

# 75

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Montefiore Hospital  
39 Fifth Avenue  
Pittsburgh, PA 15213  
(412) 648-6000

Bringing Care &  
Science to Life

## Montefiore

May 14, 1985

Nuclear Material Safety Section B  
U.S. Nuclear Regulatory Commission  
Region I  
631 Park Avenue  
King of Prussia, PA 19406

Re: Amendment Request to NRC License #37-00865-10

Dear Sirs:

This is to request an amendment to the Montefiore Hospital NRC License #37-00865-10 for a blood irradiator. The necessary information is provided below:

Manufacturer/Model: AECL RCC Gammacell 1000 Blood  
Irradiator, Model D - See attachment A

Description: Self-contained, dry, sealed source irradiator

Source: Cesium-137

Activity: 3000 Ci

Location: Montefiore Hospital Blood Bank, A Level

The Radiation Safety Office will survey the irradiator at installation and will perform leak tests per our current license conditions. The Radiation Safety Office will provide training to the Blood Bank technologists, the anticipated operators of the irradiator. Also, our Nuclear Medicine Unit has recently replaced its "Nonex" Xenon gas trap with a Pulmonex Xenon System. Attachment B is a description of the Pulmonex System.

If additional information is necessary regarding these items, please contact Margaret Eddy, Radiation Safety Officer at (412) 648-6055. Thank you.

Sincerely,

*Irwin Goldberg*  
Irwin Goldberg  
Executive Director

IG:kew

Enclosure

8508120740 850725  
REG1 LIC30  
37-00865-10 PDR

Applicant	
Check No.	079396
Amount Fee Category	#110
Type of Fee	Application
Date Check Recd.	6/1/85
Received By	Jachson

Applicant	
Check No.	077034
Amount Fee Category	#120
Type of Fee	Application
Date Check Recd.	5/28/85
Received By	Brown

"OFFICIAL RECORD COPY"

ML10

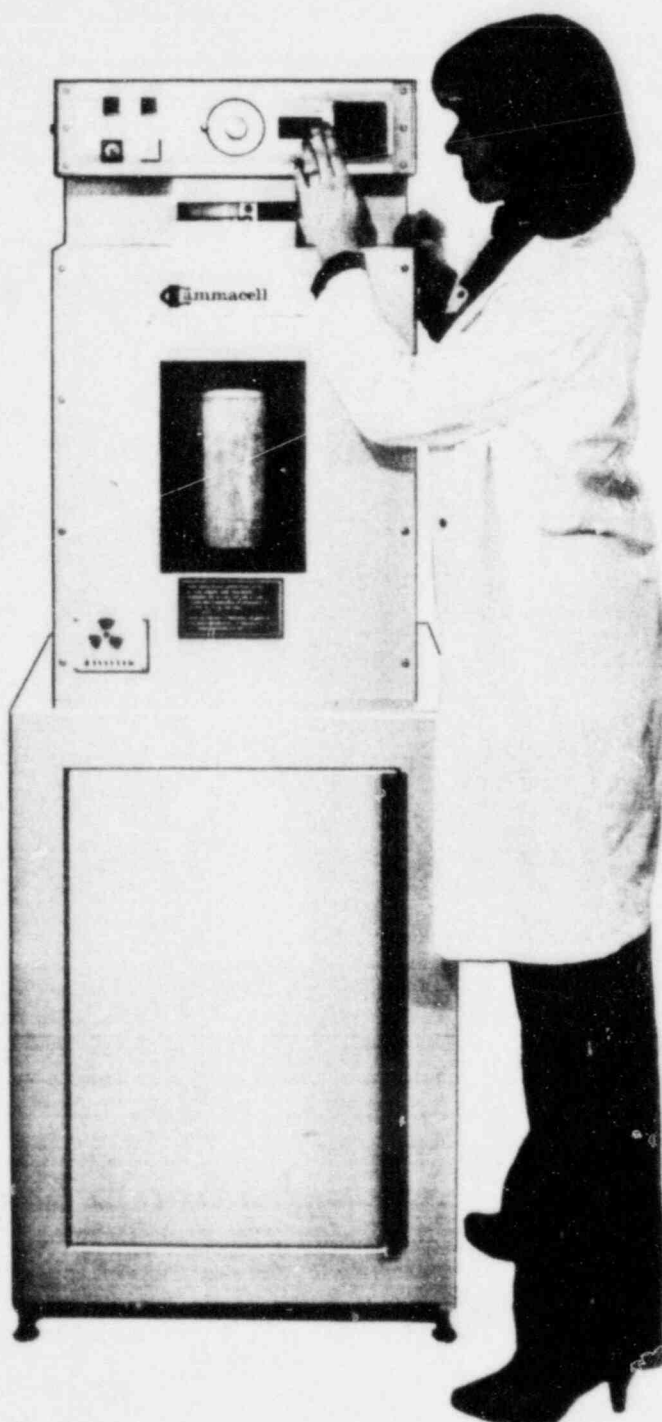
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**AECL Industrial Irradiators**

