenon. Divide the total counts by the counting time to get the counts per minute from the source. Subtract the background counts per minute found in step 1.

4. Divide the counts per minute (CPM) determined in the previous step, by the known activity of xenon in the vial. This yields the efficiency (EF) of the camera in CPM/uCi.

5. Attach the test balloon to the exhaust of the xenon trap and fill the balloon with air which has passed through the filter. The radius of the balloon should be approximately the same distance as between source and crystal outlined in step 2.

6. Place the balloon in front of the gamma camera so that the edge of the balloon just touches the crystal. Count for two minutes. Divide by (2) two to get the counts per minute, and subtract the background counts per minute found in step 1.

7. Determine the activity in the balloon as follows:

   CPM(step 6)/EF(step 4) = activity in balloon

8. For subsequent patient studies, start at step 5 and proceed, using the previously calculated EF.

9. An action level of 100-200 uCi's should indicate possible change of trap charcoal.

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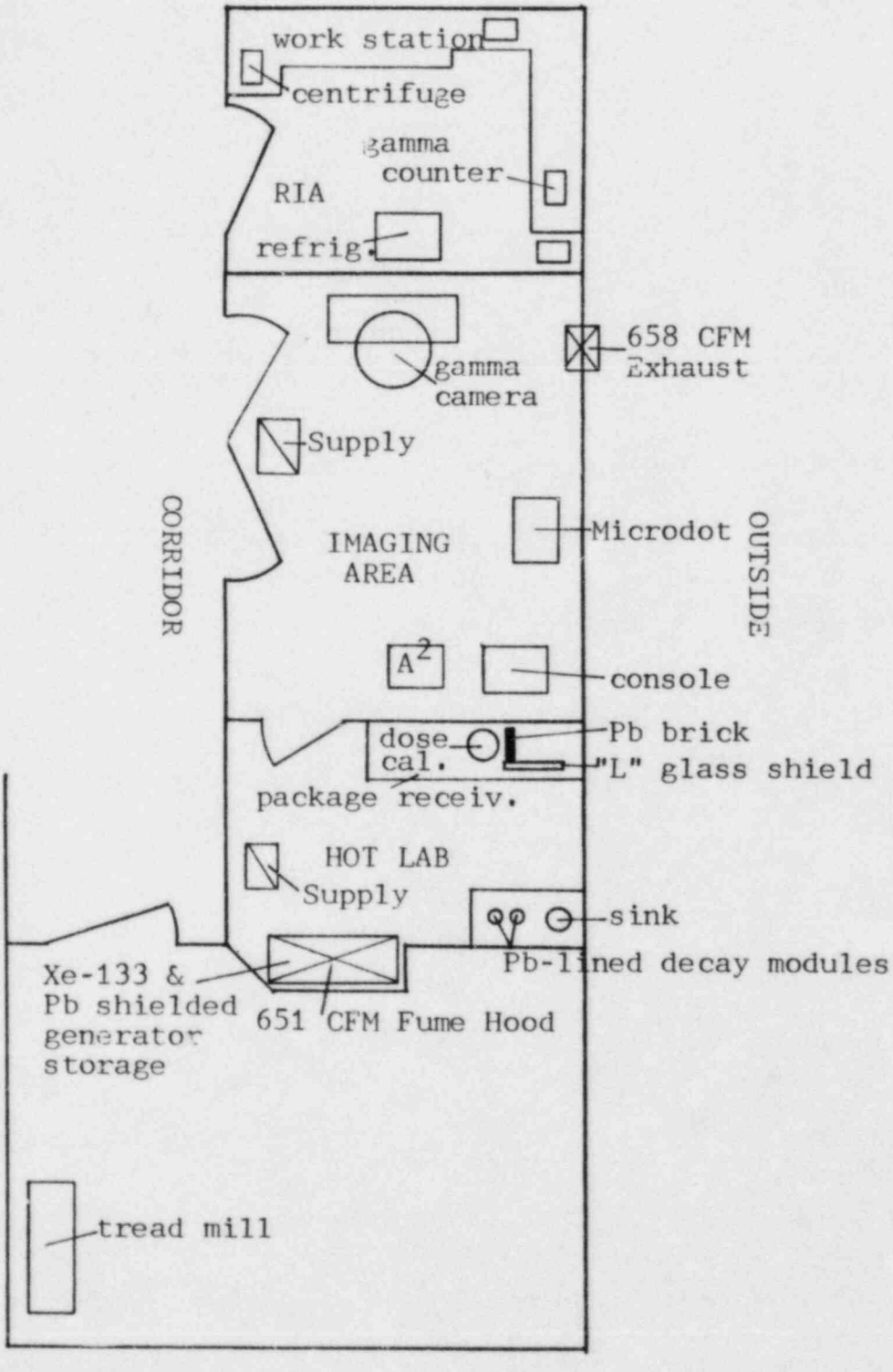
PORT HURON HOSPITAL
1001 Kearney St.
Port Huron, Michigan 48060

