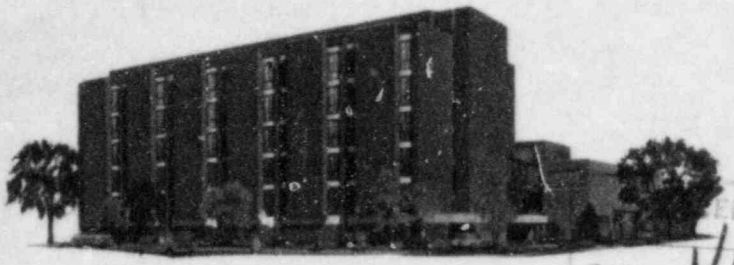

Memorial Hospital of Laramie County
Phone (307) 634-3341
300 East Twenty-third
CHEYENNE, WYOMING 82001

William C. Nichols, Administrator

1/14/85
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Braun

January 2, 1985

Mr. Jack E. Whitten
Materials Licensing Branch, Region IV
United States Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 10
Arlington, Texas 76011

In re: Radioactive Materials
License 49-01380-01

Dear Mr. Whitten:

We are requesting an amendment to our radioactive materials license in order to make four changes:

1. We wish to move the location of the Nuclear Medicine Hot Lab
2. We wish to change the storage site for our brachytherapy sources
3. We wish to change the equipment used for radioactive Xenon gas studies
4. We wish to change our Radiation Safety Officer

The first two changes are being requested due to new construction being completed at Memorial Hospital that will provide for both a new Nuclear Medicine Hot Lab and an expanded Radiation Therapy Department. Details concerning the location and associated equipment for the first three changes are attached.

The first change is described by the attached "Description of Hot Lab", along with attachments I and II. These provide the information requested in item 11 of NRC Regulatory Guide 10.8.

The second change is described by attachments III, IV and V. Attachment III shows the proposed location of the brachytherapy storage site in the mold room of the new Radiation Therapy Department. The mold room can be locked for security. Attachments IV and V describe the storage safe (model RSS-106 on attachment V) and associated equipment and shielding that will be used. Calculations show that 4 inches of lead will provide 4.6 tenth value layers of shielding for Cesium-137. This will be more than enough to reduce exposure rates at the surface of the safe to less than 1 mR per hour from our Cesium sources. Other brachytherapy sources will be stored in their shielded shipping containers behind the 2 inch thick lead L-block shield in front of the storage safe.

The newly acquired equipment to be used for radioactive Xenon gas studies is described in the attached instruction manual for this equipment. Notice that

[Continued]

this device includes not only a delivery system but also a charcoal trap that automatically filters the exhaust gas during the washout phase of the study. The performance of this trap will be monitored quarterly. The use of this new Xenon equipment is an improvement over the old equipment because it will reduce the radiation exposure to the technologist performing the exam and will reduce the risk of an accidental release of radioactive Xenon gas.

The fourth request involves a change in our Radiation Safety Officer from James Barber, M.D., to Raymond Dixon, M.D. Dr. Dixon is already listed as an authorized user of radioactive materials on our current license.

Please inform us if this does not provide you with all necessary information to grant this amendment request. We will send you a copy of the closeout survey following the actual hot lab relocation.

Please note that our institution is exempt from licensing fees according to 10CFR Part 170.11(a)(9).

Sincerely,

Jon M. Gates,
Associate Administrator

JMG:bp
Enclosures

DESCRIPTION OF HOT LAB

The areas assigned for the receipt, storage, preparation and measurement of radioactive material are shown in the attached drawings.

A. Tc-99m generators will be used only in the Nuclear Medicine Hot Lab (Attachment I). The generator in use will be located on the bench as shown in Attachment II. This generator is housed inside a cover shielded with 3/4" lead. Surveys show that the exposure rate within a foot of this shielded generator is less than 2 mR/hr. Surveys also show that the areas surrounding the Hot Lab will expose no one to more than 100 mR in 7 consecutive days.

