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Abstract

This report documents the activities and results of the decontamination and decommissioning of the DeSoto 104 Helium Mass Spectrometer Laboratory.

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Supporting Document Summary of Change

EID-04461	No. Page 1.1 of 25

Rev.	Summary of Change	Approvals and Date
A	This revision updates the Final Surveys, Section 4.5, by incorporating the latest surveys for the facility. Appropriate references are added.	RDMeyer 9-7-99 R. D. Meyer
		for PDR 9-9-99 P. D. Rutherford
		MELee 9/9/99 M. E. Lee
	RELEASE 9-24-99 CJ	C. Vernetti for 9/24/99 S, Shah

CONTENTS

FINAL REPORT FOR DECONTAMINATION & DECOMMISSIONING OF THE DESOTO 104 HELIUM MASS SPECTROMETER LABORATORY

1.0 INTRODUCTION

Beginning in the early 1960s, Building 104 at the Rocketdyne DeSoto facility was home to a number of analytical laboratories that supported nuclear related activities being conducted at the then Atomics International Division of North American Aviation. Those laboratories supported both company and DOE predecessor agency (AEC/ERDA) funded programs. During the 1970s and early 1980s, activities involving radioactive materials were terminated. The majority of the laboratories were closed, decontaminated, released for unrestricted use and converted to office space, except for the Helium Mass Spectrometer Laboratory and the Gamma Irradiation Facility (GIF). The Helium Mass Spectrometer Laboratory and the Gamma Irradiation Facility remained in operation until May 1995, when operations terminated.

The Helium Mass Spectrometer Laboratory analyzed low-level, reactor irradiated metal test samples to evaluate steels for use in reactor cores.. The Helium Mass Spectrometer and much of its supporting equipment were DOE owned. Analyses conducted in the laboratory were dedicated to the support of DOE, its national laboratories, and other DOE sponsored programs. The laboratory equipment and the DOE programs associated with the laboratory were transferred to Batelle Northwest Laboratory (BNL) in Richland, WA in 1996.

In November 1997, the final decommissioning of the Helium Mass Spectrometer Laboratory began with removal of all furniture, fixtures, piping, conduit, floor tile, dry wall, and ceiling panels. The final activities included underslab drain line removal; ventilation system removal, including a large filter plenum located on the roof; and final structural surface cleaning. In June 1998, the Final Status Survey began and was completed in September 1998. All radiation measurements are below the Rocketdyne release limits approved by the DOE and DHS and the facility is suitable for unrestricted use.

2.0 FACILITY DESCRIPTION

The Helium Mass Spectrometer Laboratory was in Building 104 at Rocketdyne Propulsion and Power's DeSoto Complex. The location of Rocketdyne's DeSoto Complex is shown as marker ❸ in Figure 1 on the map of Boeing's operations in the Southern California. The DeSoto Complex is located at 8900 DeSoto Avenue, Canoga Park, CA, which is within the city limits of Los Angeles. The DeSoto Complex is approximately 31 miles northwest of Los Angeles International Airport. Figure 2 shows the location of Building 104 within the DeSoto Complex.

California
Southern California Region

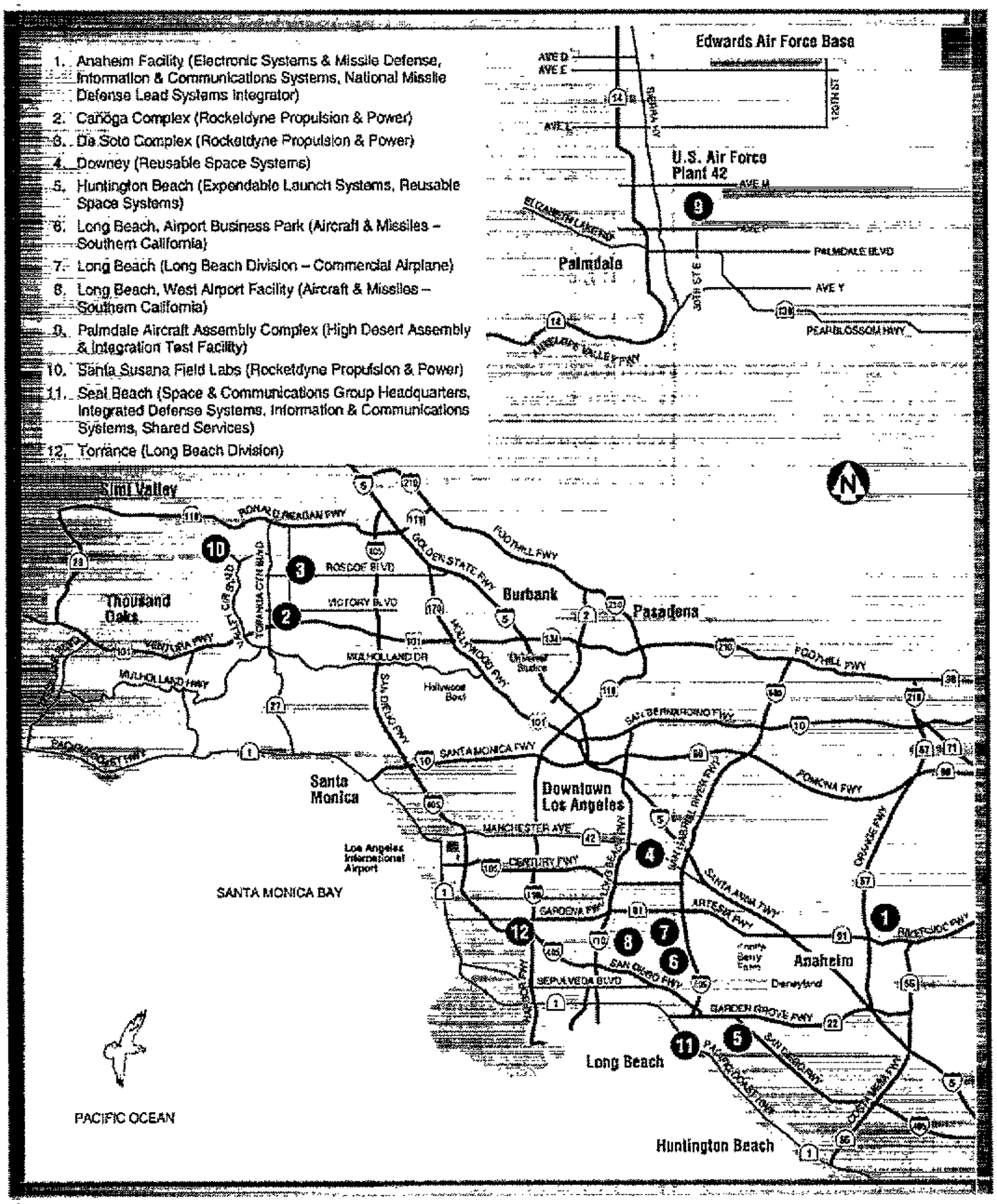

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Figure 1. Map of Boeing's operations in the Southern California Region