FACILITY DIAGRAM



Port Huron Hospital
CLOSE-OUT SURVEY RESULTS

For release of Area Unrestricted Use

Survey Date: 9/20/84

EXPOSURE RATE MEASUREMENTS:

Instrument: Victoreen 493
on 0.0-0.5 mR scale

Background: less than 0.06 mR/hr

This survey meter was used for mR/hr readings in all areas of the Department.

Results: All ambient exposure rates were at background levels indicated above. NO radioactive sources remained in the Department following the inspection.

CONTAMINIATION CHECK:

Instrument: RIA gamma counter (well counter)

Background: 215 CPM

RESULTS: All swipes revealed no removalbe contaminiation. Areas swiped represent usage location.

NOTE: The instruments used for the above surveys have sensitivities well within the NRC recommendations of 0.2 mR/hr and 200 kpm/100cm2.

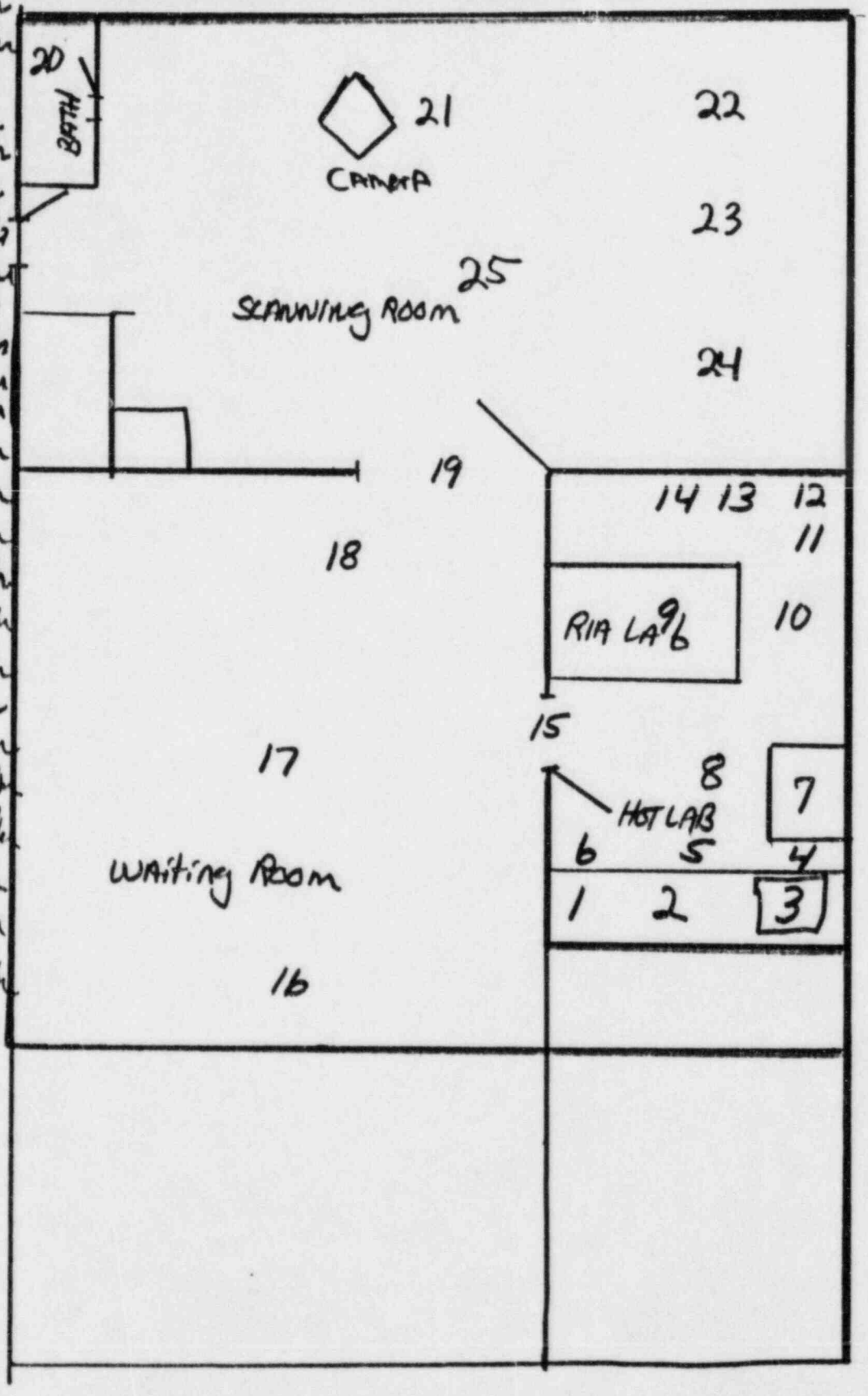
CLOSE-OUT SURVEY RESULTS

DATA:

Swipe #	CPM	AREA EXPOSURE RATE
1	236	BKGD.
2	225	BKGD.
3	191	BKGD.
4	225	BKGD.
5	211	BKGD.
6	184	BKGD.
7	220	BKGD.
8	227	BKGD.
9	223	BKGD.
10	205	BKGD.
11	203	BKGD.
12	236	BKGD.
13	211	BKGD.
14	221	BKGD.
15	239	BKGD.
16	225	BKGD.
17	213	BKGD.
18	223	BKGD.
19	189	BKGD.
20	233	BKGD.
21	217	BKGD.
22	217	BKGD.
23	206	BKGD.
24	213	BKGD.
25	191	BKGD.

Room survey - Swipe Test

Close OUT survey's



1. 0.04mR/hr