   Generators no longer in use will be stored in the decay closet (Attachment I) in their shipping containers until they are returned to the vendor for disposal.

B. Non-refrigerated radiopharmaceuticals will be stored in lead pigs in the Hot Lab behind the "L" block. Refrigerated radiopharmaceuticals will be stored in lead pigs to limit exposure. See Attachment II for location of the refrigerator.

C. Short-term, temporary storage of radioactive waste will be accomplished using a storage module, shielded with 1/8" thick lead (see Attachment II). Long-term storage for decay purposes will be located in the decay closet. This decay closet is shielded a height of 7 feet above the floor with 1/16" thick lead. A weekly survey will be performed of both storage areas.

D. Preparation of all radiopharmaceuticals, except sulphur colloid, will be carried out behind the lead glass "L" block shield in the Hot Lab. The hot plate used for preparing sulphur colloid also is located in the lab and is shielded with 1/8" lead. Syringe shields will continue to be used whenever practical when dispensing radiopharmaceuticals.

   All areas adjacent to the Hot Lab and Scan Room are restricted except on the west side. No additional shielding is needed in the walls of the Hot Lab because sufficient local lead shielding will be used to limit radiation exposure to below limits specified in paragraph 20.105 (b) of 10 CFR Part 20 even though most of the adjacent area is restricted. Airflow rates are depicted in Attachment II showing negative pressure for the scan room/hot lab area.

