Good Samaritan
Hospital and health center
... subscribing to the philosophy and policies of the Sisters of Charity of Cincinnati, Ohio

February 3, 1983

Bruce S. Mallett, Ph.D., Chief
Materials Licensing Section
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

REFERENCE: NRC LICENSE #34-01311-01; CONTROL #06804

Dear Dr. Mallett:

I wish to apologize for my misunderstanding of our conversation regarding Good Samaritan Hospital's NRC license amendment requirements, which I provided to you in my January 4, 1983 letter.

Per your request through Mr. Jack E. Spivey, Assistant Managing Director, Medical Imaging, on January 14, 1983, I have attached the completed amendment (Attachment M).

If this document does not complete the amendment requirements for Good Samaritan Hospital's NRC License #34-01311-01, Control #06804, please let me know.

Sincerely,

Richard H. Katzeff
Richard H. Katzeff
Vice President
Operations

RHK:cr

Attachment

cc G. W. Bretz, M.D.
T. K. Payne, M.D.
Joseph Kelly
Jack Spivey



Executive Offices

2222 Philadelphia Drive
Dayton, Ohio 45406

Telephone (513) 278-2612

ATTACHMENT M

EXPLANATION SHEET AND SUPPORTING DOCUMENTATION FOR XENON-133 LICENSURE

The Xenon-133 is supplied by Pharmatopes, Inc., 300 Forest Ave., Dayton, Ohio 45405, in either gas or saline form. The Xenon-133 is used for pulmonary ventilation and blood flow studies.

We are experiencing a patient load of 250-300 patients annually. The individual test doses are approximately 20 mCi.

We request a possession limit of 6,000 mCi.

The radionuclide is stored under continuous ventilation within the Fisher Perchloric Acid Fume Hood which is located in the Hot Lab. The Xenon single dose vials are stored in the lead shipping containers and are kept in an enclosure made from 2" x 4" x 8" lead bricks. The negative pressure of the fume hood and duct system dispel any Xenon-133 gas which might escape as a result of accidental vial breakage. The effluent from the fume hood is vented directly to the south side of the building exterior via a single, sealed duct. In addition to this fume hood, the hot lab has a separate ventilation system which exhausts room air through a heat wheel with no recirculation of exhaust air to the hospital interior. The hot lab borders a restroom, an ultrasound room, the nuclear medicine hallway and uptake room. A wall and lockable door separate the hot lab from the uptake room.

Xenon-133 ventilation lung scans are performed in camera rooms GG13W, FF13W and EE13W. (Please note the departmental diagram, which is enclosed.) Since these rooms are adjacent to each other, they form a restricted imaging area in the center of the department, with the following boundaries: Northernmost boundary is formed by the wall separating GG13W, from a storage room and an office; Southernmost boundary is formed by the wall separating EE13W from the invitro lab. The Eastern boundary is formed by a common wall shared by each room separating it from the Emergency Department; The Western boundary is formed by a wall and lockable doors which separates the camera rooms from the Nuclear Medicine Hallway.

Each of the camera rooms have a separate ventilation system comprised of four to six individual vents located within the ceiling light fixtures and a common exhaust system. The effluent from the exhaust system is vented directly to the south side of the building's exterior with a single, sealed duct. The air flow for each room is as follows:

1. GG13W: 247 CFM of air is supplied to this room by four (4) vents located in the light fixtures, and an additional 145 CFM is supplied from under the hallway door, for a total air supply of 392 CFM. Four separate vents in the light fixtures remove or exhaust 257 CFM, while an independent ceiling vent removes an additional 230 CFM for total exhaust volume of 487 CFM.. When the exhaust is subtracted from intake (392 CFM-487 CFM) we demonstrate a negative variance of 95 CFM for room GG13W.
2. FF13W: 231 CFM of air is supplied to this room by four (4) vents in the li[illegible] fixtures, and an additional 145 CFM is supplied from under the hallway door, for a total air supply of 376 CFM. Four separate vents in the light fixtures remove or exhaust 225 CFM, and an independent ceiling vent removes an additional 230 CFM, for a total exhaust volume of 470 CFM. When the exhaust is subtracted from the intake (376 CFM-470 CFM) we demonstrate a negative variance of 94 CFM for room FF13W.
3. EE13W: 415 CFM of air is supplied to this room by six (6) vents located in the light fixtures, and an additional 145 CFM is supplied from under the hallway door, for a total air supply of 560 CFM. Six (6) separate vents

in the light fixtures remove or exhaust volume of 397 CFM, and an independent ceiling vent removes an additional 280 CFM, for a total exhaust volume of 677 CFM - when the exhaust is subtracted from the intake (560 CFM-677 CFM) we demonstrate a negative variance of 117 CFM for room EE13W.

