MANCHESTER MEMORIAL HOSPITAL

Warren L. Prelesnik, *Executive Director*

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JUNE 3, 1985

MS 16
P7

JENNY M. JOHANSEN, M.S.
U.S. NUCLEAR REGULATORY COMMISSION
NUCLEAR MATERIALS SAFETY SECTION B
DIV. OF RADIATION SAFETY & SAFEGUARDS
631 PARK AVENUE
KING OF PRUSSIA, PA. 19406

REF: LIC.NO. 06-03413-01, CONTROL NOS. 03326 & 03486,
AND YOUR LETTERS DATED FEB 12 AND APR 15, 1985.

DEAR MS. JOHANSEN:

IN REGARD TO YOUR QUESTIONS RAISED IN YOUR LETTER OF FEB 12, REGARDING OUR REQUEST FOR LIXISCOPE I-125 SEALED SOURCES, PLEASE SEE THE ATTACHED INFORMATION.

WITH RESPECT TO THOSE QUESTIONS IN YOUR LETTER OF APR 15, 1985, WE SUBMIT THE FOLLOWING:

1. THE VICTOREEN CUTIE PIE AS DESCRIBED UNDER ITEM 9 "NUCLEAR MEDICINE RADIATION PROTECTION INSTRUMENTATION", SUBMITTED WITH OUR LICENSE RENEWAL APPLICATION, SHOWS THIS INSTRUMENT CAPABLE OF READING UP TO 25 R/HR.

2. & 3. THE "RADIATION SAFETY REGULATIONS FOR LABORATORIES" FOR THIS INSTITUTION HAS BEEN REVISED TO ADDRESS THE USE OF SYRINGE SHIELDS AND MONITORING OF HANDS AND CLOTHING. (SEE ATTACHED.)

4. THE EMERGENCY PROCEDURES UNDER "MAJOR SPILLS" HAS BEEN REVISED. (SEE ATTACHED.)

5. "AREA SURVEY PROCEDURES FOR LABS" HAS BEEN REVISED TO SPECIFY THAT THE SURVEYS FOR THE NUCLEAR MEDICINE LABORATORY WILL BE CONDUCTED IN ALL INJECTION, ELUTION, AND PREPARATION AREAS. (SEE ATTACHED.)

6. UPDATED XENON DOCUMENTATION USING THE MOST RECENT VENT MEASUREMENTS IS ATTACHED.

PLEASE LET ME KNOW IF THERE ARE ANY OTHER QUESTIONS. THANK YOU.

SINCERELY,

WARREN PRELESNIK,
EXECUTIVE DIRECTOR

03486

cc: MR. DAN MIKOLOWSKY

AUTHORIZED USERS

WALTER G. HEIMAN, M.D.	RADIOLOGIST PRESENTLY ON LICENSE
MICHAEL PASSARETTI, M.D.	ORTHOPEDIC SURGEON
WELLS CASE JACOBSEN, M.D.	ORTHOPEDIC SURGEON
PETER BASIL GRAM, M.D.	ORTHOPEDIC SURGEON
CARLOS W. VILDOZOLA, M.D.	ORTHOPEDIC SURGEON
PETER ROMERO, M.D.	ORTHOPEDIC SURGEON

WITH THE EXCEPTION OF DR HEIMAN, ALL INDIVIDUALS NAMED ABOVE WILL BE REQUIRED TO BE TRAINED USING THE S.A. HUBER/LIXI TRAINING COURSE AND LIXISCOPE INSTRUCTION MANUAL PRIOR TO USING THE LIXISCOPE. THIS COURSE IS PROVIDED BY THE MANUFACTURER, LIXI, INC., AND WE UNDERSTAND IS ON FILE WITH THE N.R.C.

POSSESSION LIMIT

2 SOURCES NOT TO EXCEED 600 mCi. EACH IN LIXISCOPE SOURCE HOLDER.

PRIOR TO USE, PERSONNEL MUST HAVE SUCCESSFULLY COMPLETED THE S.A. HUBER/LIXI TRAINING COURSE. THE COURSE COVERS THE LIXISCOPE INSTRUCTION MANUAL, THE PROPER USE AND OBSERVATION TECHNIQUES OF THE LIXISCOPE USING A PHANTOM HAND, AND PROPER UPKEEP OF THE DEVICE (i.e. CHANGING BATTERIES, ISOTOPE, ETC.)