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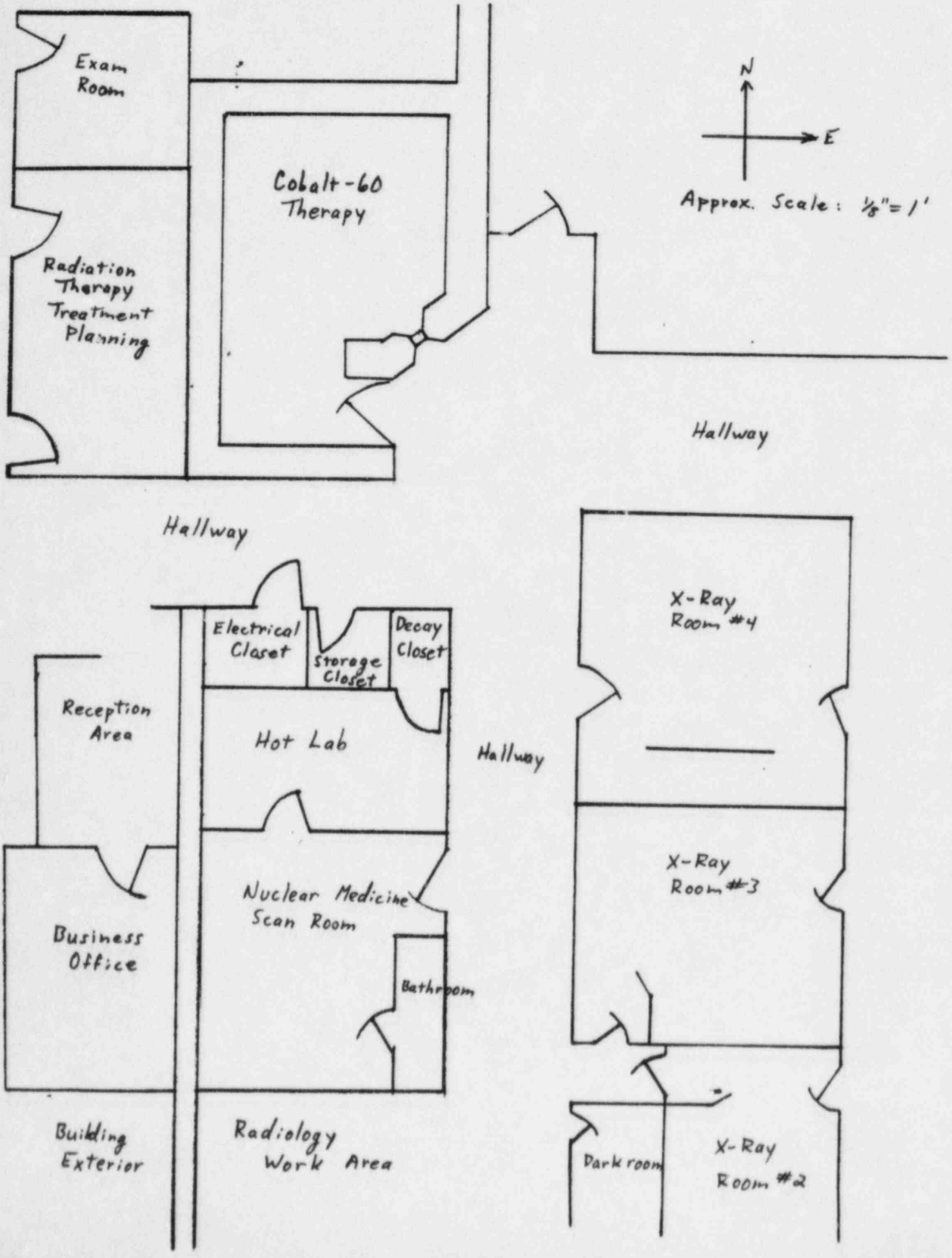
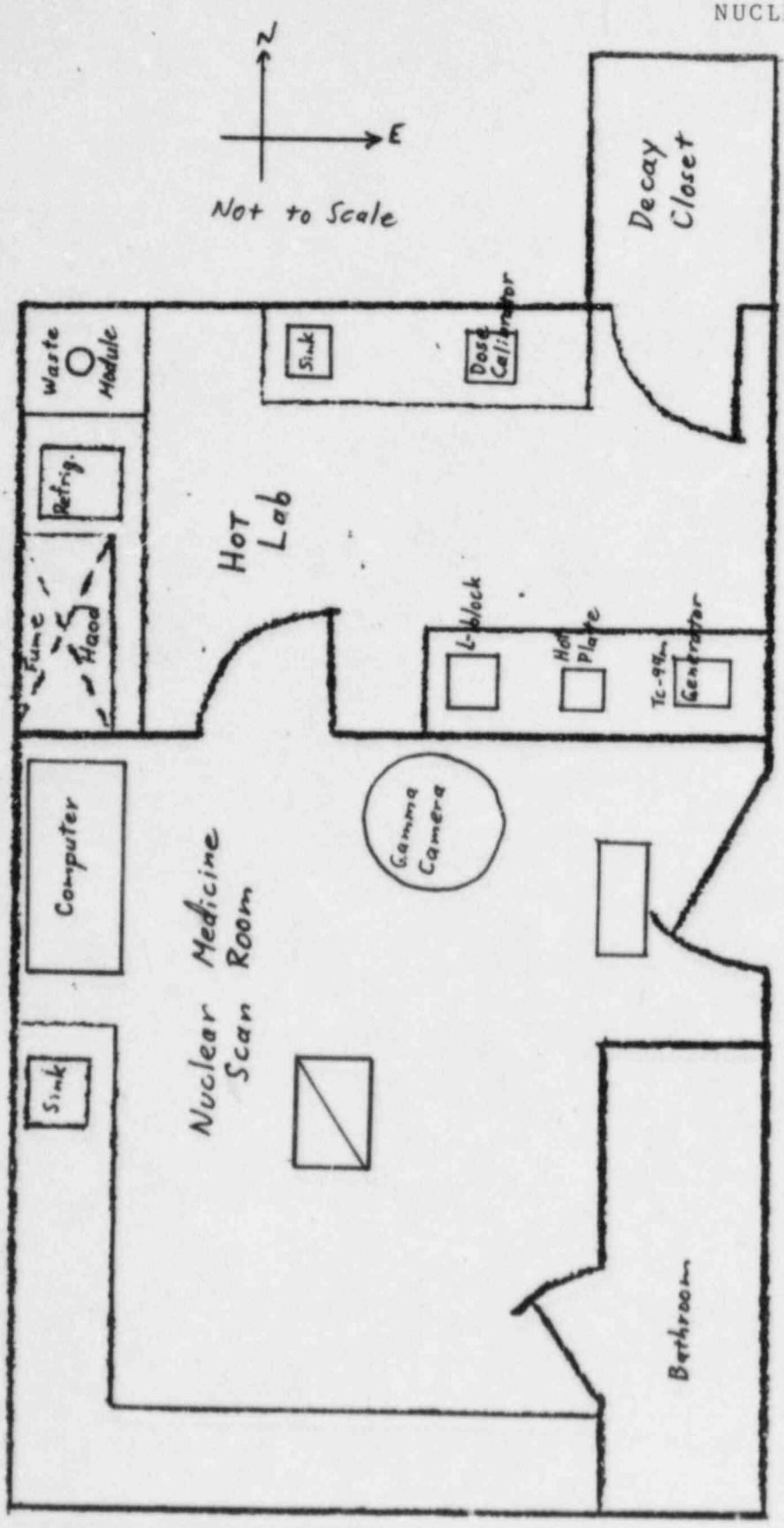
ATTACHMENT I

