



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

May 12, 2006

Morgan R. Olsen, Ph.D.
Executive Vice President and Treasurer
Purdue University
Hovde Hall, Room 230
610 Purdue Mall
West Lafayette, IN 47907-2040

Dear Dr. Olsen:

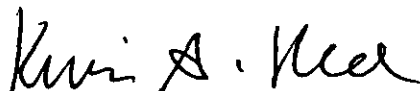
We have completed our review of your January 13, 2006, response to our November 17, 2005, letter. Our November letter addressed deficiencies pertaining to your revised Statement of Intent (SOI) and Decommissioning Funding Plan (DFP) dated November 22, 2004, which you submitted to replace the previously approved SOI and DFP dated July 25, 1990.

In addition, we have completed our review of your revised SOI and DFP dated January 13, 2006, prepared by your office to replace the University's November 22, 2004, SOI and DFP. Within the scope of our review, no further deficiencies were identified and the January 13, 2006, SOI and DFP are approved.

Enclosed you will find your July 25, 1990, Statement of Intent, which we have cancelled. In addition, we are returning your November 22, 2004, SOI and DFP which we had not taken final action to approve.

If you have any questions, please contact Kevin Null of my staff at (630) 829-9854.

Sincerely,

for 
Patricia Pelke, Chief
Materials Licensing Branch

Enclosures:

1. SOI dated July 25, 1990
2. SOI and DFP dated November 22, 2004

License No. 13-02812-04
Docket No. 030-00696

Statement of Intent

This statement of intent provides financial assurance for the licensee known as Purdue University. All activities under licenses 13-02812-04 and SNM-142 at the West Lafayette and regional campuses are covered by this financial assurance. The necessary funds will be available as needed to permit facilities to be returned for unrestricted use.

Amount of assurance:

License	13-02812-04	\$ 750,000
License	SNM-142	\$ 750,000
	Total	\$1,500,000

As Executive Vice President and Treasurer of Purdue University I am authorized to sign this statement of intent.

7/25/90
Date



Frederick R. Ford
Executive Vice President and Treasurer
Purdue University

~~CANCELLED~~



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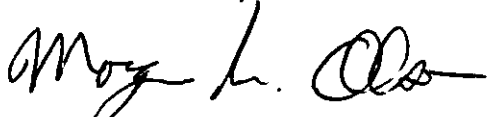
November 22, 2004

U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Statement of Intent

As Executive Vice-President and Treasurer of Purdue University, I exercise express authority and responsibility to request from the State of Indiana through the Purdue University Board of Trustees funds for decommissioning activities associated with operations authorized by U.S. Nuclear Regulatory Commission Material License No. 13-02812-04. This authority is established by Executive Memorandum C-10 entitled "Delegation of Administrative Authority and Responsibility to Officers Reporting to the President of the University". Within this authority, I intend to request that funds be made available when necessary in the amount of \$716,250 to decommission all facilities and locations identified in the above referenced license. I intend to request and obtain these funds sufficiently in advance of decommissioning to prevent delay of required activities.

A copy of Executive Memorandum C-10 is attached as evidence that I am authorized to represent Purdue University in this transaction.



Morgan R. Olsen
Executive Vice-President
and Treasurer

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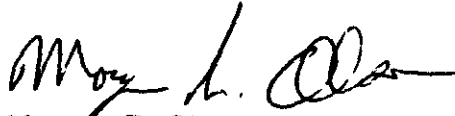
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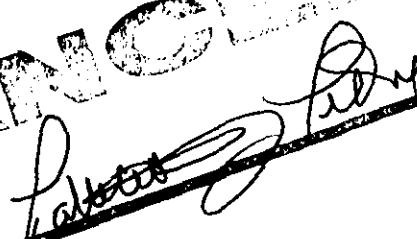
Statement of Intent

As Executive Vice-President and Treasurer of Purdue University, I exercise express authority and responsibility to request from the State of Indiana through the Purdue University Board of Trustees funds for decommissioning activities associated with operations authorized by U.S. Nuclear Regulatory Commission Material License No. 13-02812-04. This authority is established by Executive Memorandum C-10 entitled "Delegation of Administrative Authority and Responsibility to Officers Reporting to the President of the University". Within this authority, I intend to request that funds be made available when necessary in the amount of \$716,250 to decommission all facilities and locations identified in the above referenced license. I intend to request and obtain these funds sufficiently in advance of decommissioning to prevent delay of required activities.

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Morgan R. Olsen
Executive Vice-President
and Treasurer

CANCELLED



Decommissioning Funding Plan for 13-02812-04 License Purdue University

1. Historical Radionuclide Possession, Use, and Surveys.

- A. Typical amounts of radioactive materials are well below the maximum limits specified for possession in our license. The principal radionuclide utilized is P-32 with a half-life of 14.3 days. Larger quantities of byproduct material are possessed in the form of sealed sources which in general would not have a significant impact on decommissioning activities.
- B. Routine surveys of the areas where byproduct material is used have been performed on a regular basis. Significant contamination is rarely found and when any contamination (even minor amounts) is found it is decontaminated immediately. Therefore any need to engage in major decontamination activities appears to be very remote. Wipe tests performed in fume hoods and ductwork over this period have found no significant contamination and direct radiation measurements have found no fixed contamination.
- C. The health physics staff routinely "decommissions" laboratories where radioactive material is no longer being actively used. The decommissioning involves extensive wipe tests for contamination and direct radiation surveys for any fixed contamination. Only when these levels are below our release limits are these areas released for unrestricted use. There is one area where we have been unable to decontaminate the areas to levels indistinguishable from background.
- D. Contamination of a hood and ductwork with Tc-99 in a research lab will be addressed during remodeling or at license termination. It is not practical to address the contamination at this time since the interior portions of the ductwork is contaminated. The area is monitored routinely to ensure that the contamination remains fixed in place. The estimate for this work is included in our cost estimates.

Since the above historical information indicates that expected time and costs associated with decommissioning will be much lower than reference facility estimates, this will be taken into consideration when making the estimates of decommissioning costs. Therefore the reference facility estimates as described in NUREG/CR-1754, may be modified to apply to the situation at Purdue University.