California – Canoga/De Soto

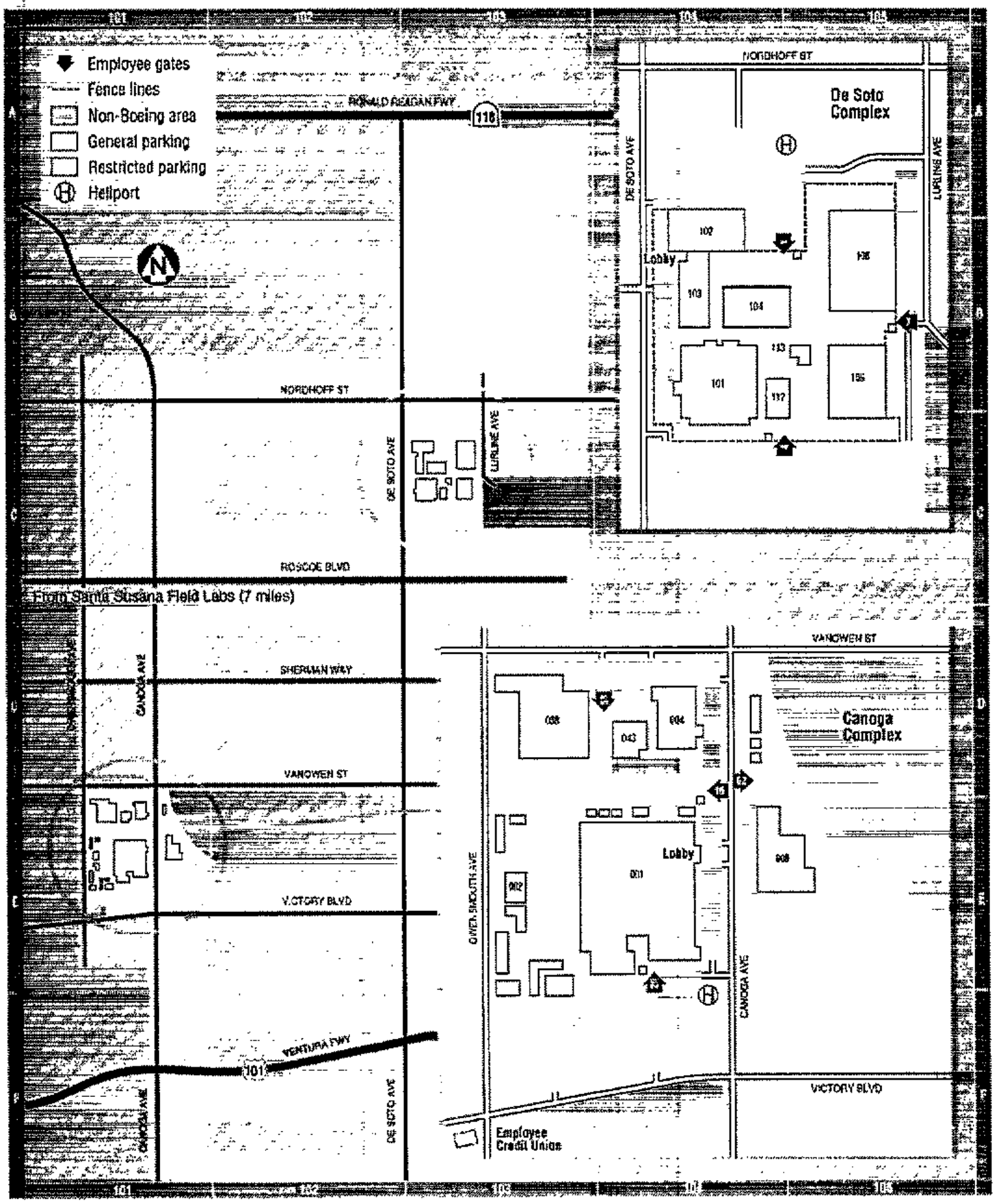

Figure 2. Map of Rocketdyne Propulsion and Power's Canoga and DeSoto Complexes

The Helium Analysis Laboratory consisted of nine rooms occupying approximately 2600 sq. ft. in the northeast quadrant of Building 104. A plan view of the laboratory is shown in Figure 3.