ORDERS FOR MATERIALS WILL BE PLACED USING LIXI, INC., CATALOG NUMBERS AND SPECIFICATIONS. WHEN REEIVED, PACKAGES WILL BE INSPECTED FOR DAMAGE. CONTENTS WILL BE INSPECTED AND OPERATIONAL CHECKES PERFORMED. RECEIVING RECORDS WILL BE MAINTAINED AND MATERIAL WILL BE LOGGED IN ACCOUNTABILITY SYSTEM. DEVICE WILL BE PLACED IN SECURED STORAGE UNTIL UTILIZED.

THE FOLLOWING GENERAL RULES WILL BE OBSERVED:

1. DEVICE WILL BE KEPT IN SECURE STORAGE WHEN NOT IN USE. LOCKS WILL BE KEPT IN PLACE.
2. NO ONE WILL BE PERMITTED TO PLACE FINGERS, HANDS OR FEET INTO THE BEAM TO TEST DEVICE FOR OPERATION.
3. THE DEVICE WILL NOT BE USED TO EXPERIMENT ON PATIENTS. USE WILL BE LIMITED TO DIAGNOSTIC EXAMINATION OF PATIENTS WITH SPECIFIC APPLICABLE MEDICAL PROBLEMS.
4. SOURCE HOLDER WILL BE LEFT ATTACHED TO DEVICE EXCEPT FOR LEAK TESTING AND SOURCE EXCHANGE.
5. DEVICE WILL BE RETURNED TO SECURE STORAGE AFTER USE.

LOST OF STOLEN MATERIAL WILL BE REPORTED IMMEDIATELY TO THE REGIONAL NUCLEAR REGULATORY COMMISSION AND THE CONNECTICUT STATE DEPT OF ENVIRONMENT PROTECTION, RADIATION COMPLIANCE DIVISION.

DISPOSAL OF MATERIAL WILL BE BY RETURN OF SOURCE HOLDERS TO LIXI, INC., DOWNERS GROVE ILLINOIS.

ALL PRECAUTIONS AND PROCEDURES AS OUTLINED IN THE S.A. HUBER/ LIXI COURSE WILL BE FOLLOWED INCLUDING:

1. THE SEALED SOURCE WILL NOT BE REMOVED FROM THE SOURCE HOLDER.
2. LEAK TEST WILL BE PERFORMED AT SIX MONTH INTERVALS ACCORDING TO S.A. HUBER LEAK TEST KIT.
3. TRANSPORT OF MATERIALS WILL BE IN ACCORDANCE WITH D.O.T. REGULATIONS. UPON RECEIPT OF RADIOACTIVE PACKAGE, THE SURVEY METER WILL BE USED TO CHECK FOR CONTAMINATION AND OR LEAKAGE.
4. SOURCE EXCHANGE WILL BE THROUGH THE MANUFACTURER.
5. ALL PROCEDURES COVERED BY THE LIXISCOPE INSTRUCTION MANUAL WILL BE FOLLOWED.
6. IN THE EVENT OF AN ACCIDENT & DAMAGE TO THE LIXISCOPE OCCURS, THE N.R.C. & CT. E.P.A. WILL BE CONTACTED IMMEDIATELY.
7. USERS WILL WEAR RING TYPE DOSIMETERS. UNNECESSARY RADIATION EXPOSURES TO PERSONNEL OR PATIENT WILL BE AVOIDED IN ACCORDANCE WITH THE ALARA PHILOSOPHY.

RADIATION SAFETY REGULATIONS FOR LABORATORIES

IT IS THE RESPONSIBILITY OF THOSE WORKING WITH RADIOACTIVE MATERIAL TO PROTECT THEMSELVES AND OTHERS FROM RADIATION HAZARDS ARISING FROM THEIR WORK. BAD EXAMPLES AND CARELESS WORKING HABITS MAY UNNECESSARILY EXPOSE ASSOCIATES OR CONTAMINATE FACILITIES AND CANNOT BE TOLERATED. THE FOLLOWING REGULATIONS SHALL BE OBSERVED:

THE LABORATORY DIRECTOR IS RESPONSIBLE FOR ORDERING STOCK SHIPMENTS OF RADIONUCLIDES AND ASSURING THAT ALL ORDERS ARE IN COMPLIANCE WITH LICENSE LIMITATIONS AS REGARD TO NUCLIDE, COMPOUND, MAXIMUM ACTIVITY, AND USE.