2. Description of Facilities

Approximately 600 standard chemical research laboratories are used for research and development involving byproduct material. A typical research laboratory has 500 square feet (46.5 m²) of space, 100 linear feet (30 m) of lab benches, two sinks, and one fume hood. A drawing of a reference laboratory is enclosed in Figure 1.

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Special facilities include 2 incinerators, a compactor, a vial crusher, liquid disposal and waste storage area, an additional waste storage area, and a facility that has 3 glove boxes. Drawings of each area are enclosed in Attachment A.

3. Scope of Decommissioning Activities

Substantiation of the Extent of Contamination at the Facility

As has been previously stated, the majority of radionuclides used at Purdue University have a very short half-life. In fact, 63% of orders purchased during the calendar years 2003 and 2004 to date were P-32 with a half-life of 14.3 days. During this same period the percentage of orders with half-lives of less than 30 days and 90 days were 74% and 84% respectively. Contamination from these radionuclides could easily be allowed to decay in place and result in no cost other than a final radiation survey to confirm that the area is free from contamination. C-14 and H-3 comprise an additional 13% of orders during that period but the total amount of unsealed material currently on hand for H-3 and C-14 is less than 200 millicuries which is typical for license quantities.

Examination of survey records (wipe tests) of the facility were made during the period from 2003 and 2004 to date. This extensive monitoring history of our facilities is used to estimate the type and amounts of contamination that could be expected to be found at the time of our facility decommissioning. These records indicate that there has been no significant contamination in any laboratory with the exception of the hood and ductwork identified above. Minor to moderate levels of contamination (200-3,000 dpm/100 cm²) were found in less than 3% of laboratories during this time. These areas are immediately decontaminated to ALARA levels of less than 200 dpm/100 cm². In all these cases, the contamination was isolated to small areas such as equipment, absorbent paper on lab benches, and the interior of fume hoods.

It is worth noting that all of the laboratories would meet the criteria established for unrestricted use according to NUREG-1556 Vol. 11 Table S.5. However using the ALARA principal, approximately 10 - 15 laboratories could undergo some type of decontamination activity at decommissioning prior to unrestricted release of the facility.

Records regarding surveys (wipe tests) of hoods and ductwork in the facility were also reviewed to estimate the contamination that would be expected to be present at decommissioning. Past wipe tests on interior surfaces of hoods have shown contamination to be present in about 3% of hoods. At decommissioning, this would indicate that as many as 15 hoods would need some minor decontamination effort. These hoods found to be contaminated were easily cleaned using conventional (soap and water) techniques. The hood ductwork that has been wipe tested has revealed no contamination of interior surfaces of the ductwork surveyed.

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Records regarding the contamination of sinks have also been reviewed. Since sink disposal in individual laboratories is not permitted, it would be expected that contamination found in sink areas would be remote. From past monitoring, we would expect that no more than 1% (6) sinks would have to undergo decontamination at decommissioning.

To summarize the above, we would expect that decommissioning efforts for nearly all laboratories at Purdue University would be very minor for the following reasons:

1. Regular monitoring of all laboratories identifies contamination early and prevents any significant spread of contamination. Contamination is not allowed to remain on surfaces in laboratories.
2. Where possible, absorbent paper and spill containment trays are used to minimize the possibility of contaminating permanent laboratory facilities.
3. Many facilities exclusively use materials with short half-lives such as P-32. These facilities, if contaminated, can utilize decay in place to achieve decontamination.
4. Laboratories are routinely decommissioned when principal investigators leave the University, retire, or cease using radioactive material. The decontamination efforts to date have been minor and accomplished with a minimal effort. Other facilities, utilized for both the storage and dispensing of radioactive materials for nearly twenty years, were decommissioned in 1987. This effort again utilized conventional techniques and the facilities have been released for unrestricted use.

4. Costs of Decommissioning

The following individuals may be necessary to provide services in order to decommission Purdue University facilities. The salaries and estimated worker costs (including 50% overhead) are listed below:

<u>Position</u>	<u>Basic Salary (\$/yr)</u>	<u>Worker Cost (\$/yr)</u>
Radiation Safety Officer	90,000	135,000
Health Physicist	45,000	67,500
Technician	30,000	45,000
Foreman	45,000	67,500
Laborer	30,000	45,000
Craftsman	40,000	60,000

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A. Planning and Preparation

Preparation of Documentation for Regulatory Agencies

Radiation Safety Officer .08 yr x \$135,000 = \$10800
Health Physicist .04 yr x \$60,000 = \$2700

Subtotal \$13500

Development of Work Plans and Equipment Procurement

Radiation Safety Officer .04 yr x \$135,000 = \$5400
Foreman .08 yr x \$67,500 = \$5400

Subtotal \$10800

Development and Presentation of Training

Health Physicist .04 yr x \$67,500 = \$2700

Subtotal \$2700

Characterization of Radiological Condition of the Facility

Radiation Safety Officer .04 yr x \$135,000 = \$5400
Health Physicist .12 yr x \$67,500 = \$8100
Technician .50 yr x \$45,000 = \$22500

Subtotal \$36000

Total \$63,000

B. Decontamination and/or Dismantling Facility Components

<u>Component</u>	<u>Number</u>	<u>Fate</u>
Glove Box	3	Decon/Disposal
Ductwork	50 m	Disposal
HEPA Filter	1	Disposal
Laboratory Benches	50 m	Decon
Sinks/Drains	6	Disposal
Wall spaces	5 m ²	Decon
Incinerator	2	Disposal
Compactor	1	Decon/Disposal
Fume Hoods	10	Decon/Disposal
Vial Crusher	1	Decon/Disposal
Floor	20 m ²	Decon

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Health Physicist	.08 x \$67,500 =	\$5400
Foreman	.08 x \$67,500 =	\$5400
Craftsman	.32 x \$60,000 =	\$19200
Laborer	.32 x \$45,000 =	\$14400
Equipment and Supplies		\$34800
Total		\$79,200

C. Packaging, Shipment, and Disposal of Low-Level Waste

Radiation Safety Officer	.04 x \$135,000 =	\$5400
Health Physicist	.08 x \$67,500 =	\$5400
Technician	.08 x \$45,000 =	\$3600
Laborer	.08x \$45,000 =	\$3600
Subtotal		\$18000