A Magnehelic meter has been connected to the exhaust system, and installed in the Nuclear Medicine Hallway; thus, providing a visual means of verifying the integrity of the exhaust system. Upon installation, to present, this meter has indicated that our exhaust system has a negative pull equivalent to 1.8 inches of water. Should this meter drop to an equivalent pull of 1.5 inches of water, each of the imaging rooms will be inspected to see if they meet compliance. Should any room fall below compliance, we shall cease to use that room for Xenon lung imaging, until the problem has been corrected and compliance re-established.

The Xenon containers are placed into the lead enclosure under the vent hood in the hot lab immediately upon receipt from the carrier. Prior to the study, a single dose vial is assayed in the CRC-6 or CRC-17 dose calibrator and the results are recorded in our dosage records and in the patient files. The vial is taken from the dose calibrator by the use of long-handled tongs and placed into the commercial gas dispensing unit which is lead-shielded. The gas is injected into the commercial lung function unit (Nuclear Associates # 36-001. Please see enclosed brochures.)

The patient is placed before the camera and a nose clip is fitted to minimize the chance of the gas being exhaled into the closed camera room. Special full-sized mouthpieces are employed to minimize the chance of Xenon-133 being forced from the corners of the mouth. The ventilation study consists of a single breath, equilibrium, and washout phases. In cases of accidental leakage of Xenon into the room as a result of hose breakage or an uncooperative patient, the room is evacuated and the door is closed until the vents have exhausted the complete room air volume. (See attached calculation indicating the time required to completely exhaust the room.) A Victoreen Survey Meter (Model 490), with a Victoreen G.M. Probe (Model 489-4), measuring - the most sensitive scale - 0 to .2 mR/h, and the scale division is broken into increments of .01 mR/h. The Radiation Safety Officer is notified upon the occurrence of any accident. All Technologists performing the studies wear whole body film badges as well as TLD finger badges from the R. S. Landauer Co.

Patients who are uncooperative or comatose are evaluated prior to the study by a Radiologist to determine if the test benefits outweigh the danger from possible leakage of the Xenon-133 caused by the patient's condition.

The lung function unit's specifications include a $CO_2$ absorber, sterilization of internal parts capability, oxygen regulation, kymograph, and recycling capability.

We also utilize the Nuclear Associates "Nonex" gas trap (number 36-022) (please see the attached pamphlets). The gas trap effectively collects most ot the used Xenon-133 from the function units exhaust tubing. Nuclear Associates' literature states that the effluent's concentration is lowered to less than $1 \times 10^{-5}$ uCi/$cm^3$ during the filter life. Filter life is related to usage and determined by a nomogram supplied by Nuclear Associates. Filter viability as it nears its end according to the nomogram is checked by placing the effluent air into a plastic bag and quantitating the radioactivity as described later. This procedure serves as a double-check in conjunction with the supplied nomogram.

Before the filter cartridges become completely saturated, the gas trap is placed into the hot lab with the door closed. The cartridge is removed by a different Technologist each time, placed into a large plastic bag, and tightly sealed. The bag is placed into a lead-lined box which is placed into our basement storage decay room. The filters are

decayed until they reach background levels and disposed of as normal trash. The decay room is located in the corner of the basement in a low traffic area. It has a locked door with a standard "Caution Radioactive Material" warning sign on the door. The names and phone numbers of the Radiation Safety Officer, Assistant Director/Medical Imaging and Medical Physicist are written on the caution sign so that they will be notified in the event of emergencies. The door is also posted with a "Caution Radiation Area" sign.

In calculating the "Air Concentration in Restricted Areas", the following assumptions are made: Maximum of 20% leakage of administered doses, maximum of eight patient studies weekly, and an estimated dose of 20 mCi per patient.

$$\frac{A \times F}{V} \leq 1 \times 10^{-5} \text{ uCi/ml}$$

$$A = \frac{20 \text{ mCi}}{\text{Patient}} \times \frac{8 \text{ patients}}{\text{week}} \times \frac{1 \times 10^3 \text{ uCi}}{\text{mCi}} = 1.6 \times 10^5 \text{ uCi/week}$$

$$F = .20$$

$$V = \frac{A \times F}{1 \times 10^{-5} \text{ uCi/ml}} = \frac{1.6 \times 10^5 \text{ uCi/week} \times .20}{1 \times 10^{-5} \text{ uCi/ml}} = 3.2 \times 10^9 \text{ ml/week}$$

The minimum room ventilation rate necessary is:

$$\frac{3.2 \times 10^9 \text{ ml/week}}{48 \text{ hrs./week}} \times \frac{1 \text{ CFM}}{1.699 \times 10^6 \text{ ml/hr.}} = 39.2 \text{ CFM}$$

The architectural records show that the camera rooms (restricted areas) where Xenon is dispensed have the following ventilation rates: GG13W, 487 CFM; FF13W, 470 CFM; EE13W, 677 CFM. Therefore, each of these rooms are well above the necessary minimum ventilation rate.