ONLY AUTHORIZED PERSONNEL OVER THE AGE OF 18 YEARS OLD WILL BE ALLOWED TO HANDLE RADIOACTIVE MATERIAL. AUTHORIZATION MUST BE OBTAINED FROM THE LABORATORY DIRECTOR AND THE RADIATION SAFETY OFFICER (RSO).

EATING, DRINKING, SMOKING, AND THE APPLICATION OF COSMETICS ARE PROHIBITED IN AREAS WHERE RADIOACTIVE MATERIALS ARE BEING HANDLED. FOOD AND DRINK SHOULD NOT BE STORED IN THE SAME PLACE (E.G. REFRIGERATOR) WITH RADIOACTIVE MATERIALS.

WORKING WITH RADIOACTIVE MATERIALS WHEN OPEN WOUNDS ARE PRESENT ON EXPOSED SURFACES OF THE BODY IS PROHIBITED UNLESS WOUNDS ARE PROPERLY DRESSED AND PROTECTED.

DISPOSABLE RUBBER GLOVES AND LAB COATS WILL BE WORN WHENEVER WORKING WITH RADIOACTIVE MATERIAL, AND SHALL BE REMOVED BEFORE LEAVING THE LABORATORY.

PIPETTING OR ANY SIMILAR OPERATION BY MOUTH IS PROHIBITED. DISPOSABLE ABSORBENT PADS, REMOTE HANDLING DEVICES, AND TRAYS SHALL BE UTILIZED WHEN POSSIBLE.

SYRINGE SHIELDS SHALL BE USED EXCEPT IN THOSE CIRCUMSTANCES SUCH AS PEDIATRIC CASES WHEN THEIR USE WOULD COMPROMISE THE PATIENTS WELL BEING.

HANDS, AND CLOTHING SHALL BE MONITORED FOR CONTAMINATION AFTER EACH PROCEDURE OR BEFORE LEAVING THE LAB. HANDS SHOULD BE WASHED ROUTINELY AFTER HANDLING RADIOACTIVE MATERIALS, ESPECIALLY BEFORE EATING.

FILM BADGES FOR MONITORING TOTAL BODY EXPOSURE WILL BE WORN IN RESTRICTED AREAS. IN ADDITION, PERSONNEL WORKING WITH RADIOACTIVE MATERIAL WILL WEAR RING TYPE BADGES. BADGES WILL BE EXCHANGED QUARTERLY FOR PROCESSING.
PERSONNEL WORKING ONLY IN THE IN-VITRO LABORATORY WITH MICROCURIE QUANTITIES OF MATERIALS WILL NORMALLY BE EXPOSED TO LEVELS WELL UNDER 10% OF THE PERMISSIBLE OCCUPATIONAL LIMITS OF 10 CFR PART 20. THEREFORE, FILM BADGE MONITORING OF THESE INDIVIDUALS MAY BE CONDUCTED FOR A TEST PERIOD WHEN A NEW PROGRAM IS BEGUN OR WHEN NEW PROCEDURES ARE INITIATED WHICH MAY INCREASE EXPOSURE. IF MONITORED EXPOSURES ARE LESS THAN 5% OF THE PERMISSIBLE LIMITS, FILM BADGE MONITORING MAY BE ELIMINATED.

GENERALLY, THE INDIVIDUAL PROCEDURES WITH RADIOACTIVE MATERIAL ARE WELL ESTABLISHED BY THE SUPPLIER. NEW PROCEDURES SHOULD BE TESTED, WITHOUT THE RADIONUCLIDE AT FIRST IF POSSIBLE, PRIOR TO NORMAL USE. THE RSO MUST BE CONSULTED BEFORE THE USE OF VOLATILE, GASEOUS, OR DUST-FORMING MATERIAL IS INITIATED.