NUCLEAR MEDICINE DEPARTMENT LAYOUT



ATTACHMENT II

NUCLEAR MEDICINE SCAN ROOM AND HOT LAB



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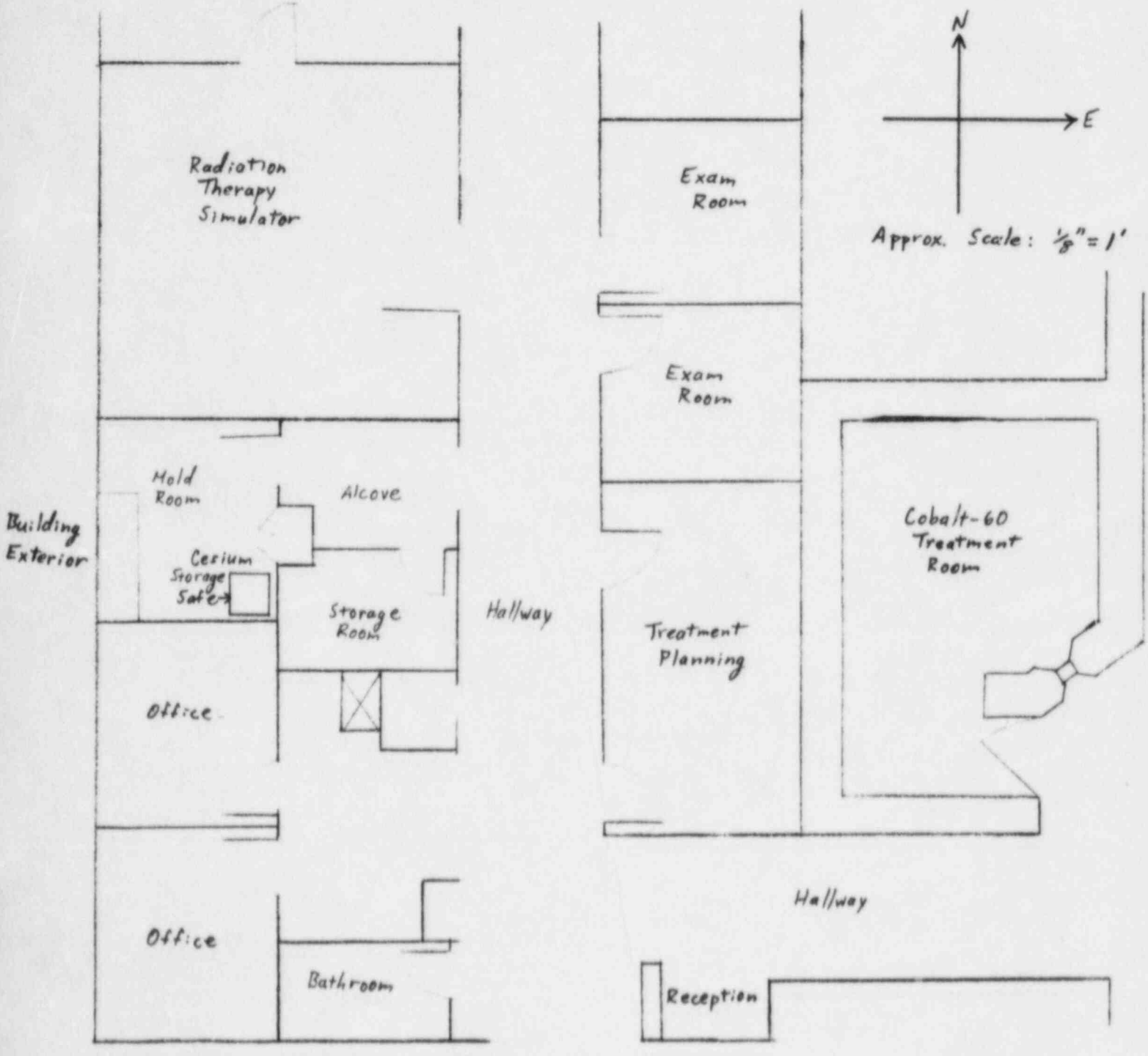
ATTACHMENT III