For the air concentrations in the hot lab hood where the Xenon-133 is stored, if 100% leakage occurs due to some accident.

$$\frac{A \times F}{V} \leq 1 \times 10^{-5} \text{ uCi/ml}$$

$$A = \frac{20 \text{ mCi}}{\text{Patient}} \times \frac{8 \text{ patients}}{\text{week}} \times \frac{10^3 \text{ uCi}}{\text{mCi}} = 1.6 \times 10^5 \text{ uCi/week}$$

$$F = 1.0$$

$$V = \frac{1.6 \times 10^5 \times 1}{1 \times 10^{-5}} = 1.6 \times 10^{10} \text{ ml/week}$$

The minimum room ventilation rate necessary is:

$$\frac{1.6 \times 10^{10} \text{ ml/week}}{48 \text{ hrs./week}} \times \frac{1 \text{ CFM}}{1.699 \times 10^6 \text{ ml/hr.}} = 196.2 \text{ CFM}$$

The architectural records show that the storage hood where the Xenon-133 is stored ventilates at the rate of 1,562 CFM, well above the minimum rate necessary.

The method of Xenon disposal is through a charcoal trap manufactured by Nuclear Associates (Please see attached Manufacturer's pamphlets).

The space around the gas trap is constantly monitored for leakage and charcoal breakdown in the trap by a Nuclear Associates Primalert 50 Area Survey Meter with alarm, which is in constant operation in the area where the Xenon trap is located. Leakage from the trap reaching alert levels (3 mR/h) would result in the evacuation of the room and closing it off until the MPC of Xenon-133 for a restricted area has been reached. The room door would remain closed until the automatic reset for the Primalert 50 resets the alarm. Once the alarm was reset, the room would be checked with the Victoreen Survey meter to confirm the ventilation of the Xenon gas.

The following equations demonstrate that, with the gas trap, the exhaust from the room is below the maximum permissible concentration (MPC) for a nonrestricted area ($3 \times 10^{-7}$ uCi/ml).

The maximum anticipated yearly patient load is 300. Each patient dose is approximately 20 mCi. The maximum annual Xenon usage is approximately 6000 mCi = $6 \times 10^{6}$ uCi.

The camera room ventilation rate for room FF13W (which has the lowest ventilation rate of the Imaging rooms) is 470 CFM.

$$1 \text{ CFM} = 1.699 \times 10^{6} \text{ ml/hr.}$$

Therefore: $470 \text{ CFM} = (470)(1.699 \times 10^{6} \text{ ml/hr})(168 \text{ hr/week}) \times 52 \text{ weeks} = 6.98 \times 10^{12} \text{ ml/yr.}$

$$\frac{\text{Total Xenon-133 usage}}{\text{Total Ventilation}} = \frac{6 \times 10^{6} \text{ uCi/yr}}{6.98 \times 10^{12} \text{ ml/yr}} = 8.6 \times 10^{-7} \text{ uCi/ml}$$

assuming the gas trap is only working with 80% efficiency, the trap will reduce the air concentrations of Xenon-133 to:

$8.6 \times 10^{-7}$ uCi/ml x .20 = $1.72 \times 10^{-7}$ which is less than $3 \times 10^{-7}$ uCi/ml as required by 20.106 of 10 CFM, Part 20.

The gas trap efficiency (and viability of filter) is checked at the initial machine installation and each time the Primalert 50 reaches the alarm state. At quarterly intervals, from installation until the trap filter is degraded (due to low trap efficiency), the gas trap receives the following efficiency test (See attached Xenon trap efficiency form).

Filters are replaced and decayed whenever either of the following occurs:

1. When it is demonmstrated by the trap efficiency test that the trap's efficiency has fallen below a minimum of 80%.

2. When the Primalert 50 Survey Alarm is set off, and it is confirmed by the Xenon trap efficiency test that the alarm is activated by a low trap efficiency.

Xenon-133 not used for patients is decayed in its lead shipping container until:

1. The activity has decayed to background by mathematical calculation and by monitoring with a G.M. Survey Meter.

2. A vial has reached an activity level suitable for Xenon trap efficiency testing.

As specified by Nuclear Regulatory Commission regulations, daily surveys are performed throughout the Section and recorded.

TIME REQUIRED TO COMPLETELY EXHAUST IMAGING ROOM

ATTACHMENT M

The calculation to determine the time required to ventilate Image Rooms is shown below:

$$T = \frac{-V}{v} \ln \left[ \frac{P(t=T)}{P(t=0)} \right]$$

where:

T = Time to ventilate the room to MPC of Xenon-133 for a restricted area.