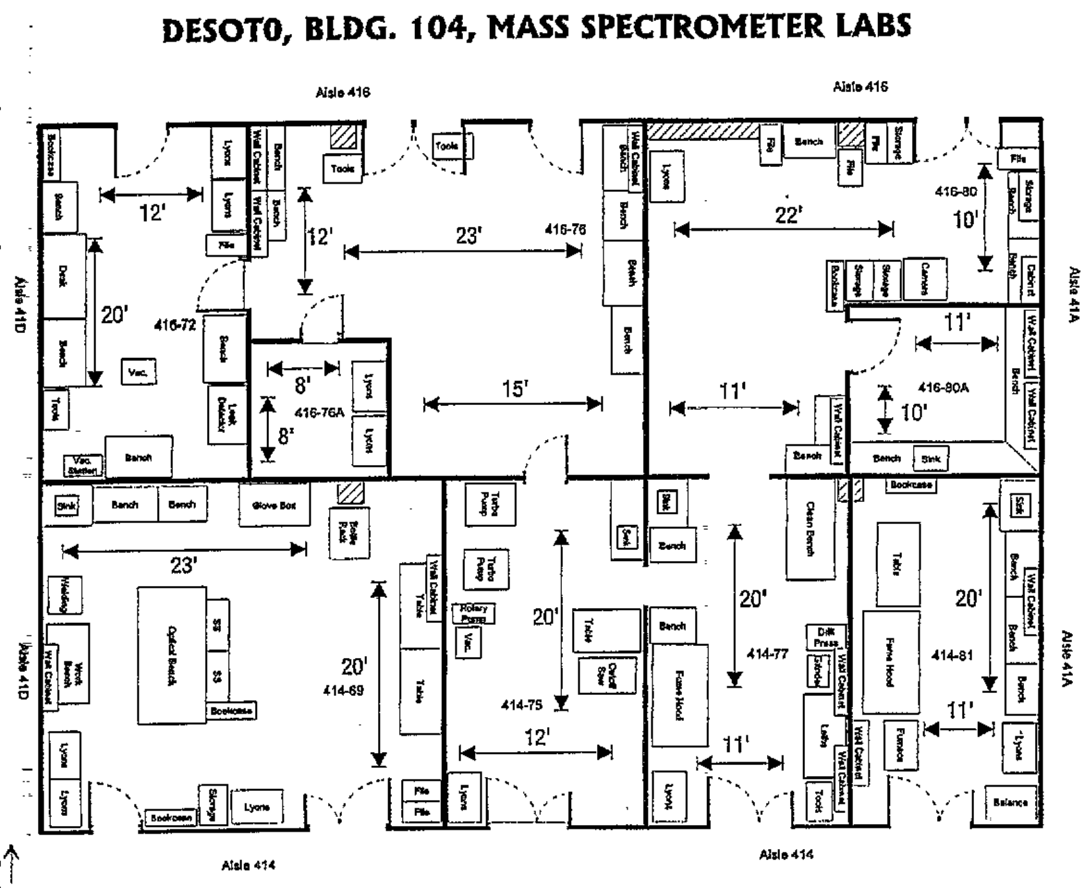

Figure 3. Plan view of the Helium Mass Spectrometer Laboratory

3.0 HELIUM MASS SPECTROMETER LABORATORY OPERATIONAL HISTORY

The laboratory utilized a high precision helium mass spectrometer to analyze milligram-sized metallic specimens irradiated in test reactors to study the effects of helium embrittlement and neutron dosimetry. Analyses conducted in the laboratory were dedicated to the support of DOE, its national laboratories, and other DOE sponsored programs. The laboratory was considered by DOE to be the national center of excellence for helium analysis work.

The test specimens were activated by exposure in test reactors throughout the DOE complex. The analytical technique consisted of vaporizing the specimens and analyzing the amount of helium present in the effluent gas. In the process, the mass spectrometer, the associated vacuum system and HEPA exhaust system were contaminated with small amounts of activation products from the irradiated specimens (typically 90% Co-60, 10% Mn-54 from neutron activated steel). In addition, some contamination of laboratory fume hoods and machine tools occurred in the handling and preparation of samples.

The laboratory was also connected to the facility radioactive water drain system. During remediation of the other radiological laboratories in Bldg. 104 during the 1980s, the radioactive drain system was removed back to the Helium laboratory perimeter. The radioactive drains within the perimeter of the Helium Laboratory were sealed and isolated to prevent further use.

In 1995 the Helium Analysis Laboratory was closed. The mass spectrometer and the majority of the support equipment were DOE property. All work performed in the laboratory was in support of DOE or DOE sponsored programs, predominately fusion reactor related programs in the latter years of operation. The laboratory equipment and the DOE programs associated with the laboratory were transferred to Batelle Northwest Laboratory (BNL) in Richland, WA in 1996.

4.0 DECONTAMINATION AND DISCOMMISSIONING ACTIVITIES

4.1 PLANNING

The planning included developing the approach, performing a safety analysis, determining the prerequisites, laying out the project schedule, developing procedures, planning the disposition of materials and wastes, convening a readiness review board, and special considerations, such as asbestos, lead paint, buried drain lines, and a large HEPA filter system (References 1-7).

In general, this project had more constraints than normally encountered because the D&D operation was performed in an area of an occupied, functional, office facility. The residents had to be kept informed about the project and its impact on normal operations in the building. Controls had to be setup to isolate the remediation work area from the rest of the building. The project was planned to cause the least interference with the occupants, including scheduling certain tasks for off-hours, weekends, or holiday periods. Because the project was indoors, fossil fuel-powered tools were replaced by electric-powered tools whenever possible.

During the planning phase of this project, plans of action were developed for possible accidental events. As a part of that process, a plan of action had been developed in the event a sprinkler head was accidentally broken. The plan provided for a two inch vacuum hose to fit over a broken sprinkler head and divert the sprinkler water outside. The plan also called for a supply of parts on hand to repair a broken sprinkler. Interestingly enough, an active sprinkler head was accidentally broken with a manlift during the D&D activities. Within minutes of the accident, the hose was attached to the broken sprinkler. Protective Services was called to shut down the sprinkler system and the broken sprinkler was replaced with a cap. The sprinkler system was back in service within five minutes. The water from the sprinklers during the first few minutes before the hose was installed was collected and stored in barrels for testing. The test results found the water was not radiologically contaminated. The barrels were sent to the hazardous waste yard for a final determination of disposal.

4.2 GENERAL D&D OF EQUIPMENT AND FIXTURES

The remediation began in November 1997. Prior to the start of remediation activities, a radiological survey identified contamination levels on equipment and materials within the area. Barrier walls were installed to isolate the affected labs from the rest of the facility, as shown in Figures 4 to 6. This prevented non-remediation personnel from entering the area and ensured containment of material within the area. The entrance to the area was enlarged to accommodate the equipment to be employed (i.e. a small forklift and a small tractor-backhoe).