Low-Level Waste

<u>Item</u>	<u>Volume</u>
Glove boxes	2.0 m ³
Ductwork	25 m ³
Fume Hoods	0.5 m ³
Sinks/Drains	0.2 m ³
Incinerators	4.0 m ³
Vial Crusher	0.2 m ³
Compactor	0.5 m ³
Miscellaneous	3.0 m ³
Total	35.4 m³ (1250 ft³)

Cost is estimated to be \$300 per cubic foot \$375,000

Total **\$393,000**

D. Final Radiation Survey

Radiation Safety Officer	.02 x \$135,000 =	\$5400
Health Physicist	.08 x \$67,500 =	\$5400
Technician	0.6 x \$45,000 =	\$27000
Total		\$37800

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5. Summary

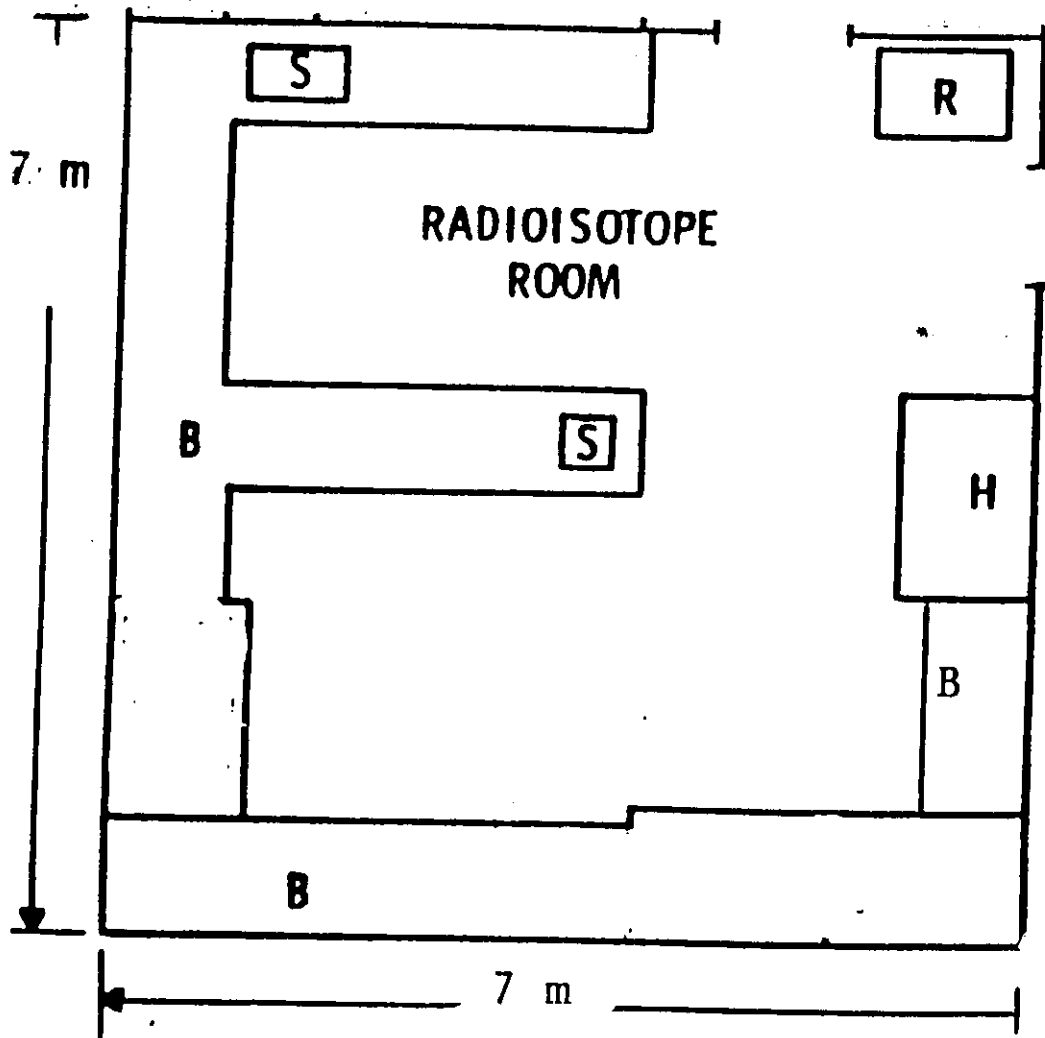
The decommissioning funding estimate above was prepared using NUREG/CR-1754. The estimates were modified to fit the specific features of our facility. Operating history has shown no significant contamination incidents and routine surveys demonstrate that no contamination is present. No sinks or drains are present in the facility that would allow for the accumulation of radioactive material. Two glove boxes (HEPA filtered) are present but no additional hoods are present at the facility.

We believe that the estimate is sufficient to return the facility to conditions for unrestricted use. However, as recommended by NUREG/CR-1754 a 25% contingency will be added to account for unforeseen expenses during the process. The cost estimate will be reviewed periodically as required by 10 CFR 30.35 to ensure that inflation, changes in site conditions, decommissioning procedures, and the cost of waste disposal is taken into account. When necessary, the estimate will be changed and our Statement of Intent adjusted to ensure the proper financial mechanism is on file with the Nuclear Regulatory Commission.

Total Cost Estimate:

Planning and Preparation	\$ 63,000
Decontamination Dismantling Components	\$ 79,200
Packaging, Shipment, and Waste Disposal	\$393,000
Final Radiation Survey	<u>\$ 37,800</u>
Subtotal	\$573,000
Contingency (25%)	\$143,250
Total	\$716,250