V = Room Volume.

v = Rate of air exhaust from room.

P(t=O) = Concentration of Xenon in room at time zero (time of Xenon-133 release into the room).

P(t=T) = Maximum permissible concentration of Xenon in room. ($1 \times 10^{-5} \frac{uCi}{ml}$ which occurs at time "T")

Room GG13W:

$V = 20 \times 10 \times 10 = 2,000\ Ft^3$
$v = 487$ CFM

$$P(t=0) = \frac{2 \times 10^4\ uCi}{(2,000\ Ft^3)\ (2.832 \times 10^4\ ml/Ft^3)} = 3.53 \times 10^{-4} \frac{uCi}{ml}$$

$$T = \frac{-2,000\ Ft^3}{487\ \frac{Ft^3}{ml}} \ln \left[ \frac{1 \times 10^{-5}\ uCi/ml}{3.53 \times 10^{-4}\ uCi/ml} \right]$$

T = 14.6 min. use T = 15 Min.

Room FF13W:

only change in formula: v = 470 CFM exhaust

$$T = \frac{-2,000\ Ft^3}{470\ \frac{Ft^3}{ml}} \ln \left[ \frac{1 \times 10^{-5}\ uCi/ml}{3.53 \times 10^{-4}\ uCi/ml} \right]$$

T = 15.2 min. use T = 16 Min.

Room EE13W:

changes in formula:

$V = 20 \times 15 \times 10 = 3{,}000\ Ft^3$

$$P(t=0) = \frac{2 \times 10^4\ uCi}{(3{,}000)\ (2.832 \times 10^4\ ml/Ft^3)} = 2.35 \times 10^{-4}\ uCi/ml$$

$$T = -\frac{3{,}000\ Ft^3}{677\ Ft^3/ml}\ \ln\left[\frac{1 \times 10^{-5}\ uCi/ml}{2.35 \times 10^{-4}\ uCi/ml}\right]$$

T = 13.98 min. use = 14 Min.

E Hagard. Ph.D

# XENON TRAP EFFICIENCY

DATE: ____________________ PERFORMED BY: ____________________

CAMERA USED: ______________________________

With the low energy collimater in place, using a 20% window, and calibrated for an 81 KEV peak, the gamma camera is used in gathering the following data:

1. Two background counts are taken:
   A. Prior to Xenon being brought into room: ____________.
   B. After Xenon is removed from the room: ____________.
   C. From these, an average background count is determined: ____________.

2. A plastic bag containing a small amount of Xenon is brought into the camera room for two counts:
   A. Bag and contents are counted to obtain total Xenon counts: ____________.
   B. Contents of bag are evacuated through the trap, and the empty bag is counted to obtain the residual Xenon count in the bag: ____________.
   C. Residual counts are subtracted from Total Xenon Counts to obtain Net Xenon Counts evacuated through the trap: ____________.

3. A plastic bag was attached to the room outlet of the trap, in order to collect the Xenon trap effluent, and counted:
   A. This bag is counted to determine the gross counts escaping our Xenon trap: ____________.
   B. The average background count is subtracted from the gross count in the Xenon trap bag to determine the net counts escaping our Xenon trap: ____________.

4. Xenon Trap Efficiency:

   A. $\frac{\text{Net Counts from Trap (3,B):}}{\text{Net Counts through Trap (2,C):}} \times 100\% =$

      % of untrapped Xenon.