# Gammacell 1000

## Blood Irradiator



The Gammacell 1000 irradiator is designed for the irradiation of blood and blood components to inactivate leukocytes. It is also well suited to irradiate biological or other samples.

The Gammacell 1000 is self-shielded and can be safely operated in an existing laboratory environment. When fully loaded, the external radiation level of the Gammacell 1000 is less than 2.0 mrem/h at 1 m from the source and 20 mrem/h at 5 cm from the surface of the unit\*.

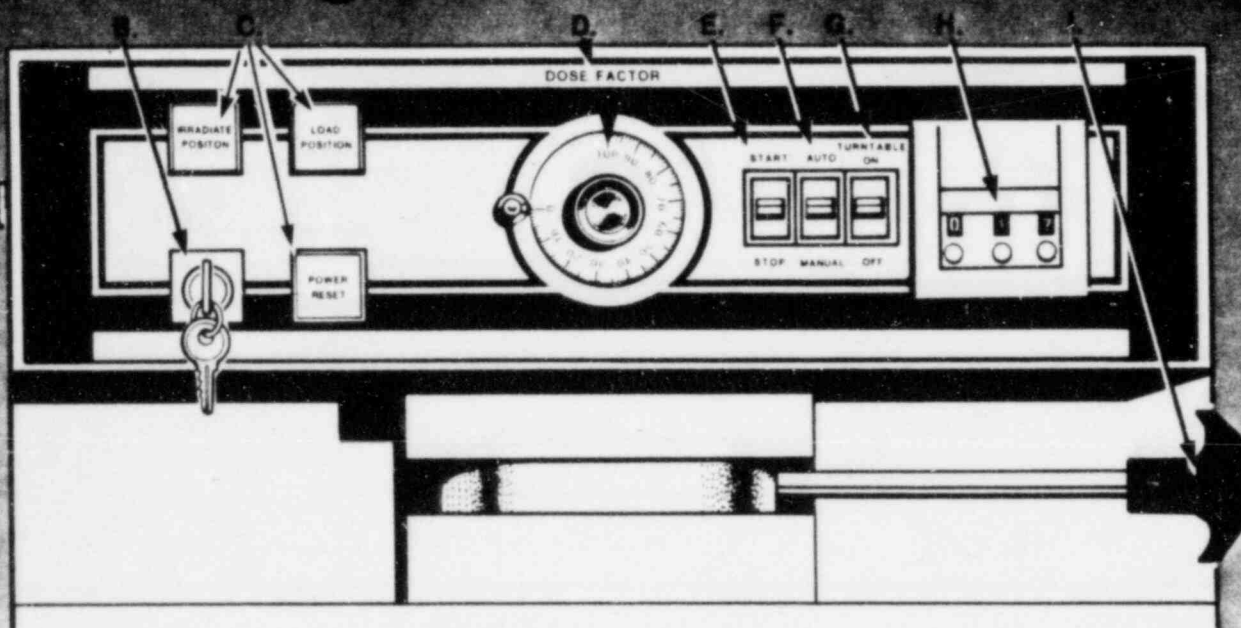
A 3000 rad dose can be delivered in 2-7 minutes depending on source size selected.

The gamma irradiation source is cesium 137, which has a half-life of 30.2 years. This source is permanently sealed in a stationary position within a lead shield. The sample chamber is rotated to and from the source by a shielded rotor. Within the sample chamber there is a turntable, with a removable beaker. Good dose uniformity ( $\pm 14\%$ ) is given when the turntable is rotating. A test tube holder can also be used in the sample chamber and is available as an optional accessory.