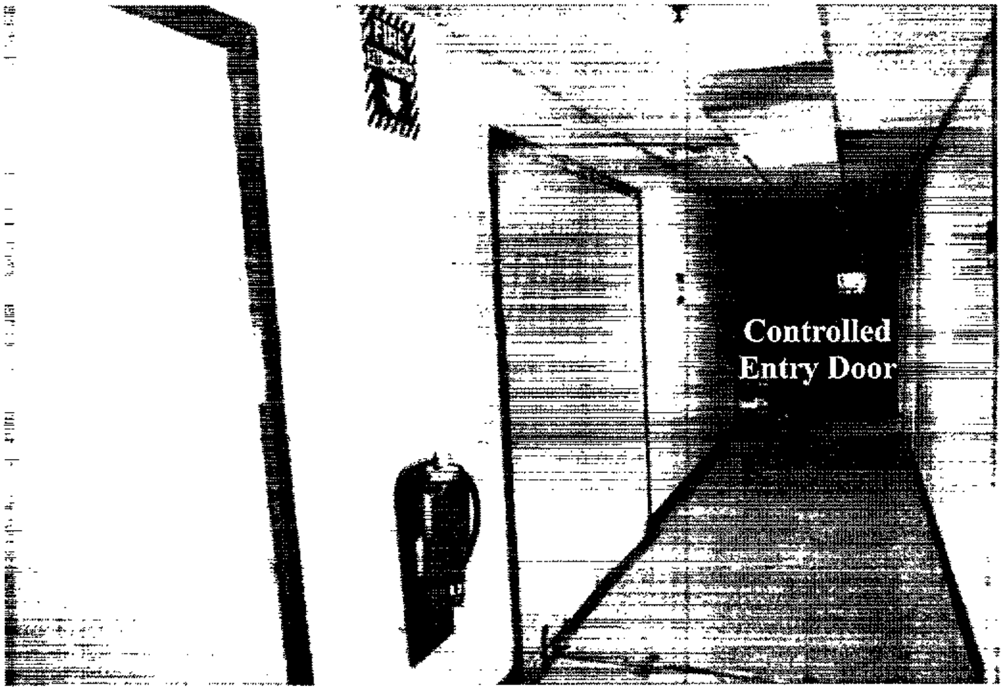

Figure 4. Barriers isolating the remediation area from the rest of the facility.

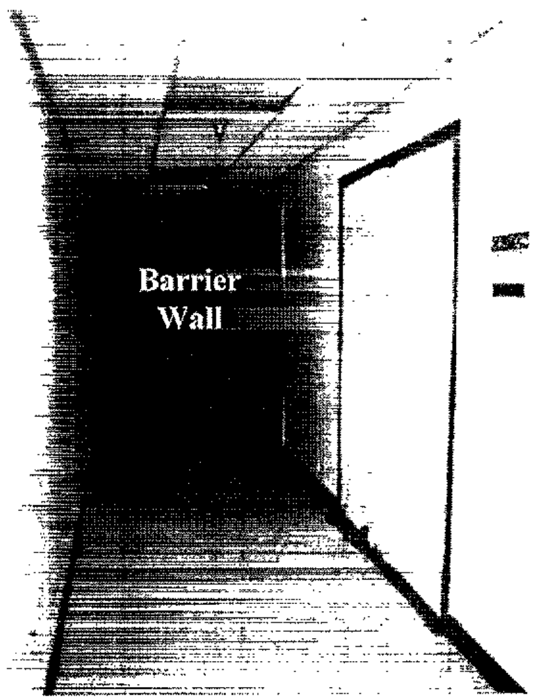

Figure 5. Barriers isolating the remediation area from the rest of the facility.

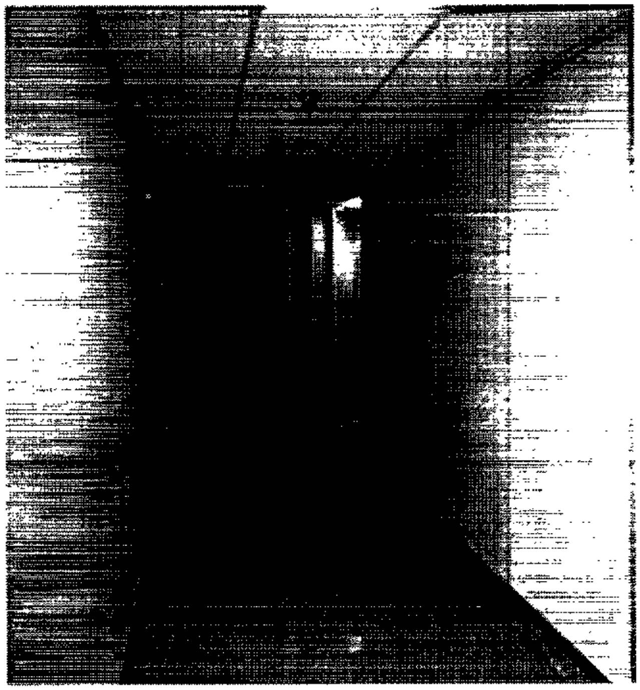

Figure 6. Barriers isolating the remediation area from the rest of the facility.

Figures 7 to 10 show typical furniture, equipment, piping, and ducting in some of the rooms in the former Helium Laboratory.

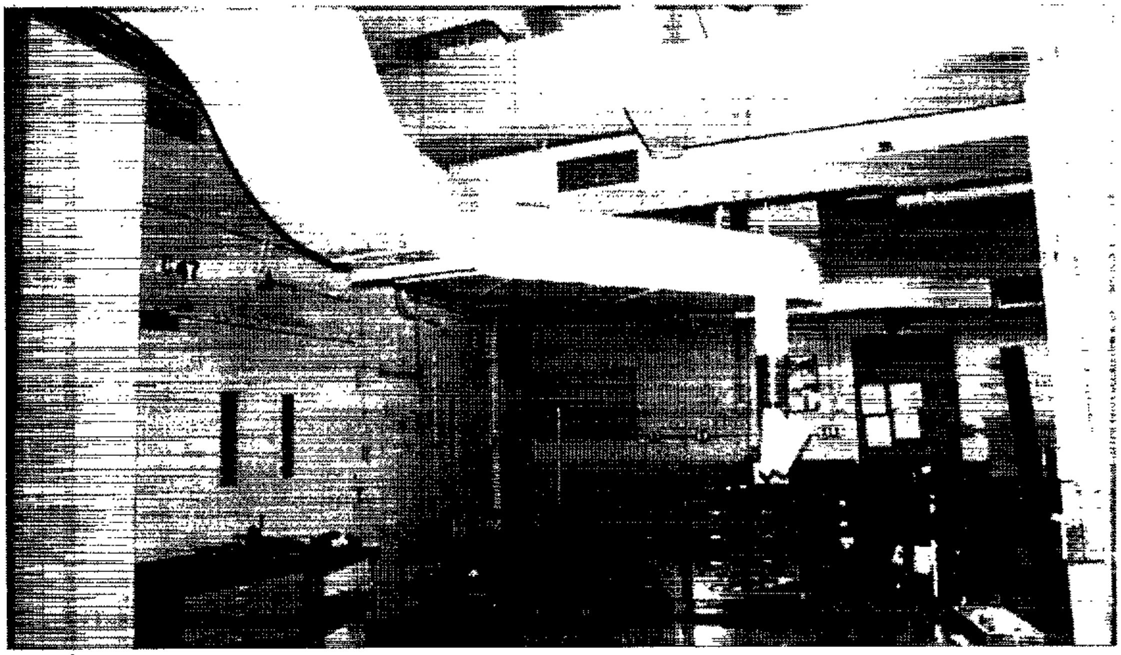

Figure 7. Typical furniture, equipment, piping, and ducting in the former Helium Laboratory.