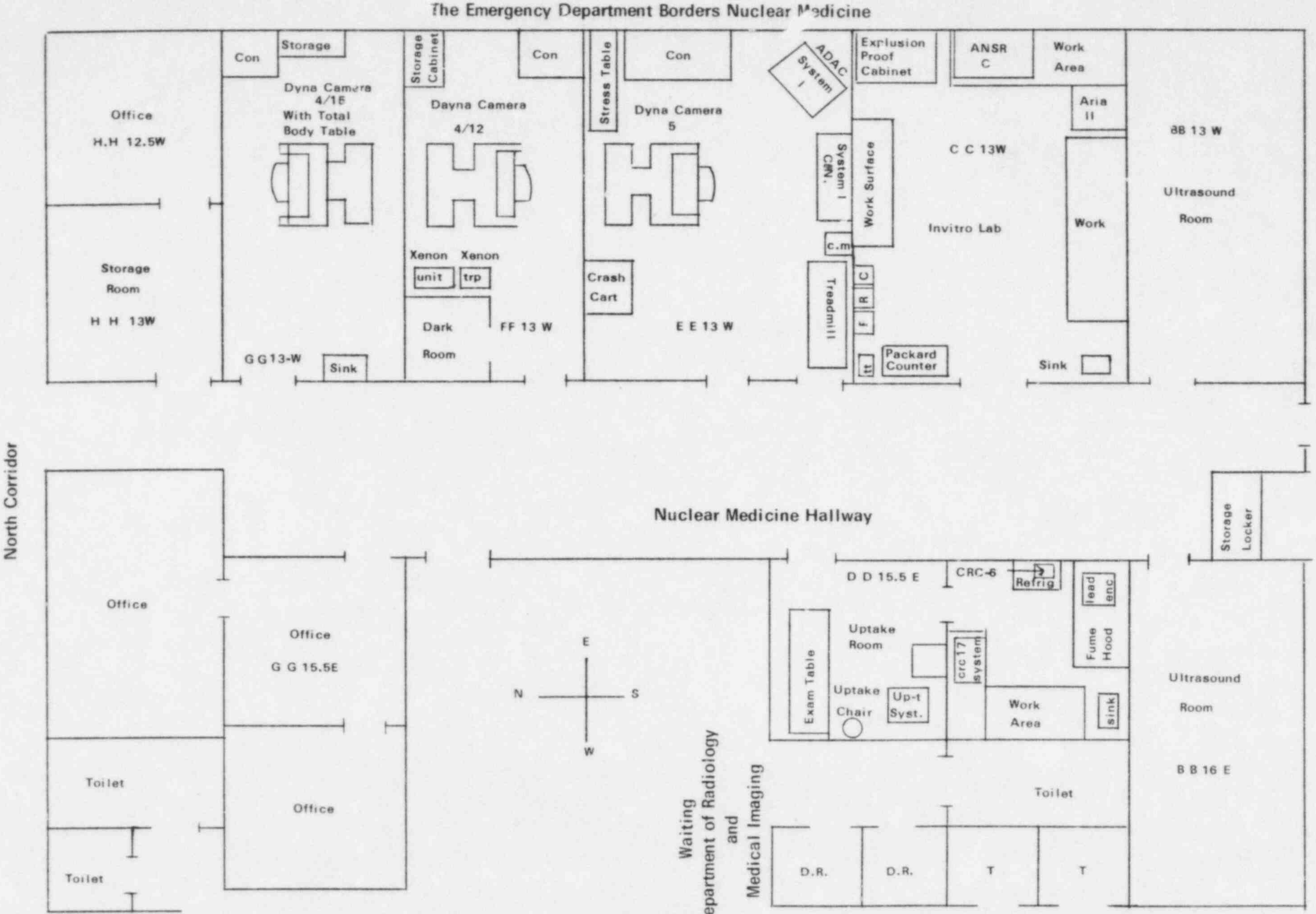
   B. (100%) -- (% of untrapped Xenon) = % Xenon Trap Efficiency

      (100%) -- (                    ) = [          ] % Efficiency

Good Samaritan Hospital and Health Center
Dayton, Ohio

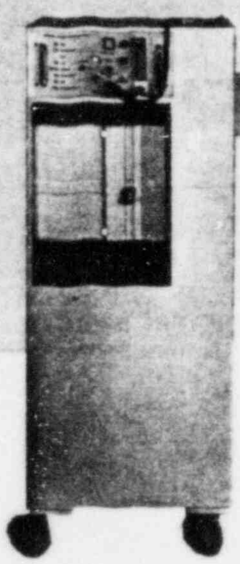
Nuclear Medicine Section

(Ground Floor - South Building)




Scale 1/8" = 1 Foot

# Xenon Lung Function Unit

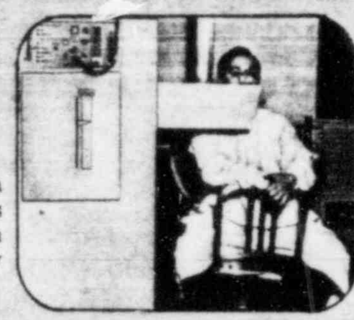


## Fully automatic, self-contained with push-button and remote operation

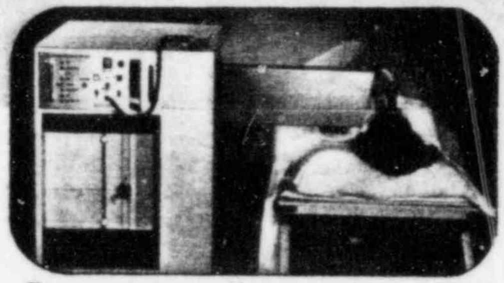
**CHOOSE BETWEEN KYMOGRAPH CHART RECORDER AND VOLUME DISPLAY**

- **Direct bolus injection.**
- **Re-use of xenon gas.**
- **Homogeneous gas mixing.**
- **Simple system sterilization.**

Lung Function Unit is shown with Volume Display



Shown with Kymograph



**Erect or supine studies are easily performed by lowering adjustable arm to patient's level.**

This fully-automated, self-contained system enables the clinician to perform pulmonary function studies efficiently and with minimum effort. It allows single breath, equilibrium, washout, and oxygen uptake studies routinely. Effluent gas is trapped in the system and expelled only on the operator's command. Xenon/air mixtures are withdrawn from the system automatically. Accidental gas release is eliminated by an automatic shutdown/washout mode.