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Typical Radioisotope Lab

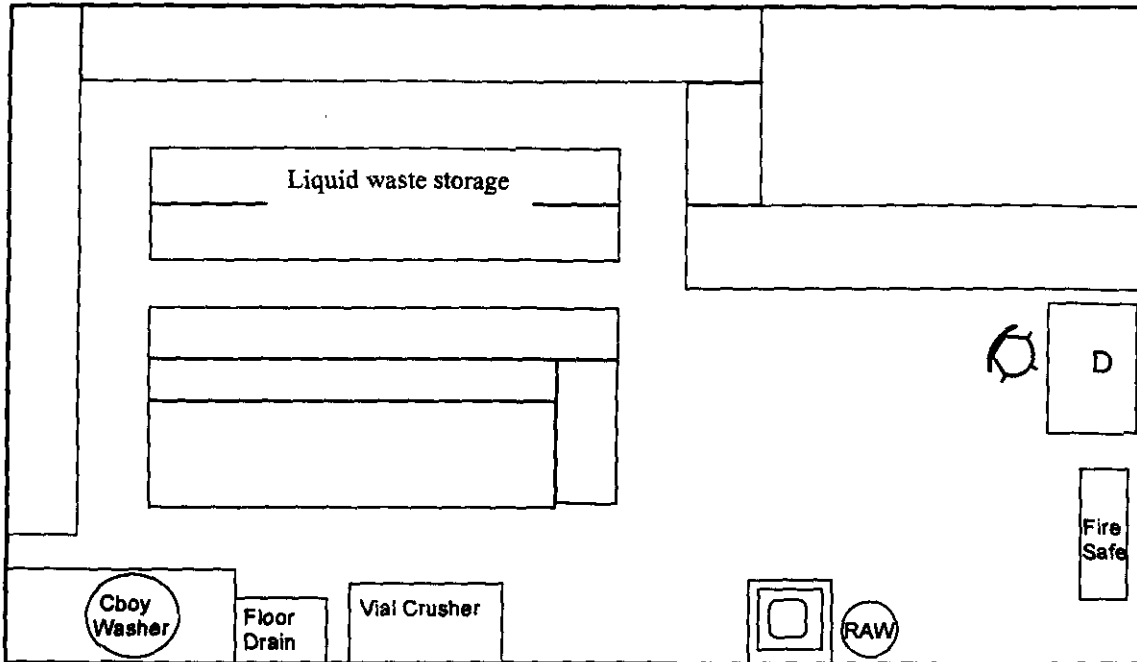
Figure 1

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**Attachment A
Special Facilities**

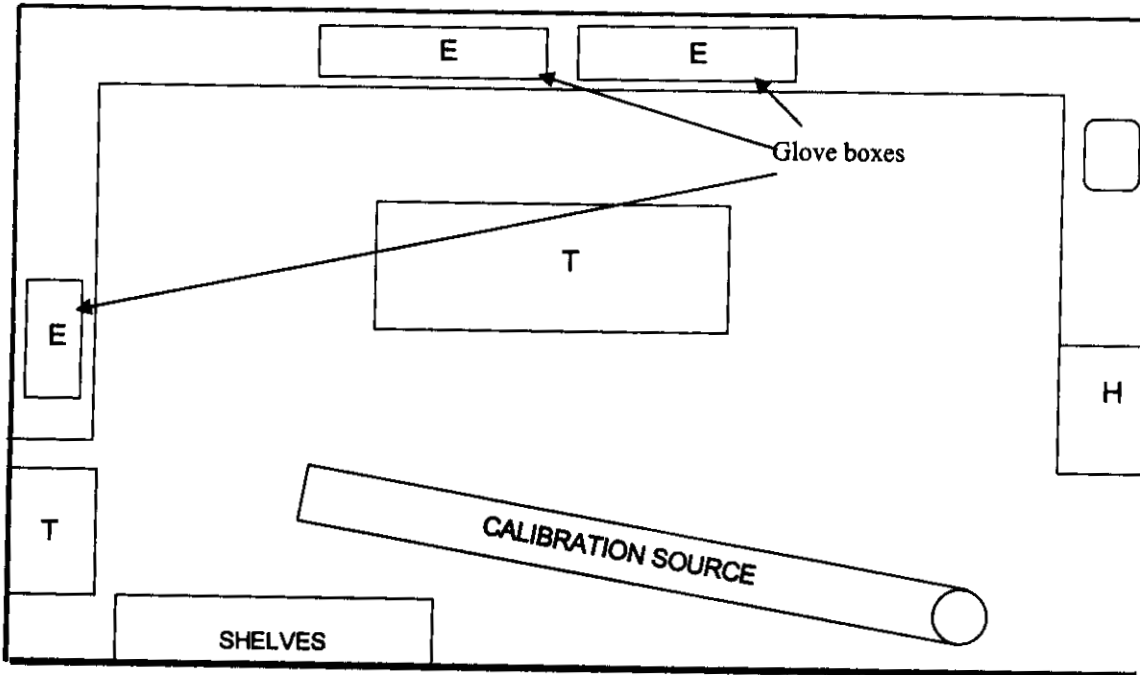
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The liquid waste storage facility is located in an academic building in close proximity to where much of liquid radioactive waste is generated. Short-lived material is held for decay and if no hazardous components are present the material is disposed of via the sanitary sewer. Long-lived material is transferred to another area where it is transferred to drum for shipment and disposal via incineration. Mixed waste is temporarily stored in this area until it is transferred to our RCRA facility. **Routine surveys have identified no facility contamination to date.**