2. 0.05mR/hr
3. 0.02mR/hr
4. 0.03mR/hr
5. 0.05mR/hr
6. 0.04mR/hr
7. 0.05 mR/hr
8. 0.03 mR/hr
9. 0.06mR/hr
10. 0.02mR/hr
11. 0.03mR/hr
12. 0.06mR/hr
13. 0.04mR/hr
14. 0.04mR/hr
15. 0.04mR/hr
16. 0.02mR/hr
17. 0.05mR/hr
18. 0.02mR/hr
19. 0.01mR/hr
20. 0.05mR/hr
21. 0.06mR/hr
22. 0.02mR/hr
23. 0.03mR/hr
24. 0.01mR/hr
25. 0.04mR/hr

1. Needle Storage
2. Draw station
3. Cal/Hot sink area
4. Floor survey
5. Floor survey
6. Floor survey
7. Frig. Storage
8. Floor survey
9. RIA work Area
10. Floor survey
11. Floor survey
12. Generator #1
13. Generator #2
14. Generator #3
15. Floor survey
16. Waiting area
17. Office area
18. Scanning Room
19. Floor survey
20. Bathroom
21. Camera
22. micro-dot
23. Control Panel
24. MOS
25. Floor survey

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PORT HURON HOSPITAL

1001 KEARNEY ST. P.O. BOX 5011 PORT HURON, MICH. 48061-5011 (313)987-5000
CHARLES W. McKINLEY-PRESIDENT

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2. Dr. Herm Calderon, Radiologist
3. Dr. John Waud, Ph.D., Laboratory
4. Gerald Wesley, Director, Radiology
5. Dr. Benjamin John
6. Mr. Gary Leroy, Vice President, Professional Services
7. Bill Hack, Consulting Physicist
8. Ed Fuller, Nuclear Medicine

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