## SPECIAL FEATURES

**Remote Controller:** Unlike any other system, all functions are selected by means of a hand-held remote controller attached to a 10-foot coil cord. The technician can administer to the patient and index the system as desired while operating the gamma camera.

**Resistance-free breathing:** A series of pumps and blowers, used in combination with the spirometer, assures resistance-free breathing for the patient.

**Spirometer:** An 8.5-liter, water-seal spirometer, governed to 7.5 liters, serves as a resistance-free reservoir for the patient's breathing. The tank and bell are easily drained, and water sterility can be maintained by adding a free iodine radical to the water itself.

**Kymograph*:** The kymograph recorder provides a direct-volume readout of the patient's inspired/expired air volume on an easy-to-read 10" chart. Pulmonary function parameters such as Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV), Tidal Volume (TV), and Oxygen Uptake can be easily determined from the charted data. This information greatly enhances the correlation of data between the nuclear medicine clinician and the respiratory staff. With chart speeds of 30, 60 and 1200 mm/minute, a variety of display presentations are possible. Direct calibration of camera efficiency for radioxenon is easily obtained.

*Kymograph is supplied only with Models 36-001 and 36-003. Models 36-002 and 36-004 include a graduated scale on which the volume level of the spirometer is displayed.

**Adjustable arm:** Whether doing a supine or upright study, the lead-shielded, counter-weighted 21" arm adjusts to your patient's position. It moves vertically from 40" to 50" above the floor, permitting an interference-free view of the patient and allowing the instrument to be positioned next to the gamma camera. An adapter for supine studies is provided.

**Homogeneous gas mixtures:** Automatic feeding of homogeneous gas mixtures, with provision for the manual addition of oxygen at any time, minimizes the total dead space within the system. The mixing of gases is under the technician's control at all times. An internal in-line blower creates a homogeneous gas/air mixture within 15 seconds after the introduction of radioxenon and provides continuous resistance-free breathing.

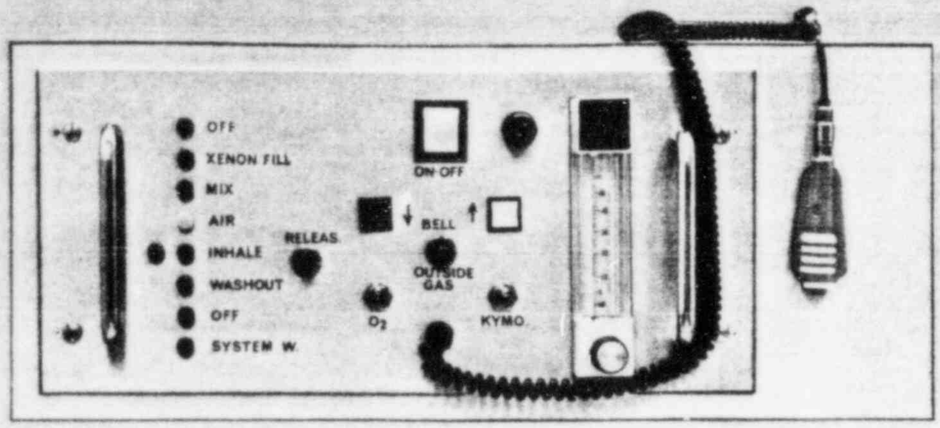
**Self-contained xenon and oxygen supply:** Both xenon gas and standard oxygen bottles with regulators can be mounted internally for maximum ease of administration. Radioactive gas may also be administered through an exterior gas inlet or through a serum cap on the adjustable arm. This cap allows the direct injection of xenon gas by syringe, permitting the patient to receive either a bolus of xenon or a homogeneous mixture.

**Bolus injection port**, conveniently located on the adjustable arm, allows direct delivery of a bolus of xenon to your patient.

**System sterilization** between patients is easily done by flushing ethylene oxide through the internal system. A disposable bacteriostatic filter can be placed on the mouthpiece port to isolate the unit from contamination.

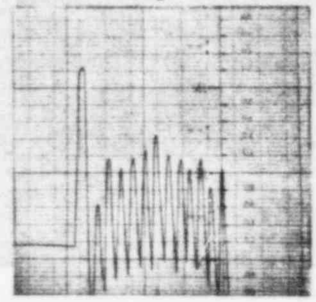
**Fully lead shielded**...safe for both the patient and staff. When the system is loaded with 70 mCi of xenon-133 gas, for example, the radiation level at ANY external surface is equivalent to background.