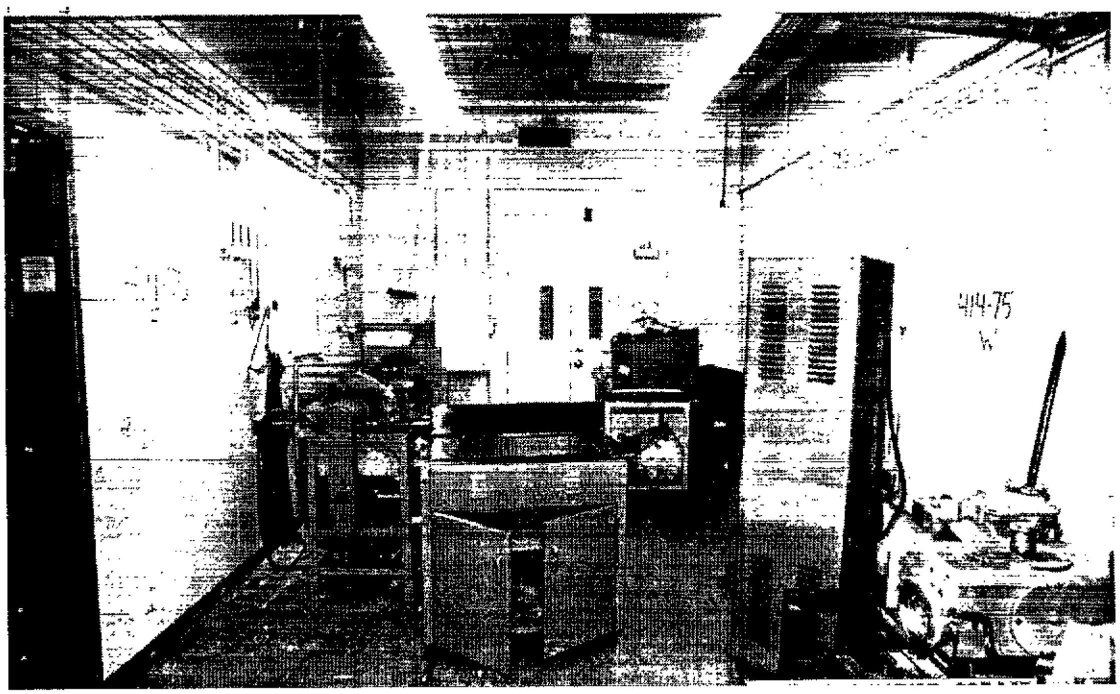

Figure 8. Typical furniture, equipment, and piping in the former Helium Laboratory.

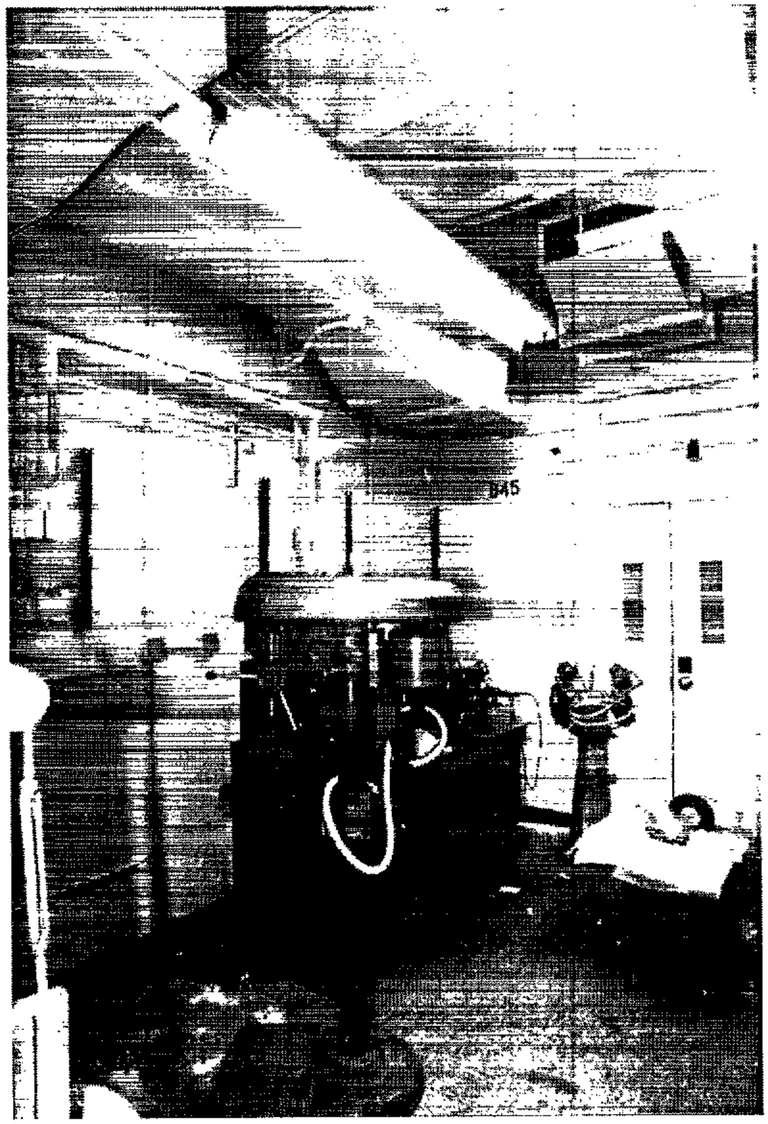

Figure 9. Typical equipment, piping, and ducting in the former Helium Laboratory.