RECEIPT OF STOCK SHIPMENTS SHALL BE IN ACCORDANCE WITH ESTABLISHED PROCEDURES.(SEE PROCEDURES FOR OPENING PACKAGES, AND PROCEDURES FOR RECEIPT OF PACKAGES)

RADIONUCLIDES SHALL BE HANDLED AND STORED IN THE SPECIALLY DESIGNATED LOCATIONS. VESSELS CONTAINING RADIOACTIVE MATERIALS SHALL BE LABELLED AS TO COMPOUND, RADIONUCLIDE, ACTIVITY, AND DATE OF CALIBRATION AND SHALL BE ADEQUATELY SHIELDED WHILE IN USE AND STORAGE. AREAS WHERE THESE MATERIALS ARE ROUTINELY USED OR STORED SHALL BE LABELED WITH A "CAUTION (OR DANGER) -- RADIOACTIVE MATERIAL" LABEL, AND WILL BE KEPT LOCKED WHEN UNATTENDED.

MOVEMENT OF RADIOACTIVE MATERIAL WITHIN THE HOSPITAL, IF REQUIRED, SHALL BE ACCOMPLISHED USING PROPERLY SHIELDED CONTAINERS.

CONTAMINATED WASTE AND UTENSILS SHALL BE DISPOSED OF IN THE CONTAINERS PROVIDED. ALL FORMS OF DISPOSAL MUST BE APPROVED BY THE RSO AND CONFORM TO APPROPRIATE LOCAL, STATE, AND FEDERAL REGULATIONS (SEE PROCEDURES FOR RADIOACTIVE WASTE DISPOSAL). IF LIQUID WASTE DISPOSAL INTO THE SANITARY SEWER SYSTEM IS APPROVED, A SINK WILL BE DESIGNATED AND LABELED "HOT SINK -- TO BE SURVEYED BEFORE PLUMBING WORK".

RADIATION SAFETY SURVEYS MUST BE CONDUCTED ROUTINELY AND WHENEVER A SUSPECTED HAZARD EXISTS. RESULTS SHALL BE RECORDED, AND ALL READINGS IN EXCESS OF PERMITTED LIMITS WILL BE BROUGHT TO THE ATTENTION OF THE RSO. (SEE SURVEY PROCEDURES)

"GOOD HOUSEKEEPING" SHALL BE MAINTAINED AT ALL TIMES. SPILLAGE SHOULD BE PREVENTED, BUT IN THE EVENT OF SUCH AN ACCIDENT, THE PRESCRIBED EMERGENCY PROCEDURES SHOULD BE FOLLOWED. (SEE EMERGENCY PROCEDURES FOR RADIOACTIVE SPILLS)

ALL PATIENT DOSES SHALL BE ASSAYED IN THE DOSE CALIBRATOR PRIOR TO ADMINISTRATION. DO NOT USE ANY DOSE THAT DIFFERS FROM THE PRESCRIBED DOSE BY MORE THAN 10%.

TC-99m MUST BE TESTED FOR MO-99 BREAKTHROUGH PRIOR TO ADMINISTRATION TO PATIENTS. MAXIMUM CONTAMINATION SHALL NOT EXCEED 1 uCi PER mCi OF TC-99m, OR MORE THAN A TOTAL OF 5 uCi OF MO-99 PER PATIENT DOSE. (SEE PROCEDURES FOR MOLYBDENUM BREAKTHROUGH TESTING)

ANY QUESTIONS INVOLVING SAFETY SHOULD BE DIRECTED TO THE RSO.

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LICENSE NO. 06-03413-01

EMERGENCY PROCEDURES FOR RADIOACTIVE SPILLS

MINOR SPILLS (uCi AMOUNTS)

NOTIFY: NOTIFY THE PERSONS IN THE AREA THAT A SPILL HAS OCCURRED.

PREVENT THE SPREAD: COVER THE SPILL WITH ABSORBENT PAPER.

CLEAN UP: USE DISPOSABLE GLOVES AND REMOTE HANDLING TONGS. CAREFULLY FOLD THE ABSORBENT PAPER AND PAD. INSERT INTO A PLASTIC BAG AND DISPOSE OF IN THE RADIOACTIVE WASTE CONTAINER. INCLUDE ALL OTHER CONTAMINATED MATERIALS SUCH AS DISPOSABLE GLOVES.

SURVEY: WITH A G-M SURVEY METER, CHECK THE AREA AROUND THE SPILL, YOUR HANDS AND CLOTHING FOR CONTAMINATION.

REPORT: REPORT INCIDENT TO R.S.O. & PHYSICIAN IN CHARGE.