Three access tubes are provided for instrumentation. They enter the sample chamber from the storage cabinet.

\* These external radiation levels meet the requirement of the International Commission in Radiation Protection, Publication No. 15 (ICRP #15)

## CONTROL PANEL



- A. Safety Switch Button**  
(see item E)

- D. Dose Factor**  
With this control it is possible to rotate the rotor so that the sample chamber is only partially exposed to the radioactive source, thus reducing the dose rate in the sample chamber. Determination of the Dose Rate distribution at any of the partial irradiate positions is left up to the customer to perform.

- G. Turntable Switch**  
Controls power to the sample chamber turntable drive. When this switch is on, the turntable is rotating.

- B. Key Operated Power Switch**  
Controls power to the irradiator

- E. Stop/Start Switch**  
Controls movement of the rotor. The sample chamber can be rotated to the "Irradiate" position only when the "Safety Switch Button" (item A) is pressed and the "Stop/Start Switch" is held in the "Start" position. The sample chamber can be returned to the "Load/Unload" position by holding the Stop/Start Switch in the "Stop" position.

- H. Digital Timer**  
In the automatic mode, a three digit readout timer controls the irradiation time. Readout range is 0.1 to 99.9 minutes. Timer accuracy is comparable to the accuracy of an electrical clock.

- C. Indicator Lights**  
When illuminated, these lights indicate: — "POWER RESET" (White)  
"LOAD POSITION" (Green)  
Sample chamber in the "Load/Unload" position.  
"IRRADIATE POSITION" (Red)  
Sample chamber in the irradiate position.

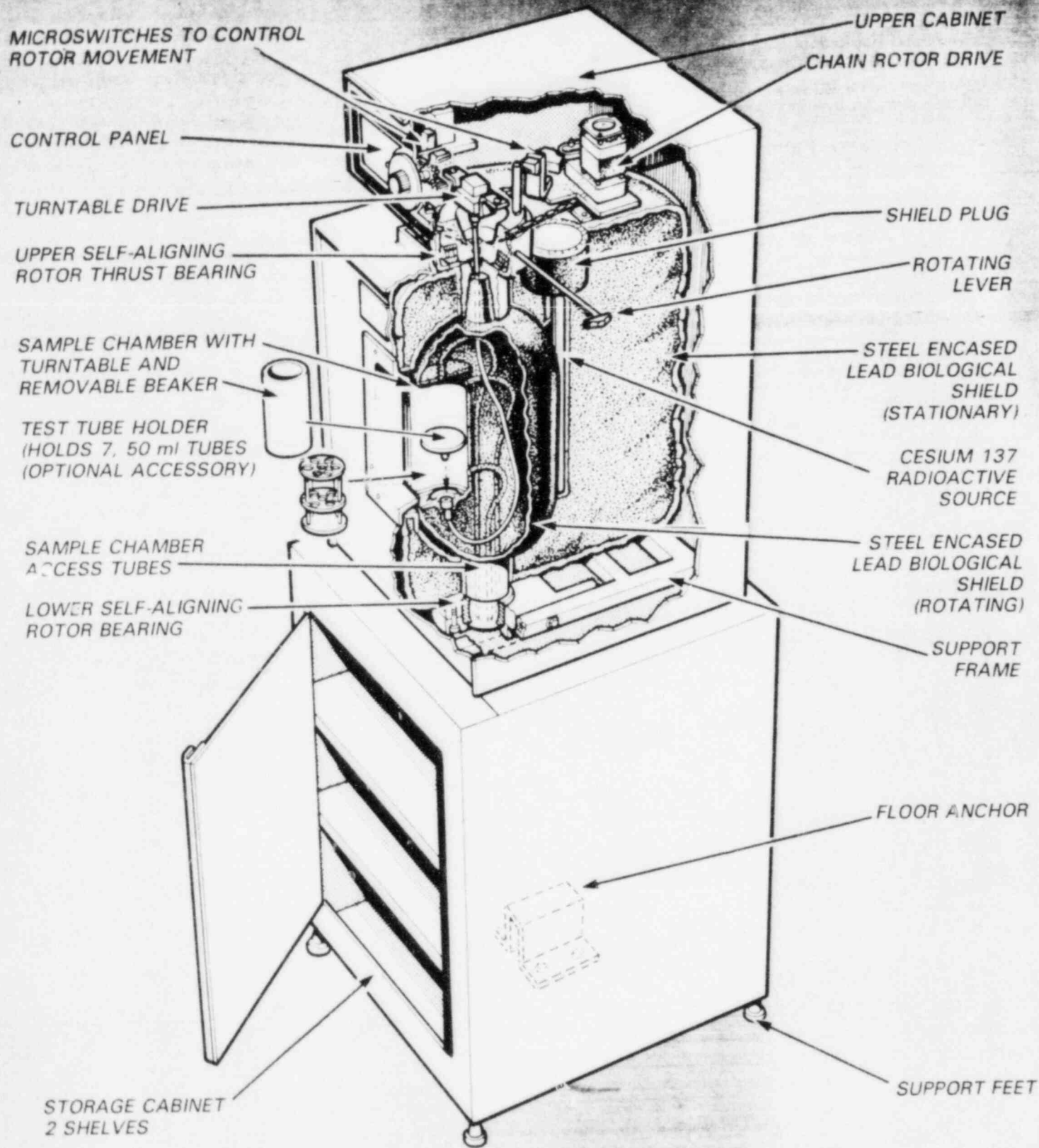
- F. Auto/Manual Switch**  
Determines mode of equipment operation. When the switch is in the "Auto" position the sample chamber will be automatically returned to the "Load/Unload" position by the expiration of the preset time of the digital timer. When the switch is in the "Manual" position, the digital timer will act as an elapsed time indicator only. The sample chamber can be returned to the "Load/Unload" position by pressing the "Stop Button".