DEPARTMENT LAYOUT



RADIUM AND CESIUM SHIELDED WORK STATION

- **Provides *optimum* working conditions when using radium and cesium**
- **Designed for maximum protection and versatility**

The Radium and Cesium Shielded Work Station is the ideal vehicle for the safe storage of radium and cesium. It provides optimum protection to personnel from radiation exposure when storing sources, and has sufficient work and storage area to allow flexibility when using its contents. Optional heavy-duty 5" swivel casters lend mobility to the work station and permit easy transport of sources to the point of use under hazardous free conditions.

As a guide to determine maximum isotope content for a desired surface radiation level, the following Tenth-Value-Layers (in lead) are provided.*

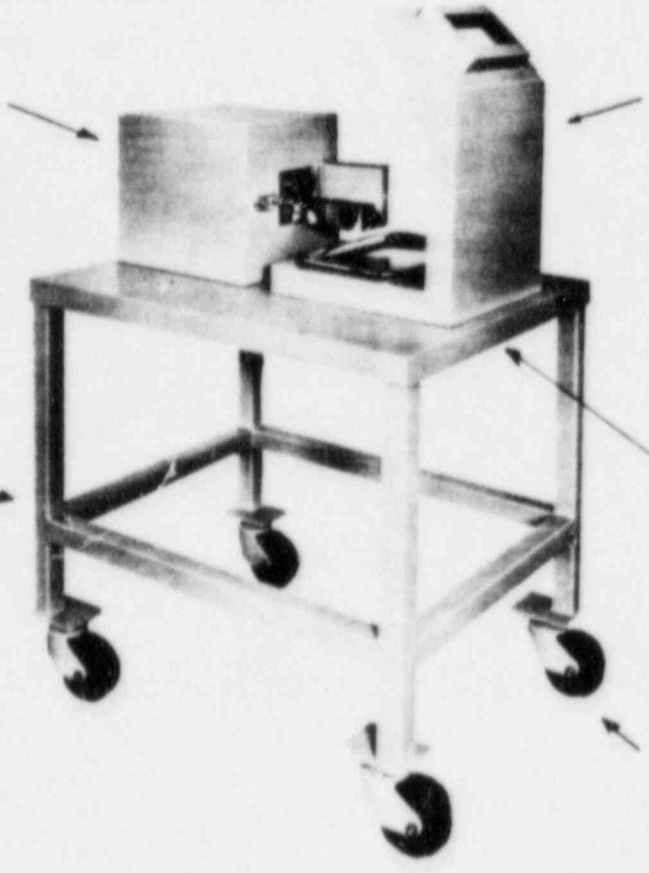
Radium	5.5 cm	Cesium-137	2.2 cm
Cobalt-60	4.1 cm	Iridium-192	2.0 cm
		Gold-198	1.1 cm

Shielded Storage Safe
Constructed of steel and shielded with lead, these safes provide maximum protection from radiation exposure. Keylocked and fireproof. Stainless steel storage drawers. (4-drawer unit shown).