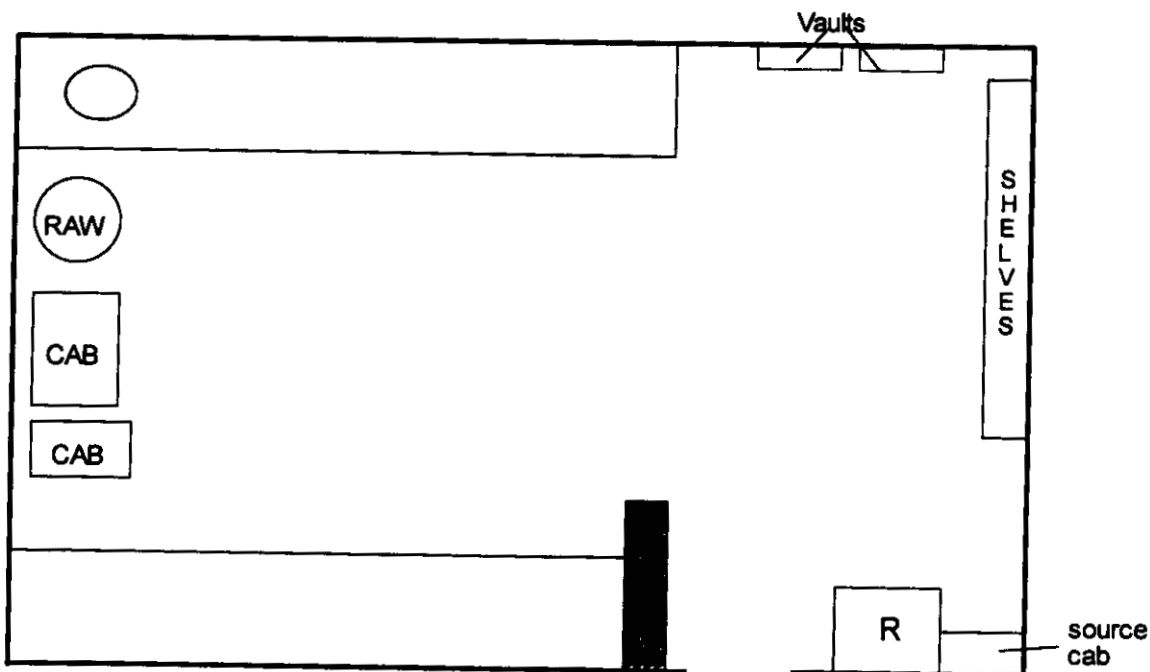


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The special procedures area is located in a basement area of an academic building. It has 3 glove boxes for use with material that has the potential for significant contamination. These glove boxes are not in active use at this time. The area is also used for storage of items awaiting waste disposal. Instrument calibrations are also performed using a nominal 65 Ci Cs-137 source. **One glove box has low-level tritium contamination.**

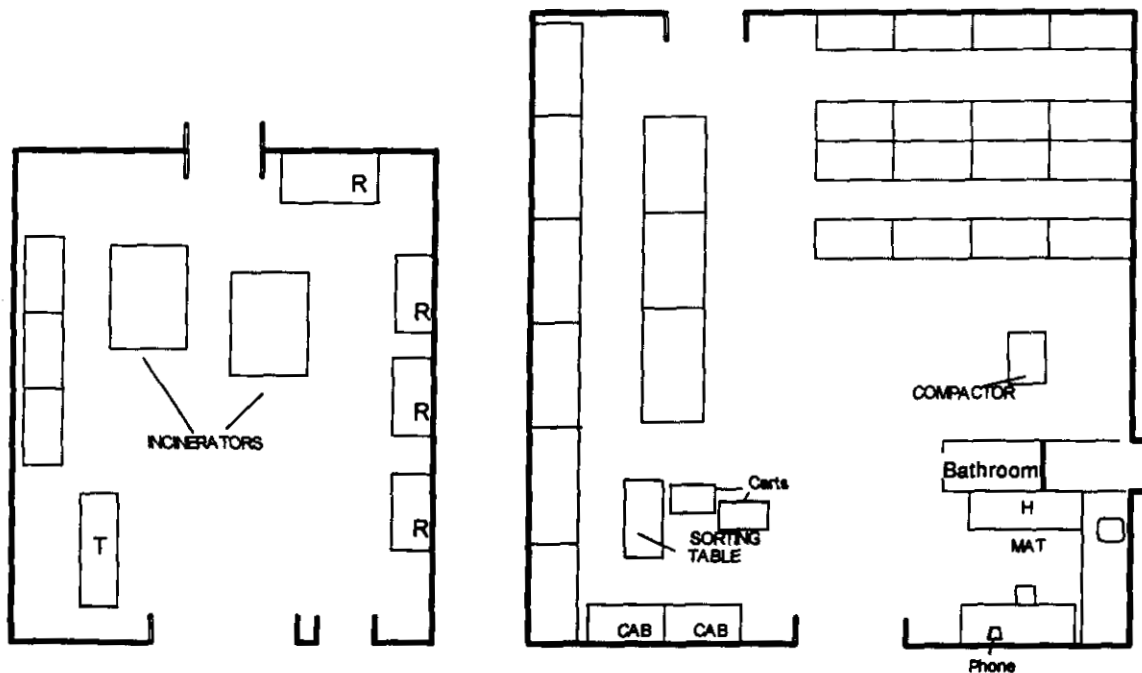


The radioisotope dispensing facility is located in the basement area of an academic building. It is the receiving and storage area for incoming radionuclide shipments. It also is equipped with lead lined storage vaults for security and radiation shielding. **No contamination has been identified in this facility to date.**



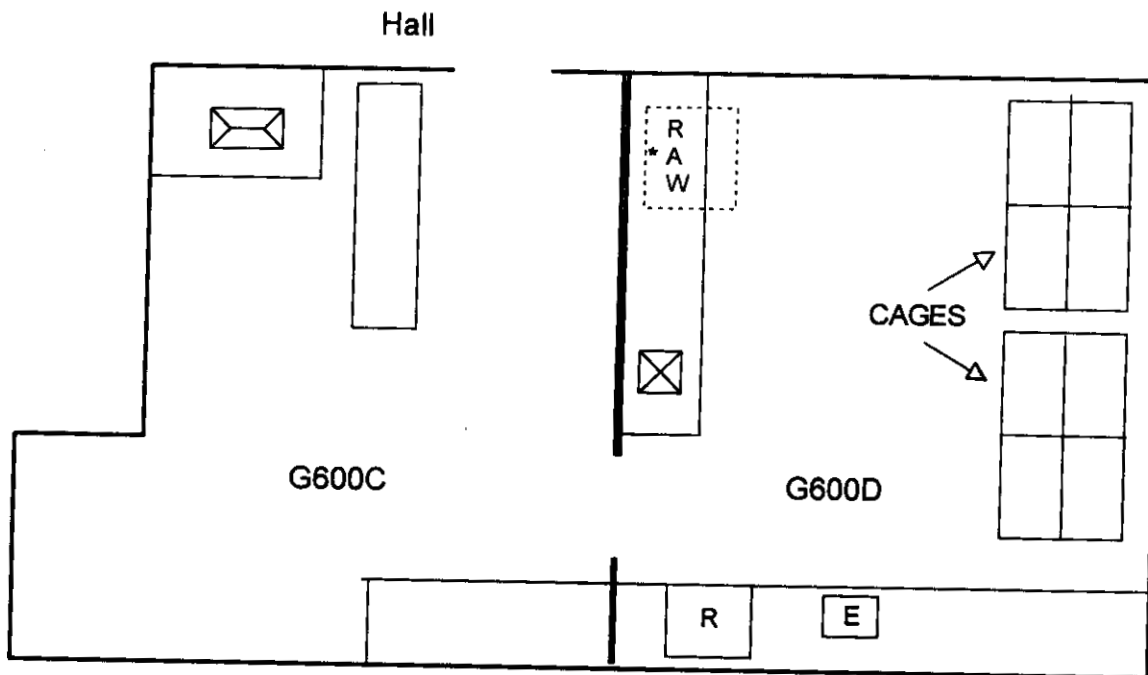
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The two waste buildings are located at a remote campus location. The building on the left houses 2 waste incinerators. Freezers are also located in this building for the storage of biological material awaiting incineration. The second building holds dry solid waste undergoing decay in storage and material that is awaiting incineration. A compactor equipped with a HEPA filter for the compaction of metal and glass waste is also located in this building. **Surveys have identified no major contamination of these facilities. Isolated spots of very low-level contamination have been identified and all areas with removable contamination have been decontaminated.**