MAJOR SPILLS:

CLEAR THE AREA: NOTIFY ALL PERSONS NOT INVOLVED IN THE SPILL TO VACATE THE ROOM.

PREVENT THE SPREAD: COVER THE SPILL WITH ABSORBENT PADS, BUT DO NOT ATTEMPT TO CLEAN IT UP. CONFINE THE MOVEMENT OF ALL PERSONNEL POTENTIALLY CONTAMINATED TO PREVENT THE SPREAD.

SHIELD THE SOURCE: IF POSSIBLE, THE SPILL SHOULD BE SHIELDED, BUT ONLY IF IT CAN BE DONE WITHOUT FURTHER CONTAMINATION OR WITHOUT SIGNIFICANTLY INCREASING YOUR RADIATION EXPOSURE.

CLOSE THE ROOM: LEAVE THE ROOM AND LOCK THE DOOR(S) TO PREVENT ENTRY.

CALL FOR HELP: NOTIFY THE R.S.O. & PHYSICIAN IN CHARGE IMMEDIATELY.

PERSONNEL DECONTAMINATION: CONTAMINATED CLOTHING SHOULD BE REMOVED AND STORED FOR FURTHER EVALUATION BY THE RADIATION SAFETY OFFICER. IF THE SPILL IS ON THE SKIN, FLUSH THOROUGHLY AND THEN WASH WITH MILD SOAP AND LUKEWARM WATER.

RADIATION SAFETY OFFICER: WALTER G. HEIMANN, M.D.
OFFICE PHONE:646-1222 HOME PHONE: 649-7204

REF: NRC GUIDE 10.8 REV 1 11/1/77 APP. H

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AREA SURVEY PROCEDURES FOR LABS USING GAMMA EMITTING ISOTOPES

EACH LABORATORY UTILIZING RADIOACTIVE MATERIAL IS REQUIRED TO CONDUCT ROUTINE SURVEYS OF THE AREA. THE FOLLOWING REPRESENT THE MINIMUM SURVEY REQUIREMENTS AND SHOULD BE SUPPLEMENTED WITH ADDITIONAL SURVEYS IF A SPILL HAS OCCURRED OR A RADIATION HAZARD IS SUSPECTED:

SURVEY TYPE	NUC. MED. * MINIMUM FREQUENCY	IN VITRO LAB. MINIMUM FREQUENCY	RECORD
RADIATION LEVELS	DAILY	N/A	YES
CONTAMINATION	WEEKLY	MONTHLY	YES

* NUC. MED. INCLUDES ALL INJECTION, ELUTION, AND PREPARATION AREAS.

RECORDS OF SURVEYS

RESULTS SHALL BE RECORDED AND MAINTAINED ALONG WITH THE FOLLOWING:

A DRAWING OF THE FACILITY SHOWING FEATURES SUCH AS THE "HOT SINK", STORAGE AREAS, ACTIVE WASTE AREAS, ETC. FOR REFERENCE TO REPORT FORM.

LOCATION, DATE, TYPE OF EQUIPMENT USED, AND SURVEYOR'S INITIALS.

FOR WIPE TESTS, THE PULSE HEIGHT ANALYZER SETTINGS AND THE RADIOACTIVE STANDARD, ACTIVITY, AND DATE SHOULD BE NOTED.

IF AN UNACCEPTABLE LEVEL IS MEASURED, THE INITIAL READINGS, CORRECTIVE ACTIONS TAKEN, AND SUBSEQUENT READINGS WILL BE RECORDED.

SURVEY PROCEDURES AND MAXIMUM LIMITS

RADIATION LEVELS ---- AREA MONITORING IS CONDUCTED WITH A CALIBRATED SURVEY METER SUFFICIENTLY SENSITIVE TO DETECT 0.05 MR/HR. A MAXIMUM LIMIT OF 0.06 MR/HR. IN NON-CONTROLLED AREAS AND 2.5 MR/HR. IN CONTROLLED AREAS IS ALLOWED, BUT SHOULD BE KEPT AS LOW AS PRACTICAL.