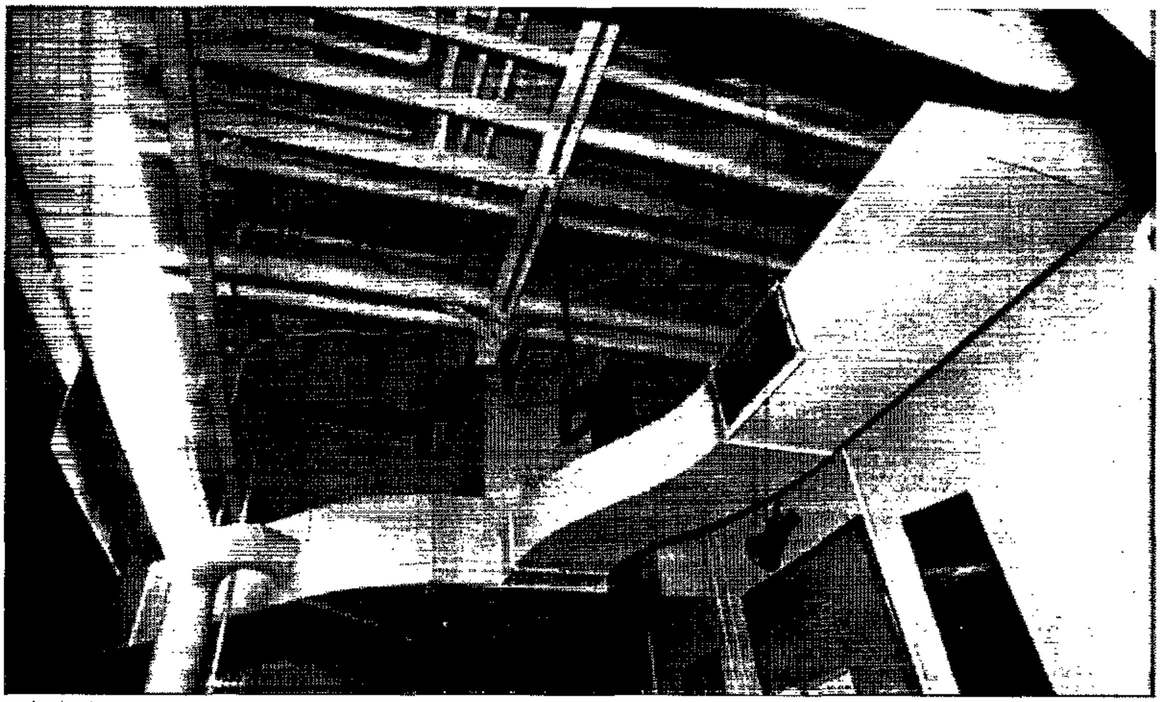

Figure 10. Typical lighting, piping and ducting in the former Helium Laboratory.

All surfaces had to be made accessible for radiological survey. This included removing drawers from furniture, examining notebooks for test samples taped to pages, and disassembling fume hoods and other equipment and structures to expose inaccessible surfaces.

Hazardous materials that had been verified and documented as non-radioactive, i.e., oils, paints, chemicals, were packaged and sent to the hazardous waste yard for disposal. Non-contaminated furniture and equipment were separated for divestment or disposal as conventional waste. Some of the contaminated equipment could be readily decontaminated to below radiological release levels. After verification of decontamination, it was released for divestment or disposal. Equipment that could not be decontaminated was size reduced and/or packaged for disposal as LLW waste in accordance with established procedures. All furniture and equipment was routed through a single checkpoint location.

After the labs were cleared of all furniture and equipment, a licensed contractor sampled and tested the entire area for asbestos containing materials (ACM) and lead paint. The ACM consisted of floor tiles, tile mastic, and some pipe insulation. A certified asbestos abatement contractor removed the ACM. The asbestos abatement was performed between Christmas and New Years when the plant was shut down. Two doors were widened to accommodate the contractor's equipment. The asbestos workers were trained in radiation safety prior to the ACM removal and all equipment used during the abatement was radiologically surveyed prior to release from the area. The ACM was packaged in accordance with established procedures as asbestos containing LLW waste for disposal at an approved waste site. The steel shot used for bead blasting the tile mastic was also packaged as LLW. Figure 11 to 13 shows the Helium Laboratory after ACM abatement. The asbestos abatement contractor returned later to remove the previously inaccessible areas of the flooring that were exposed when the partition walls between the rooms were removed.