- I. Emergency Lever**  
In the event of a power failure the sample chamber can be manually rotated from the "Irradiate" position to the "Load/Unload" position.

### Electrical Power Requirements

Standard: 110/120V, 60Hz, standard North American wall outlet three prong plug  
Optional: 220/230V, 50Hz, standard wall outlet three prong plug  
Note: The type of power supply available (50Hz or 60Hz) is to be specified at the time of ordering.

Power  
Cable: A 3m (10 ft) power cable is provided with the unit.

**WEIGHTS**

Total Weight:	1,134 kg (2,500 lbs.)
Floor Loading:	3,052 kg/m <sup>2</sup> (625 lbs/ft <sup>2</sup> )
Projected Floor area:	0.372 m <sup>2</sup> (4 ft <sup>2</sup> )

**DIMENSIONS**

Width:	61 cm (24 in)
Length:	61 cm (24 in)
Height:	165 cm (65 in)
Colour scheme:	beige and blue

**BEAKER DIMENSIONS**

Height	16.5 cm (6.5 in) 7.6 cm (3 in)
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**SAMPLE CHAMBER DIMENSIONS**

Height	21.3 cm (Without turntable) (8.4 in)
Height	20.3 cm (With turntable) (8.0 in)
Diameter	8.5 cm (3.35 in)

### Radiation Specifications

The Cesium 137 sources are doubly encapsulated in stainless steel and are held in a source holder.

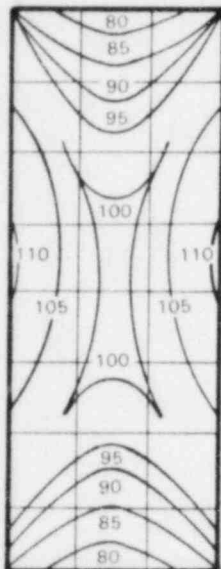
The source holder is permanently installed and sealed within the steel encased biological shield.

The curies contained in each Gammacell 1000 model and the corresponding Central Dose Rates are listed as follows:

Gammacell 1000 Model	No. of Sources	Nominal Curie Content $\pm 20\%$	Central Dose Rate (CDR) $\pm 10\%$ rad/min/Ci	Nominal CDR rad/min
A	1	540	0.833	450
B	2	1,080	0.833	900
C	3	1,620	0.806	1,305
D	4	2,160	0.792	1,710

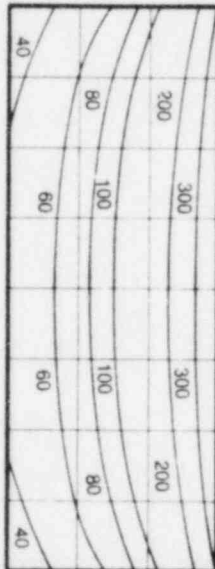
The central dose rates in the table represent measurements with the beaker in place and in an air medium. For a liquid, such as blood, the central dose rates should be decreased by 10%.