CONTAMINATION ---- A SERIES OF WIPES IS TAKEN IN AREAS WHERE ACTIVITY IS HANDLED IN UNSEALED FORM, WITH EACH WIPE ENCOMPASSING APPROXIMATELY 10 X 10 CM. A GAMMA-SCINTILLATION WELL COUNTER IS USED, WITH THE ANALYZER THRESHHOLD SET BELOW THE LOWEST GAMMA ENERGY USED IN THE LABORATORY, AND THE UPPER LEVEL SET AT MAXIMUM. THE FOLLOWING MEASUREMENTS ARE THEN PERFORMED AND RECORDED:

TAKE A 1 MIN. BACKGROUND COUNT & RECORD BKGD COUNTS PER MIN. (CPM).

TAKE A 1 MIN. COUNT ON A LONG-LIVED STANDARD AND RECORD NET CPM (GROSS CPM - BKGD CPM). THIS IS A CONSTANCY CHECK ON THE COUNTER.

TAKE A 1 MIN. COUNT ON ALL SAMPLES AND RECORD NET CPM.

AREAS WITH A REMOVABLE ACTIVITY OF 0.001 uCi/100sq cm. OR MORE WILL REQUIRE DECONTAMINATION, AND REPEAT TESTING.

NOTIFICATION

ANY LEVELS WHICH ROUTINELY EXCEED THE PERMITTED LIMITS SHOULD BE BROUGHT TO THE ATTENTION OF THE RADIATION SAFETY OFFICER (RSO).

XENON-133 DOCUMENTATION

1. QUANTITIES TO BE USED

A. PATIENT INFORMATION
(1) NUMBER OF STUDIES EXPECTED PER WEEK: 3
(2) AVERAGE ACTIVITY PER PATIENT: 10 MCI.
HIGHER DOSES WILL BE USED ONLY WHEN PROFESSIONAL MEDICAL JUDGEMENT INDICATES THE NECESSITY

B. MAXIMUM POSSESSION LIMIT: 100 MCI.

2. PHYSICAL DESCRIPTION

A. USE AND STORAGE AREAS (SEE DIAGRAM)
THE XENON-133 GAS WILL BE STORED IT'S SHIELDED SHIPPING CONTAINERS UNTIL USED. IT WILL BE STORED IN THE HOT LAB AND USED IN IMAGING ROOMS 1 OR 2.

ROOM 1 DIMENSIONS: 14.5 X 20 X 8.5 FT. = 2465 CU.FT.
ROOM 2 DIMENSIONS: 14 X 20 X 8.5 FT. = 2380 CU.FT.
HOT LAB DIMENSIONS: 13.5 X 20 X 8.5 FT. = 2295 CU.FT.

B. VENTILATION (SEE DIAGRAM)

ROOM	VENT	TYPE	AIRFLOW (CFM)
1	1	SUPPLY	450
1	2	SUPPLY	360
1	1	EMERGENCY EXHAUST	650
	2	EXHAUST	600
	3	EXHAUST	340
2	1	INTAKE	390
2	1	EMERGENCY EXHAUST	620
2	2	EXHAUST	550
HOT LAB	1	INTAKE	285
HOT LAB	1	EXHAUST	320

EMERGENCY EXHAUSTS ARE NORMALLY OFF AND ALL THREE ROOMS ARE ARE UNDER NEGATIVE PRESSURE. THERE IS NO AIR RECIRCULATION. THE NORMAL EXHAUST AIR FROM THESE ROOMS IS DILUTED WITH EXHAUST AIR FROM OTHER AREAS OF THE BUILDING AND VENTED AT THE ROOF OF THE THREE-STORY BUILDING. ACCESS TO THE ROOF IS RESTRICTED BY LOCKED DOORS. THE TOTAL EXHAUST RATE AT THIS VENT IS 6600 CFM.
THE EMERGENCY EXHAUSTS ARE CONTROLLED FROM THE IMAGING ROOMS AND GOES DIRECTLY TO THE ROOF VENT EF-1A WITH A TOTAL EXHAUST VOLUME OF 1120 CFM.

CHANGES IN FLOW RATE BETWEEN HEATING AND COOLING: NONE
TOTAL AIR PRESSURE IN NUC.MED.SUITE: NEGATIVE
AIR FLOW MEASUREMENT DATE: MAY, 1985
MEASUREMENT BY WINGS TESTING & BALANCING CO. WALLINGFORD, CT.