(See facing page for complete details.)

Steel Table
Model ST-101
Provides solid support surface for components of work station. Smooth bevel-edged worktop offers adequate area for tool and instrument placement. Table support frame is solid steel with welded corner joints for maximum strength. 4" x 4" floor supports.

Dimensions: 28" x 36" x 33¾" High. Weight: 120 lbs.



L-Block Lead Shield
Model Pb-212
Solid, heavy (410 lbs.) lead shielding (5.0 cm thick) protects head and torso from radiation. Tilted lead glass window (4" x 8") permits safe, unobstructed viewing of work area. Dimensions: 22" H x 14" W x 16½" L.

An optional 13½" x 9¾" x ¾" high Stainless Steel Tray, Model T-15F, for use with L-Block Shield is available.

Storage Drawer (optional)
Model OSD-101
Fits under worktop. Dimensions: 24" L x 19½" W x 7" H.

Swivel Casters (optional)
Model OSC-101
Heavy duty, 5" casters provide complete mobility to the work station.

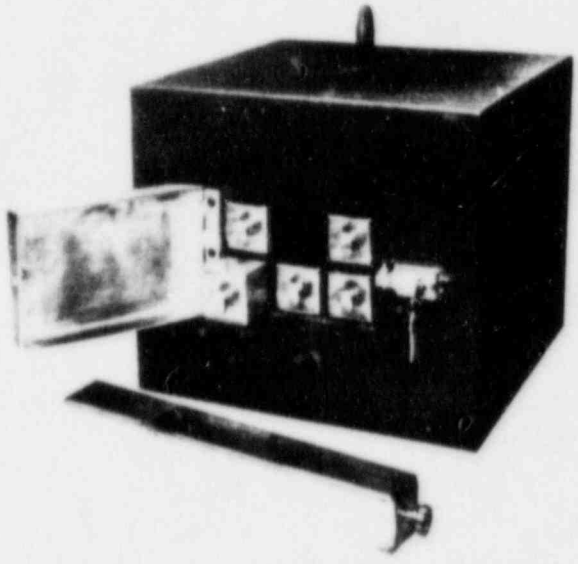
*National Council on Radiation Protection and Measurements. Report No. 40, "Protection Against Radiation from Brachytherapy Sources."

460496

RADIUM AND CESIUM STORAGE SAFE

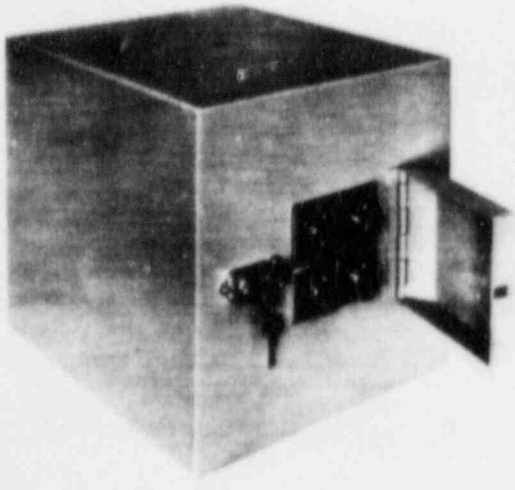
- **Offers maximum protection**
- **Custom-designed storage drawers available**
- **Stainless steel drawers**
- **Keylock & fireproof**

Constructed of steel and shielded with 4" of lead, this Storage Safe provides maximum protection against exposure to radiation. Each safe is fireproof and has a keylock door. The storage area in each drawer is 6" L x 1¾" W x 1⅞" D.



Model RSS-106

Custom-Designed Drawers
For special requirements relating to drawers, source holders or other modifications, a separate quotation will be forwarded upon request.