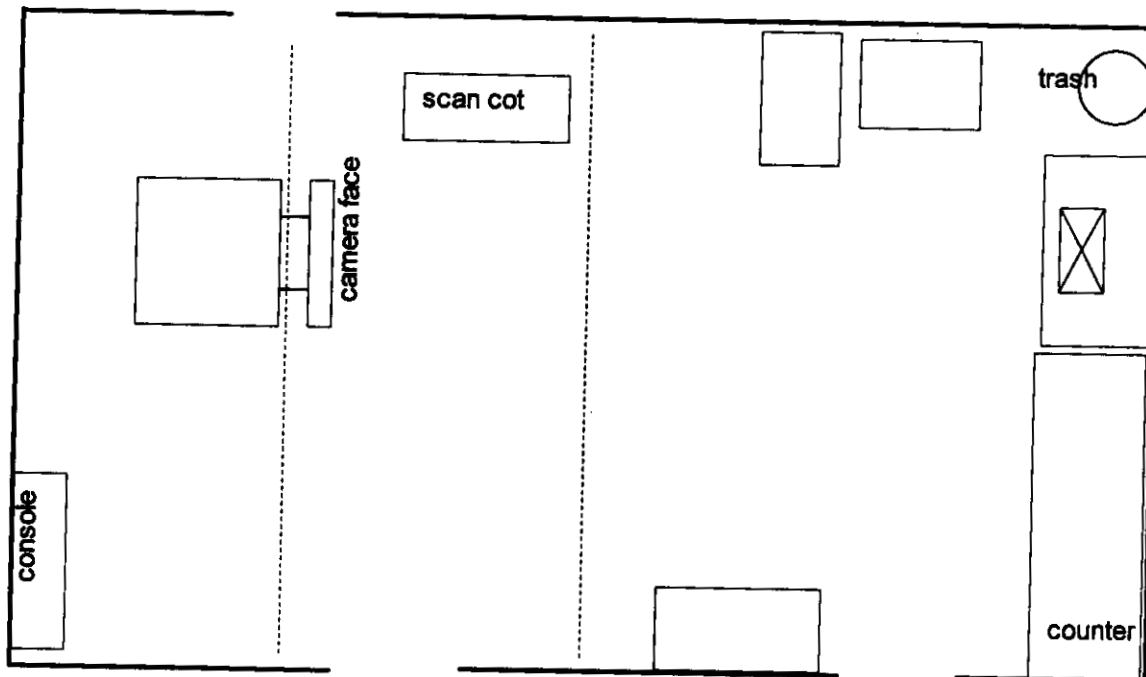


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These rooms are located in the Veterinary School complex for the administration of therapeutic doses of I-131 to feline patients. Animals are housed in this area until meeting criteria for release to their owners. **Since only short lived nuclides have been used (Tc-99m and I-131) no residual contamination should be expected.**

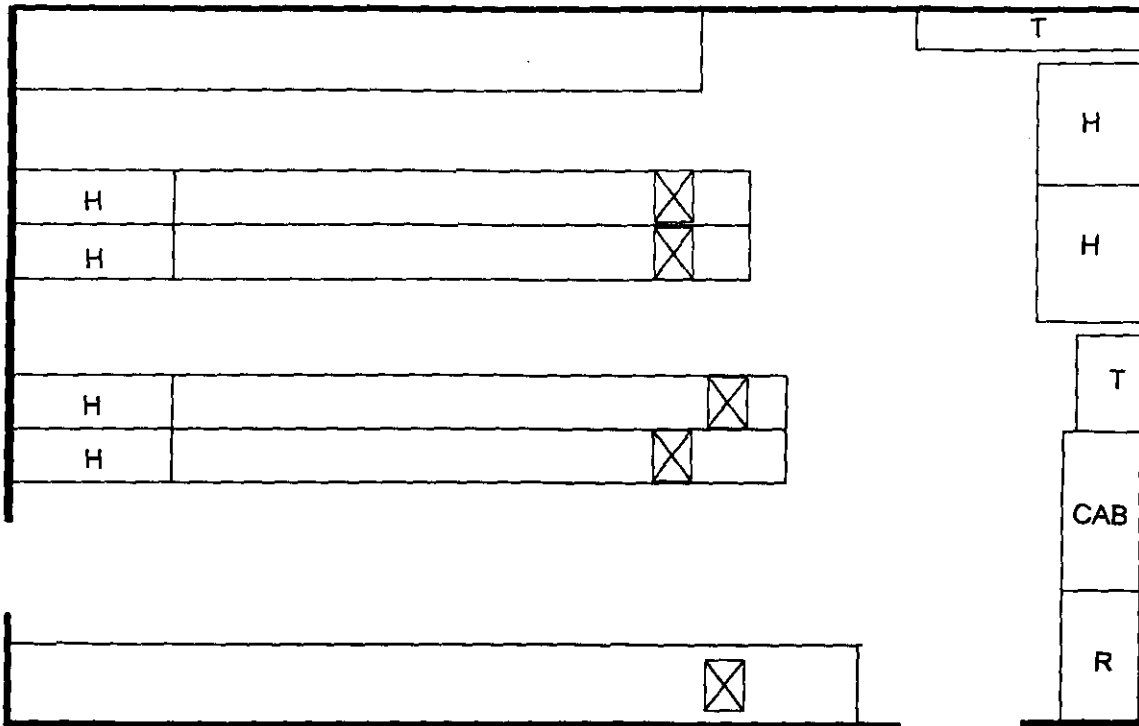


The Veterinary Nuclear Medicine room is located in the Vet School complex. The primary use of this area in performing nuclear scans (predominantly Tc-99m) on horses and small animals.