**Complete mobility** makes positioning easy, whether the patient is ambulatory or confined to a stretcher. Silent, ball-bearing rubber casters (5" D.) assure exceptional ease of movement. Two of the casters have wheel locks to immobilize the system during studies.




**Control Panel showing automatic and manual control functions, oxygen flowmeter, and hand-held remote controller.**

**Kymograph Display showing FVC and TV.**



## Automatic functions allow one technician to perform an entire study with the convenient hand controller.

The automatic functions, indexed by a remote hand switch, are in the following sequence:

OFF—Unit is off.

XENON FILL—In this position, a front panel gas port is activated. Xenon or any other gas (nitrogen, oxygen, etc.) may be added to the system. This cycle is also used when introducing ethylene oxide gas for sterilization.

MIX CYCLE—Internal blowers automatically mix the air/xenon/oxygen to homogeneity within two minutes.

PATIENT AIR—Patient is positioned and breathes ambient air (through the system) to adjust to the mouthpiece and system.

INHALE—In this cycle, the patient is breathing on the closed loop spirometer system. To assist the technician during a single breath study, an audible "click" is heard on the patient's first inspiration. This signals for the injection of the xenon bolus through the injection port. The kymograph is automatically started in this position.

PATIENT WASHOUT—Patient inhales ambient air and washes out through the system. When the camera indicates that the patient is sufficiently free of xenon, the operator moves to the "OFF" position.

OFF—The patient is removed from the [illegible]m, and the remaining xenon is held in storage in the spirometer. If additional data is desired, the patient may be re-introduced to the system.

SYSTEM WASHOUT—An internal blower flushes the entire system rapidly and guarantees that no residual xenon remains.

**Sequential functions can be overridden at any time by means of the remote controller.**

The patient can become acclimated to the system (before the analysis begins) by breathing ambient air through the unit. The shielded arm (with mouthpiece) is adjustable from 40" to 50" above floor level to accept adult and adolescent patients in erect and supine positions.

## Manual Control Functions

RAISE BELL—Adds air to the system at any time by activating a pump. Momentary switch operation.

LOWER BELL—Adjusts the bell volume to the clinician's requirements before the study begins. Momentary switch operation.

OXYGEN REGULATOR & FLOW VALVE—Provides $O_2$ replenishment (or $O_2$ fill) to the spirometer system. Precision flowmeter (with needle valve) regulates the $O_2$ supply.

EXTERNAL GAS INLET—Used to charge the system with xenon from an external source or to admit a sterilizing agent (i.e., ethylene oxide).

KYMOGRAPH — MANUAL ON-OFF SWITCH — For use in other than the automatic mode.

AUTO SHUT-OFF—Turns off the unit in case of bell over-fill, and actuates an audible alarm.

BELL OVER-FILL RELEASE—Releases the bell and places the unit automatically in the washout mode.

INJECTION PORT — For adding xenon into the system with a xenon gun. Port is located next to mouthpiece.

Contains 7.5-liter spirometer, optional 3-speed kymograph recorder, means for an internally-mounted oxygen and xenon supply, 3 blowers, and removable soda lime ($CO_2$) absorber. All controls are on front panel. Fully shielded by lead and mounted on casters. Doors in the main frame provide access to instrument and accessories. 22" x 23" x 55" high without arm. Arm extends 21" from side of console. Includes an adapter for supine studies.

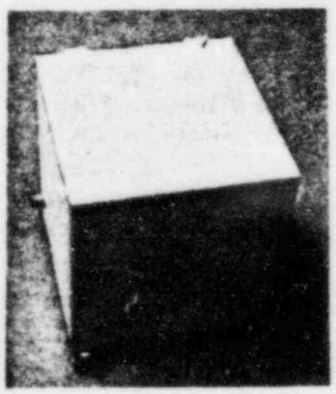
| | | | |
|---|---|---|---|
| 36-001 | Lung Function Unit with kymograph | | $5600.00 |
| 36-002 | Lung Function Unit without kymograph | | 4900.00 |
| 36-003 | Lung Function Unit with added shielding for xenon-127. With kymograph | | 5900.00 |
| 36-004 | Lung Function Unit with added shielding for xenon-127. Without kymograph | | 5200.00 |
| 36-005 | Kymograph Chart Paper | roll | 10.00 |
| 36-006 | Kymograph Self-Inking Pen | 6 | 15.00 |
| 36-007 | Disposable Mouthpiece | | 4.00 |
| 36-008 | $CO_2$ Absorber, 2-lb. container | ea. | 5.00 |
| | | 20 containers | 70.00 |
| 36-009 | Disposable Bacteriostatic Filters | 10 | 37.50 |
| 36-010 | Face Mask, Medium | | 25.00 |
| 36-011 | Face Mask, Large | | 25.00 |
| 36-012 | Face Mask Harness. Holds mask in place | | 11.00 |