Model RSS-104

Model No.	No. of Drawers	Safe Dimensions	Lead Thickness	Net Weight
RSS-104	4	12¾" H x 12¾" W x 14½" D	4" (10.2 cm)	950 lbs.
RSS-106	6	12¾" H x 15" W x 14½" D	4" (10.2 cm)	1150 lbs.

Atomlab

INSTRUCTION MANUAL

PULMONEX XENON SYSTEM

130-500

3-STEP SIMPLICITY OF OPERATION

1. Start: Set timer. Patient adjusts to breathing on system. Add oxygen. Set "Airflow" control. Switch handle to 2.

2. Single Breath-Equilibrium: Patient is breathing on closed loop. Inject Xenon at mouthpiece. Patient breathes until equilibrium (about 2 minutes). More oxygen may be added during 2, if necessary. Switch to 3.

3. Washout: Patient breathes room air through unit, exhales into trap. Study is complete.

Atomic Products Corporation

Center Moriches, New York 11934, U.S.A.
(516) 878-1074

460496

To thoroughly familiarize yourself with the equipment and methodology, it is suggested that you run through the procedure several times; first without any patient, then with a colleague as a "patient" without actually using xenon. When you are completely familiar with the routine, you can start doing xenon studies on a patient with confidence.

FOLLOW THESE SIMPLE STEPS CAREFULLY:

A. Setting Up Your Pulmonex

1. Open the top rear door. Inspect the interior. All hoses should be connected to their respective ports. Bags should be lying flat. The elbows on the bags should be in their wall brackets. Hoses should not be kinked.
2. Open the lower front door. All hoses should be connected to their respective ports.
3. Remove the empty plastic cartridge that hangs in the lower compartment. Fill the cartridge about 1/4 to 1/3 full with the blue drierite (139-101) and return the cartridge. This serves as a moisture trap for the air going into the charcoal cartridge. Close the lower compartment. Replace the drierite when it changes color (from blue to pink). *Failure to change the drierite will significantly shorten the life of the charcoal cartridge.*
4. Remove the empty plastic cartridge that is within the top compartment. Fill 1/4 to 1/3 full with white granule soda-lime (Model #130-019). Reconnect to the hoses. This soda-lime serves as a carbon dioxide trap. Close the top rear door. Change the soda-lime between each patient. *Failure to change the soda-lime will cause the patient to rebreathe too much carbon dioxide thus causing hyperventilation.*
5. Bring the unit to the area of operation. Make sure the timer is on "0" and plug into a nearby electrical outlet.
6. At the rear of the unit, there are two white hose connections, side by side. Attach the breathing tubes/Y Fitting/bacteria filter/mouthpiece assembly to the hose connections. The plastic plug and warning label on the Y fitting must be facing up.

> **Note**: Keep the breathing tubes as short as possible. If a patient is supine bring the system to the bedside. Never add a length of tubing to the patient side of the Y fitting. If you need more tubing length replace both breathing tubes. The distance from the Y to the patient must be as short as possible.

It is advisable to use hose clamps to tightly fasten the breathing hoses to the hose connections. As a safety precaution you can connect a hose from your room vent to the exhaust port on the Pulmonex. This exhaust port is located on the patient side of the Pulmonex just below the overhang.

> **Caution**: Some patients are sensitive to oxygen. Consult a physician before using oxygen. If the physician prefers, substitute room air for oxygen.

7. To add oxygen connect and clamp a 1/4" oxygen hose from your oxygen supply to the oxygen inlet port on the Pulmonex front panel. Turn the oxygen valve to 5 psi or 6-8 liters/minute and leave it on. If possible, use a pediatric regulator on the oxygen tank.

> **Note**: Use a flow regulator, not a flow meter. Flow rates can be high (up to 50 liters/min.) but pressure must be low, 5 psi.