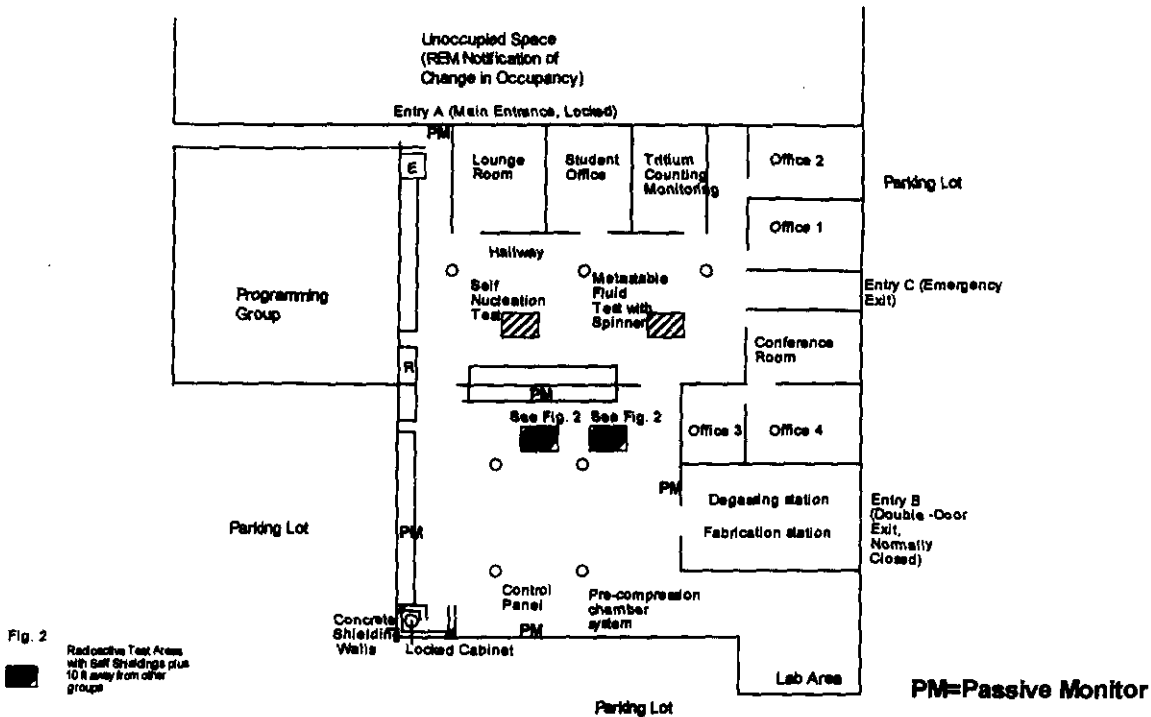


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The area below is the teaching and research laboratory for Nuclear Pharmacy. Mo-99 /Tc99m generators are utilized to train nuclear pharmacy students. Sealed sources are used for gamma camera and dose calibrator checks.

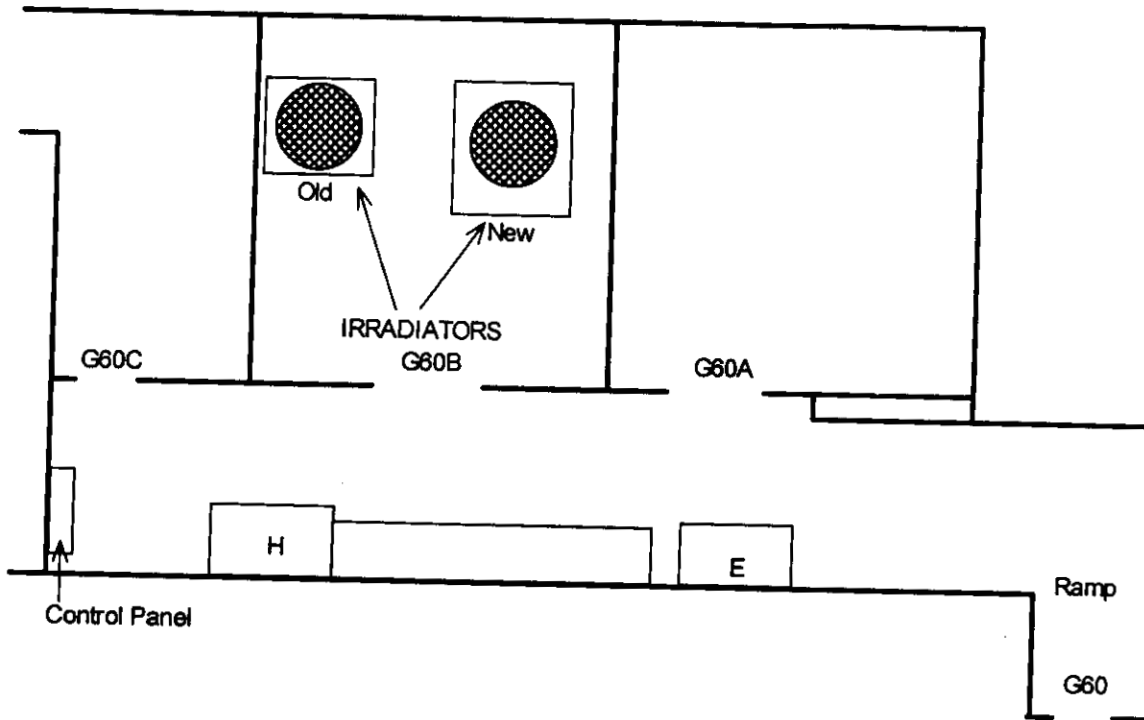


This area is used for Nuclear Engineering research at an off-campus facility. Cf-252 and a neutron generator (locally shielded with concrete or paraffin) are utilized to induce nuclear reaction to investigate the fusion process. Passive monitors are located at the facility boundaries. Only small amounts of unsealed material are in use.