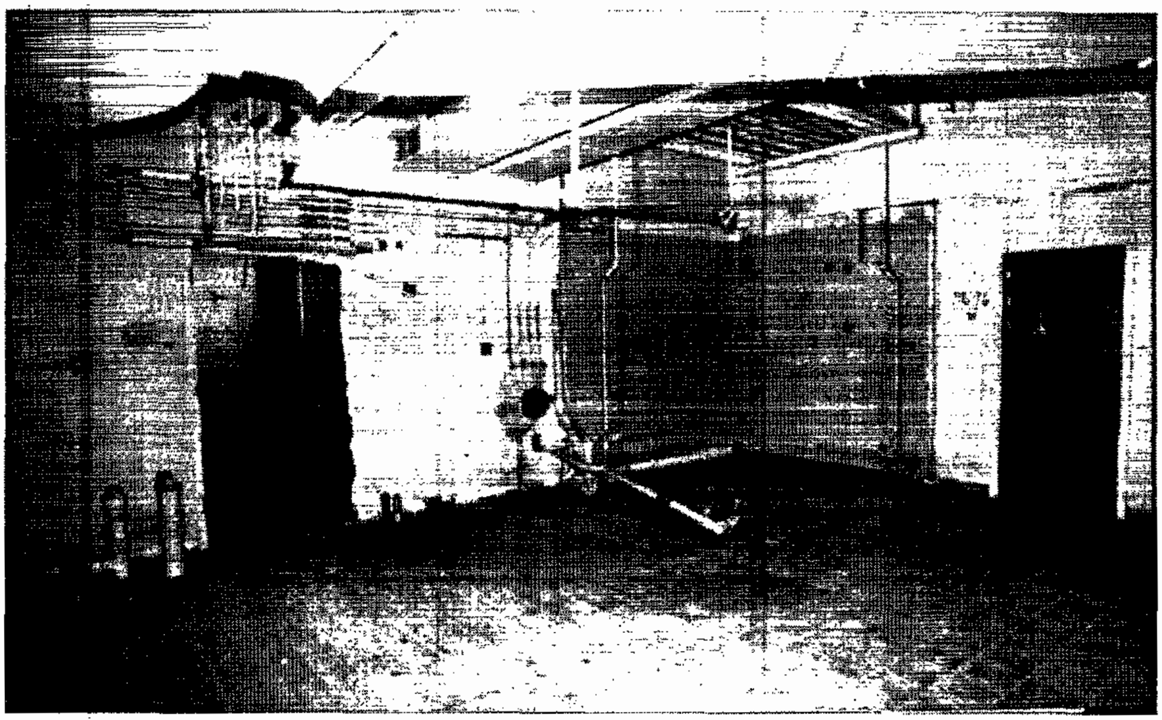

Figure 11. Room 416-76 after removal of the asbestos floor tile and tile mastic.

Figure 12. After removal of the asbestos floor tile and tile mastic.

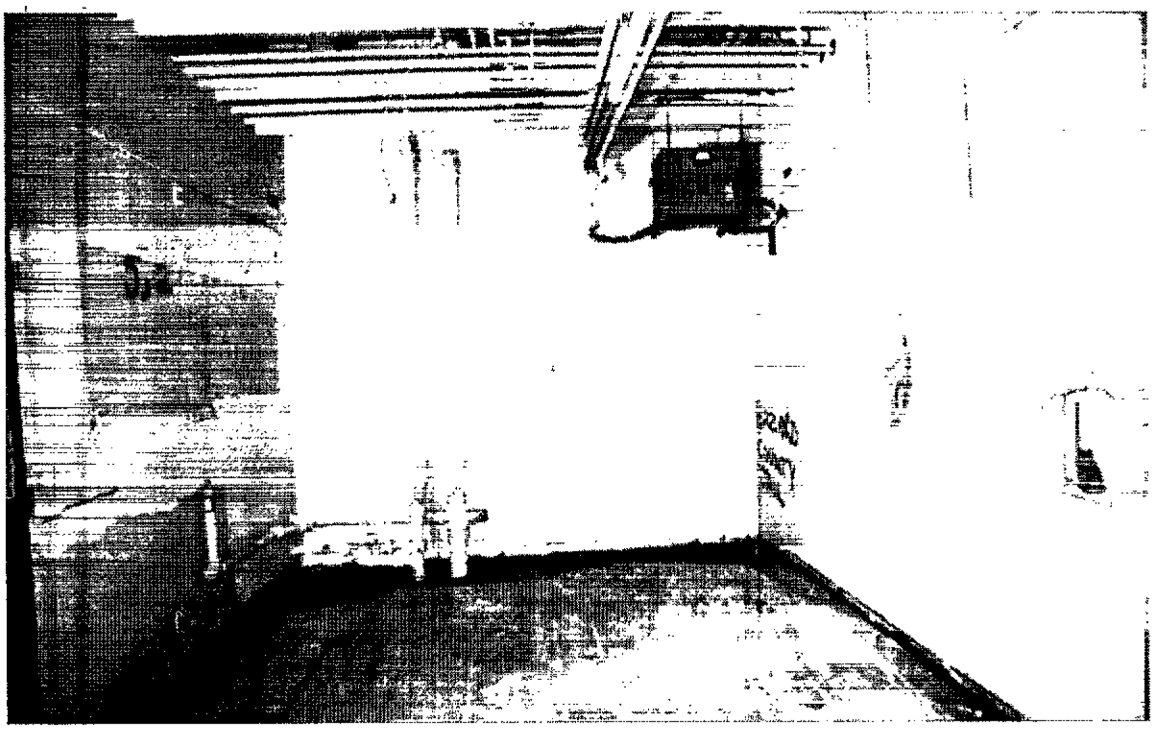

Figure 13. Room 416-72 after removal of the asbestos floor tile and tile mastic.

There were some utilities that did not service the Helium Laboratory, but passed through the Helium Laboratory to service other areas of the building. These utilities were shut down during off-hours and replaced by new re-routed utilities that did not pass through the remediation area. This would allow removal of the old electrical buses and water pipes with the rest of the utilities in the Helium Laboratory.

The remediation area was then isolated from all incoming utilities, i.e., electrical, water, natural gas, except for the fire suppression system. Because of the possible presence of PCB in the light ballasts, the light ballasts were removed and surveyed. The light ballasts were not radiologically contaminated. They were packaged and sent to the hazardous waste yard for disposal.

Fixtures, including lighting, plumbing and electrical, were removed (Figure 14 and 15), surveyed and packaged for disposal per approved procedures. Containment boxes were staged through a fenced temporary holding yard adjacent to the remediation area.

Figure 14. Removing the utilities.

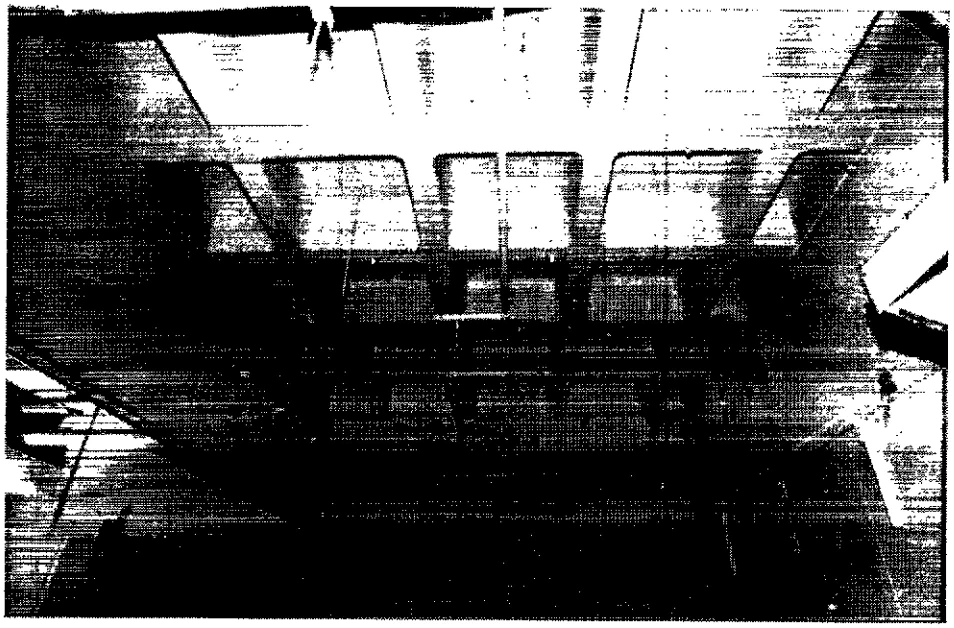

Figure 15. Removal of the utilities.