**Fig. 1**  
Isodose Rate Curves Turntable Rotating



The approximate dose rate distribution in the sample chamber with the turntable rotating at 4.0 rpm is shown in Fig. 1. The approximate dose rate distribution with the turntable stationary is shown in Fig. 2.

**Fig. 2**  
Isodose Rate Curves Turntable Stationary



Figures 1 and 2 represent typical Dose Rate Distribution in an air medium. These measurements are not carried out on each individual unit. Numbers shown in the Figures represent percentage of measured central dose rate.

### Shipping

The Gammacell 1000 is shipped in two shipping packages. One contains the upper and lower cabinets; the other is a returnable overpack which contains the radiation shield assembly complete with cesium sources. A nominal charge is levied for rental of this overpack.

Shipping Weights and dimensions are as follows:

#### Active package

Weight: 1,270 kg (2800 lb)

Height: 142 cm (56 in)

Base: 92 cm  $\times$  92 cm (36 in  $\times$  36 in)

Volume: 1.2 m<sup>3</sup> (42 ft<sup>3</sup>)

#### Non-Active Package

Weight: 91 kg (200 lb)

Length: 152 cm (60 in)

Width: 76 cm (30 in)

Height: 102 cm (40 in)

Volume: 1.18 m<sup>3</sup> (41 ft<sup>3</sup>)

The gammacell 1000 active shipping package meets the requirements of the USDOT, AECB, CSA and complies with the IAEA Regulations for the Safe Transport of Radioactive materials 1973 edition (as amended)

### Certification and Documentation

The cesium 137 sources are individually tested for leakage and contamination. A leak certificate is provided with each source.

Also provided are measurement certificates of curie content and central dose rate.

An operation and maintenance manual is shipped with each unit.

Customers in the United States and Canada when applying for their radioactive materials licence should apply for 20% more than the amount of curies of cesium 137 in the source ordered to allow for the  $\pm 20\%$  source loading tolerance.

## Gammacell 1000

### Blood Irradiator

The specifications contained herein were in effect at the time of printing. Atomic Energy of Canada Limited has a policy of continuing development and reserves the right to discontinue models at any time or change specifications or designs without notice and without incurring obligation.

## **PULMONEX XENON SYSTEM**

**One technician can perform an entire study by simply moving a single handle.**



**Full-function xenon delivery system with built-in xenon gas trap for rebreathing, washout, perfusion and single breath studies on supine or seated patients.**

- Complete easy-to-use system.
- "Air-in"/"Air-out" breathing tubes and motor-driven circulator assures resistance-free breathing.
- Two lead glass windows permit observation of patient breathing bags.
- All flow circuits automatically controlled by a master valve system.
- Automatically timed washout.
- Accepts any commercial form of xenon.
- Rolls easily on large casters for positioning of supine or seated patients.
- Fully shielded.
- Carbon dioxide and moisture traps included.

**SIMPLE, SAFE OPERATION**

The Pulmonex Xenon System is a simple to use, reliable and complete system for the performance of all regional ventilation studies. A built-in xenon gas trap with disposable charcoal cartridge removes xenon effluent after each study and eliminates the need for expensive venting systems. Motor-controlled air flow assures resistance-free breathing regardless of your patient's pulmonary condition. Practical cabinet design and total mobility permit easy patient positioning in the seated or supine positions.

### **PULMONEX...the complete, self-contained xenon system**

Pulmonex provides a completely integrated system (delivery unit, and built-in gas trap) for performing xenon studies. A sensitive, responsive master valve, controlled by a single handle on the front panel, and silent synchronized motors permit full-system control of xenon gas flow from initial application to ultimate disposition of the xenon effluent into the gas trap.

All controls are conveniently located on an "up-front" control panel. With the patient on-line, either seated or supine, the user can control the system and observe the patient and gamma camera from one position. The control panel is clearly marked and each mode in the study procedure is distinctively apparent. The two internal patient breathing bags (Air-in and Air-out) are easily observed through individual viewing windows on the front panel. An adjustable manual 15-minute timer initially activates all functions and automatically shuts down the system to complete the study after patient and system washout.