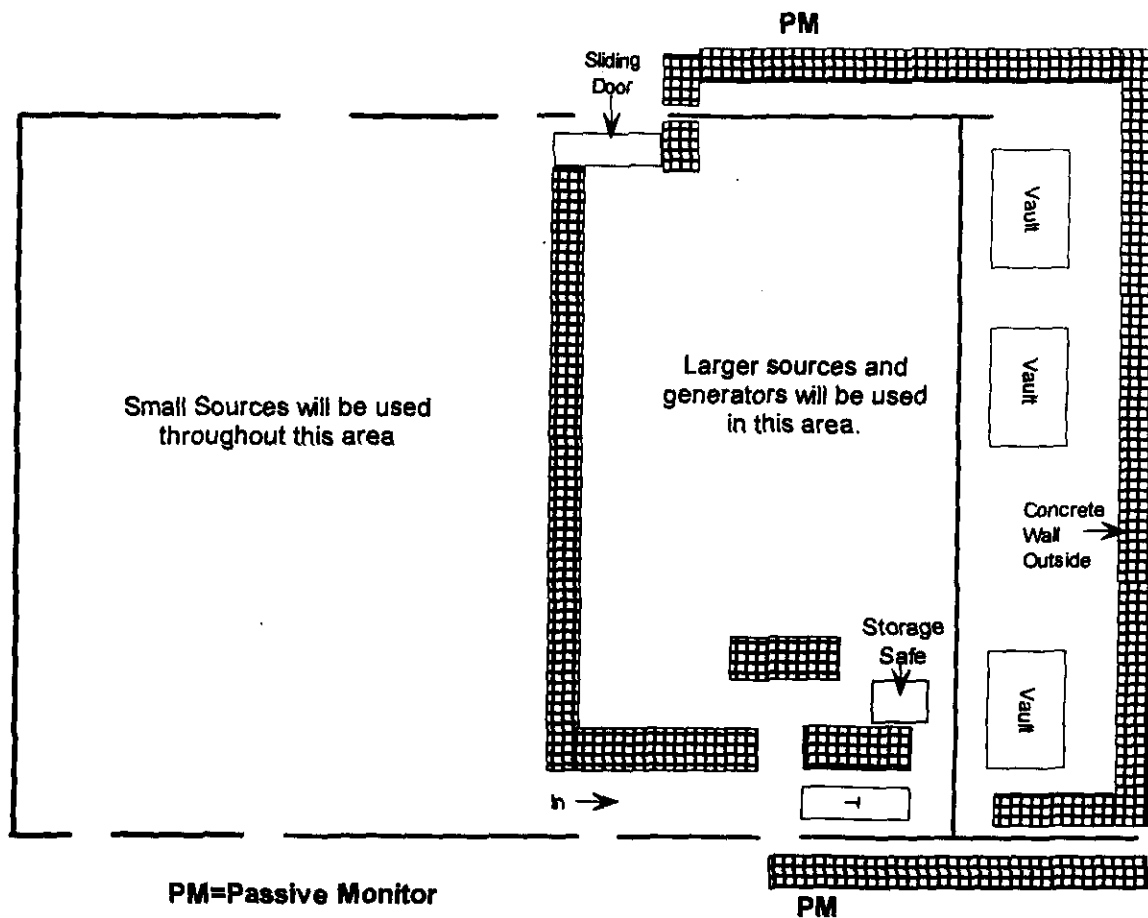
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The self-shielded irradiator area is located in the basement of an academic area. The door to the room is locked. The entry to the area is locked and equipped with an alarm that notifies University Police if tripped. **Only sealed sources in use.**

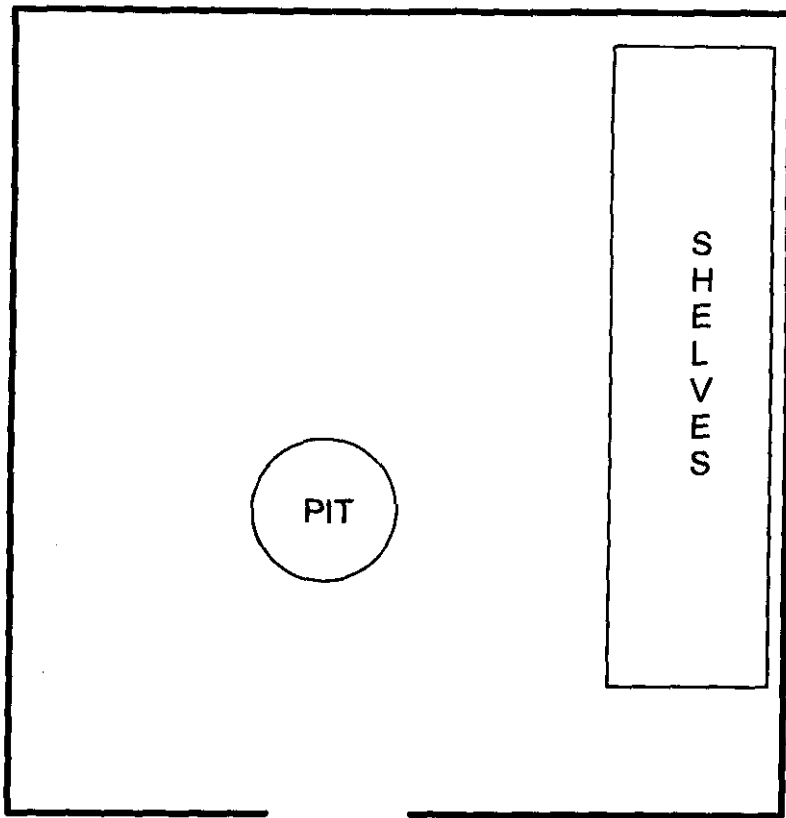


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The Physics Department utilizes Cf-252 and neutron generators at an off-campus location to perform research into the development of methods to detect weapons of mass destruction in vehicles, luggage, etc. The experimental area is shielded with concrete. **No significant amounts of unsealed material in use.**



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This room is located in our RCRA facility for the storage of mixed waste until it shipped for disposal. Unsealed materials are in containers and are put into drums for disposal. Areas are monitored for contamination after each operation. No contamination found to date.

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