B. Performing a Study.

8. Using a source, position the patient in front of the scintillation camera. See that both the lungs are within the crystal area.
9. Set the camera for Xe-133. Record all data on tape.
10. Place the Pulmonex as close to the patient as possible and set the handle to the "Start" position. The number "1" will appear under the handle.
11. Set the "Air Flow" control to 30 (an arbitrary figure that can be changed to accommodate the patient's breathing pattern).
12. Press the button on the front panel to add oxygen to the "To Patient" bag. Only add a small amount of oxygen, about 1/4 full. (The bag will only move slightly, do not fill it up.) More oxygen can be added later if the patient requires. In many cases, it is possible not to add any oxygen and perform the entire study on ambient air. In all cases, the oxygen is only to enrich the air in the circuit.

    To do a study with ambient air, before connecting the patient to the system, turn the Pulmonex on and go to position #2. When the "To Patient" bag is 1/4 full, switch the handle back to position #1. Now the system is ready to use.
13. Set the timer to 9 minutes (an arbitrary figure that can be changed at any time depending on the study procedure you prefer).
14. Place the mouthpiece in the patient's mouth. Clamp the patient's nose closed. A face mask may be used, if preferred. Place a vertex cape (#055-101) on the patient.
15. Have the patient breathe briefly on "Start" to become accustomed to breathing with a mouthpiece. The "from patient" bag will move slightly as the patient exhales.
16. Switch the handle to "Single Breath, Equilibium, #2". With a NEN Gun or syringe filled with xenon, puncture the mouthpiece's rubber with the needle and add the xenon as you have the patient take a deep inspiration. Have the patient hold his breath for as long as possible and then continue to breathe normally. Increase the "Air Flow" control to about 70, (an arbitrary figure that can be changed to accommodate the patient's breathing pattern).

    Advise the patient to breathe slowly and normally. Observe both breathing bags moving through the front panel windows. Add oxygen if the patient requires it. An alternative to puncturing the mouthpiece is to use the luer adapter plug provided with the system.

A common problem is the xenon not getting into the patient for single breath. If this happens, try again with these changes:

A. Lower the "Air Flow" control to 20 or 10 five seconds before xenon administration.

B. Puncture the mouthpiece closer to the patient.

C. Have the patient take a deeper breath.

17. When the patient reaches equilibrium (1 or 2 minutes, the counting rate on the camera stabilizes), switch to "Washout, #3". Take washout data on the camera (typical framing: first picture, 15 seconds; second, 30 seconds; third, 60 seconds). Have the patient breathe normally slowly.

18. Carefully watch the "from patient" bag. If it starts blowing up, the patient is breathing too fast. Advise him to normalize his breathing and increase the "Air Flow" speed. If the bag continues to expand up towards the glass, the patient will feel back pressure and resistance. To relieve this effect, open the lower cabinet. In the center there is a motor control. Turn it clockwise until the breathing bag deflates. Return the control to about 1/2 of its range when the study is complete. The use of this motor control will be a rare occurence. Do not adjust it unless it is absolutely necessary. If it is used, be sure to return it to its original position. To be effective, the increase in motor speed must be done before the bag is full so watch the "From Patient" bag carefully during washout.

19. When the washout is complete, remove the patient and let the system run for a few more seconds or until both bags are empty.

To prolong the life expectancy of your charcoal cartridge, do the following:

1. When the patient has completed the washout, do not leave the system running for more than 10 seconds.
2. Check the lower blower motor. It should be set on 50-60 and not increased unless a specific patient needs the extra evacuation power.
3. Make sure the drierite is replaced before it changes color.
4. Do not leave the Pulmonex in Position #3 when not in use.
5. Monitor the trap effluent at regular intervals and keep a formal record.
6. Spread studies out. If you perform all your studies in one day, xenon may break through.

Additional routine for maintenance program:

1. Remove the two breathing tubes on the back of the unit. Take one short tube about 8" and connect the two ports on the back of the unit together so that there is a C configuration made by the single tube. Place the handle in position #2 and press the oxygen button filling the unit with oxygen. Both bags should be blown up tight against the glass windows. They should remain tight for about two minutes. If they do not blow up tight or sag, you may have a leak somewhere in the system. Call us if this happens.

460496