C. XENON CONCENTRATIONS IN THE ROOM ARE ROUTINELY MONITORED USING THE XENALERT MONITOR ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

3. PROCEDURES FOR ROUTINE USE

A. PATIENT DOSES WILL BE MEASURED IN OUR DOSE CALIBRATOR PRIOR TO ADMINISTRATION. THE PATIENT WILL BE INSTRUCTED ON THE PROCEDURE AND ONE OR MORE PRACTICE RUNS WILL BE DONE WITHOUT THE XENON. THE PATIENT WILL BE FITTED WITH EITHER A MOUTH PIECE AND NOSE CLAMP, OR A FACE MASK WHICH COVERS THE MOUTH AND NOSE.
THE PROCEDURE WILL BE COMPOSED OF THREE PHASES; BREATH HOLD, EQUILIBRIUM, AND WASHOUT. DURING THE WASHOUT PHASE, THE USED XENON WILL BE DRAWN INTO THE CHARCOAL TRAP.

B. SPECIAL APPARATUS
(1) ADMINISTRATION SYSTEM
ATOMIC PRODUCTS CORPORATION MODEL 130-330
ATOMIC PRODUCTS CORP.
(2) XENON-133 TRAP
ATOMIC PRODUCTS MODEL 127-313
ATOMIC PRODUCTS CORP.
(3) ROOM AND TRAP MONITOR
XENALERT MN 36-751
NUCLEAR ASSOCIATES INC.
THE MANUFACTURER'S INSTRUCTIONS WILL BE FOLLOWED WHEN USING THIS EQUIPMENT.

4. EMERGENCY PROCEDURES

IN THE EVENT XENON-133 IS ACCIDENTLY RELEASED, THE EMERGENCY EXHAUST WOULD BE TURNED ON AND THE PATIENT AND ALL PERSONNEL WOULD LEAVE THE IMAGING ROOM AND THE DOOR WOULD BE CLOSED. BASED ON THE ROOM WITH THE LOWEST EXHAUST RATE (RM#2), VOLUME OF 2380 CU.FT.,AND THE TOTAL EXHAUST RATE OF 1170 CFM, THE ROOM WOULD REMAIN UNOCCUPIED FOR 40 MINUTES (20 ROOM TURNOVERS). BEFORE RE-ENTERING, THE XENALERT ROOM MONITOR AND PORTABLE SURVEY METER WOULD BE USED TO INSURE ROOM RADIATION LEVELS HAVE RETURNED TO NORMAL.

5. AIR CONCENTRATIONS IN RESTRICTED AREAS

REQUIRED: C = (A X F)/V < 1E-5 UCI./ML. PER 40 HR. WEEK

WHERE:

C = CONCENTRATION IN UCI/ML FOR A 40 HR. WEEK
A = MAXIMUM ACTIVITY USED PER WEEK: 100 MCI.
F = FRACTIONAL LOSS DUE TO LEAKAGE ETC: 0.2
V = VENTILATION RATE: 320 CFM (WORST CASE HOT LAB)

$$C = \frac{100\text{MCI}/40\text{ HR. WEEK} \times (1E+3)\text{UCI/MCI}}{320\text{CFM} \times 6.8E+7\text{ ML/CFM/40-HR.WK.}} \times 0.2$$

C = 9.2 E-7 UCI/ML

6. AIR CONCENTRATIONS IN UNRESTRICTED AREAS

A. REQUIRED: C = (A X F)/V < 3E-7 UCI/ML

$$C = \frac{100\text{MCI/WK} \times 1E+3\text{ UCI/MCI} \times 52\text{ WKS/YR}}{320\text{ CFM} \times 1.5E+10\text{ ML/CFM/YR}} \times 0.2$$

C = 2.2 E-7 UCI/ML

B. TRAPPING EFFICIENCY WILL BE CHECKED WEEKLY USING THE XENALERT ROOM/TRAP MONITOR PER THE MANUFACTURER'S INSTRUCTIONS. THE CHARCOAL TRAP CARTRIDGE WILL BE REPLACED WHEN THE EFFICIENCY IS LESS THAN 90%.

C. SATURATED TRAP CARTRIDGES WILL BE HANDLED PER THE MANUFACTURER'S INSTRUCTIONS USING THE XENALERT MONITOR AND PORTABLE SURVEY METER. THE SATURATED TRAP WILL BE HELD UNTIL MEASUREMENTS WITH A LOW LEVEL SURVEY METER AND WITH ALL SHIELDING REMOVED SHOW NO READING ABOVE BACKGROUND.