## **The PULMONEX SYSTEM**

The Pulmonex Xenon System effectively integrates manual and electronic controls into a simple, sensitive system that provides maximum, reliable test results using minimum effort. System complexities have been eliminated. All internal circuitry, valves and tubing have been designed to afford ease of operation and patient comfort.

A master valve, controlled by one handle on the front panel, directs the flow of gases throughout the system. Oxygen may be added to the system any time during a study by fingertip button control. A push button operates a circulator blower motor to provide gentle positive system pressure. This, combined with a specially-designed master valve and wide diameter, short circuit airways, provides resistance-free patient breathing. There is no dead air space. An injected bolus of xenon reaches your patient exactly when desired. An in-line CO<sub>2</sub> absorber prevents hyperventilation. The system has automatic timer and pressure control dials to accommodate your patient's breathing pattern and to assure complete system washout into the gas trap.

All internal systems are completely shielded for patient and operator safety. A bacteriostatic filter may be used at the mouthpiece to prevent system contamination.

### **INTEGRATED XENON GAS TRAP**

The Pulmonex system has its own built-in gas trap. Exhaled xenon is gently pulled through activated charcoal contained within a "U" shaped cartridge made of 1/8" lead by an induction vacuum pump. The control panel timer and airflow pressure dial regulation of the trap pump assures complete patient and system purging. Only clean air leaves the trap exit port. Under normal usage the charcoal cartridge will last about a year. The gas trap cartridge is easily replaced when expended.

#### **SPECIFICATIONS:**

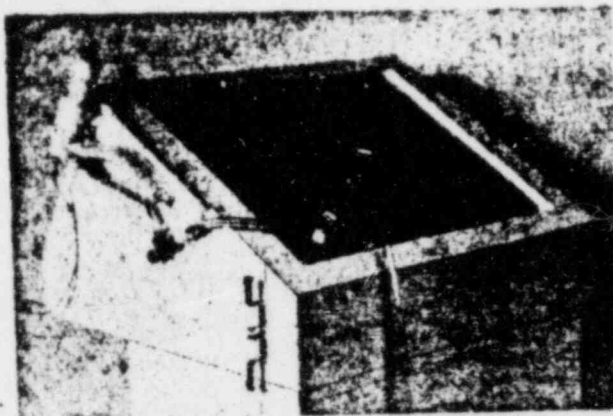
Motor UL approved. 115 VAC, 50/60 Hz.

Size: 18" x 19" x 46"

Weight: 150 lbs.

130-500 Pulmonex Xenon System, complete	\$ 2695.00
127-319 Disposable Charcoal Cartridge...	325.00
130-550 Disposable Mouthpiece .....	1.85 ea.
130-700 Disposable Bacteria Filter .....	2.95 ea.
139-191 Moisture Absorber (Drierite) .....	7.00 lb.
130-019 Soda Lime, CO <sub>2</sub> Absorber .....	4.00 lb.
087-130 220V Converter .....	150.00

#### 150-300 XENON GUN MOUNT



Adapts the NEN Calidose gun to both the Pulmonex and Economy Systems. Attaches to the side of the unit and draws oxygen from that system. Delivers xenon to the patient on command by simple depression of a push button.

Installation takes only minutes. Does not effect the xenon system. Comes complete, with all hardware, ready for installation. (Does not include Calidose gun.)

**\$ 98.50 each**

BETWEEN: William O. Miller, Chief  
License Fee Management Branch  
Office of Administration

John E. Glenn, Chief  
Nuclear Materials Section B  
Division of Engineering and  
Technical Programs

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED

Applicant/Licensee: The Montefiore Hospital  
Association of Western Pennsylvania  
Application Dated: 5/14/85  
Control No.: 03835  
License No.: 37-00865-10

2. FEE ATTACHED

Amount: \$ 120.00  
Check No.: 077034

3. COMMENTS

Signed Brenda Platchek

Date 5/22/85

B. LICENSE FEE MANAGEMENT BRANCH

1. Fee Category and Amount: 7B \$120 + <sup>4/16</sup> 3E app fee due

2. Correct Fee Paid. Application may be processed for:

Amendment ✓

Renewal                     

License                     

Signed Frances Brewer

Date 5/29/85

og 6/17/85