**A 10-minute, 35-mm slide/cassette audio-visual program on the performance capabilities of the Lung Function Unit is available on loan on request.**

Instruction Manual

# "NONEX"™
# XENON GAS TRAP*

**Model 36-022**



™Nuclear Associates, Inc. *Patent Pending

**NUCLEAR ASSOCIATES, INC.**
Subsidiary of
**RADIATION-MEDICAL PRODUCTS CORP.**
100 Voice Road • Carle Place, N.Y. 11514 • (516) 741-2842

# SHIELDED "Nonex"™ XENON GAS TRAP*

***Removes effluent radioxenon rapidly, reliably, safely***

- **UL-listed.**
- **Easy-to-replace 5-cartridge filter.**
- **Fully shielded on all 6 sides.**
- **Compatible with any xenon delivery system.**
- **Compact, mobile, and easy to use.**


The UL-listed "Nonex" Xenon Gas Trap assures the safe, rapid removal and containment of radioxenon from effluent air following ventilation imaging studies. High efficiency, simple operation and low cost make the system an excellent solution to your radiogas disposal problems.

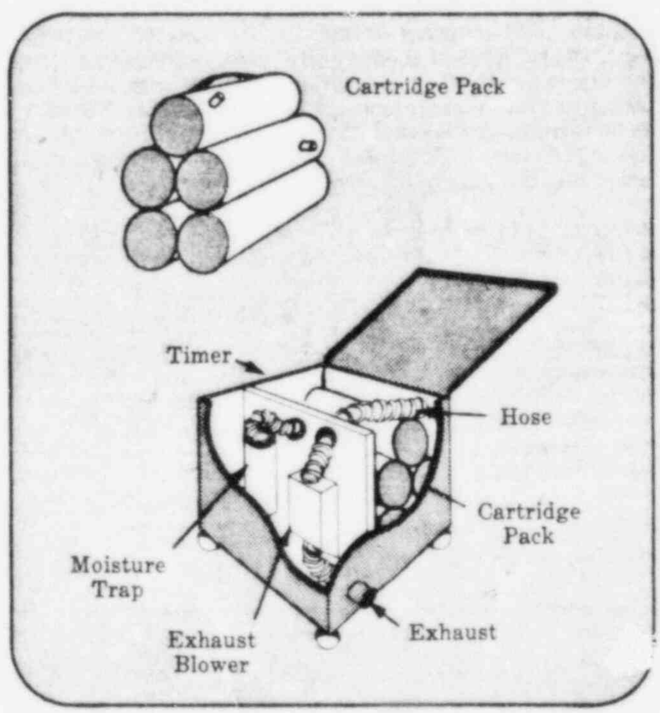
The "Nonex" is designed specifically to adsorb inert radioactive gases such as xenon-133. A vacuum pump draws the gas through a desiccant (to remove moisture) and through five charcoal-filter cartridges, trapping the xenon and assuring the lowest possible effluent concentration throughout the useful life of the filters. The 5-cartridge pack provides a low-velocity flow path (5-8 liters/min.) and sufficient dwell time to remove the xenon gas from the effluent stream.

Unlike some other gas traps, with the "Nonex" there's no need for the radioxenon to be held-in-transit by an "expandable interface" between the delivery system and the trap. The "Nonex" can handle the exhaust from your system directly, without any interface.

Cartridge life depends on many factors, including frequency of usage, amount of activity, numbers of studies per day, etc. Regular checks of cartridge efficiency should be an integral part of departmental quality assurance. A digital elapsed-time meter, included with the "Nonex," makes it convenient to set up a standing schedule for cartridge efficiency checks (we suggest at least every 10 hours of trap running time). Trap efficiency can be checked by using the NRC's "known volume of xenon in a known volume of air" method (described in the instruction manual). Or, you can obtain quick, accurate readings of the xenon concentration in gas trap effluent and room air by using the unique "XenAlert" Room Air & Gas Trap Monitor (see page 11).

The "Nonex" can be integrated into any radioxenon system or used independently as a patient exhalation unit. It is fully shielded on all six sides with ⅛" lead. The cartridge-pack can be easily replaced in less than a minute. A desiccant-filled container on the input line serves as a moisture trap.

For departments using xenon-127, the "Nonex" can be ordered with additional lead shielding.




The "Nonex" can also be used to seat an upright patient or rolled under an imaging table for supine studies. Casters provide silent mobility. 115V, 60 Hz. 15" x 15" x 15¼" high. Net 105 lbs.

**36-023** "Nonex" Xenon Gas Trap .................... $ 950.00
**36-026** Replacement Cartridge Pack ................ 275.00
**36-024** "Nonex" Gas Trap for Xenon-127 ............ 1200.00

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