The heating and cooling ducting (HVAC) and the HEPA filters were removed up to the perimeter of the Helium Laboratory and sealed off. The HVAC ducting had been repainted in the past and radiological cleanliness could not be verified. It was subsequently packaged for disposal as LLW. Figure 16 shows some of the HVAC ducting during its removal. The HVAC ducting outside of the remediation area was modified to eliminate the impact of this project on the normal activity in the rest of the building.

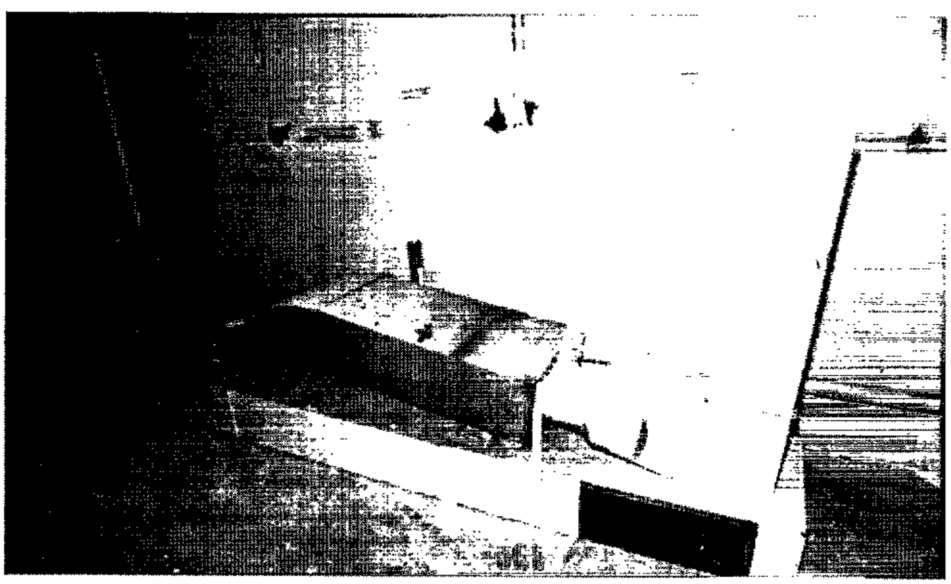

Figure 16. HVAC ducting removal.

When the rest of the building was converted to offices in the 1980's, a new wall, consisting of metal studs and wallboard, was erected around the existing perimeter walls of the Helium Laboratory. The interior walls within the laboratory areas were removed up to that exterior wall erected in the 1980's, as shown in Figures 17 to 19. Since the wall coverings were known to be repainted, all wall covering materials were disposed of as LLW waste.

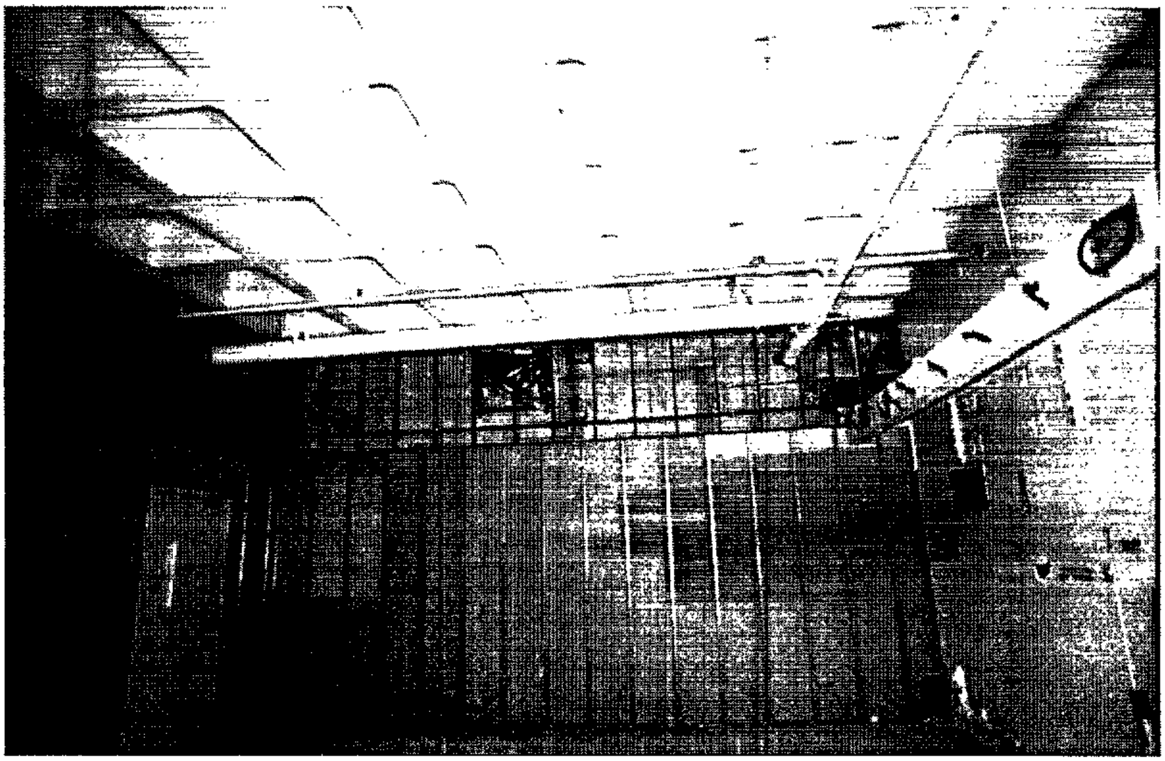

Figure 17. Removing the interior walls.

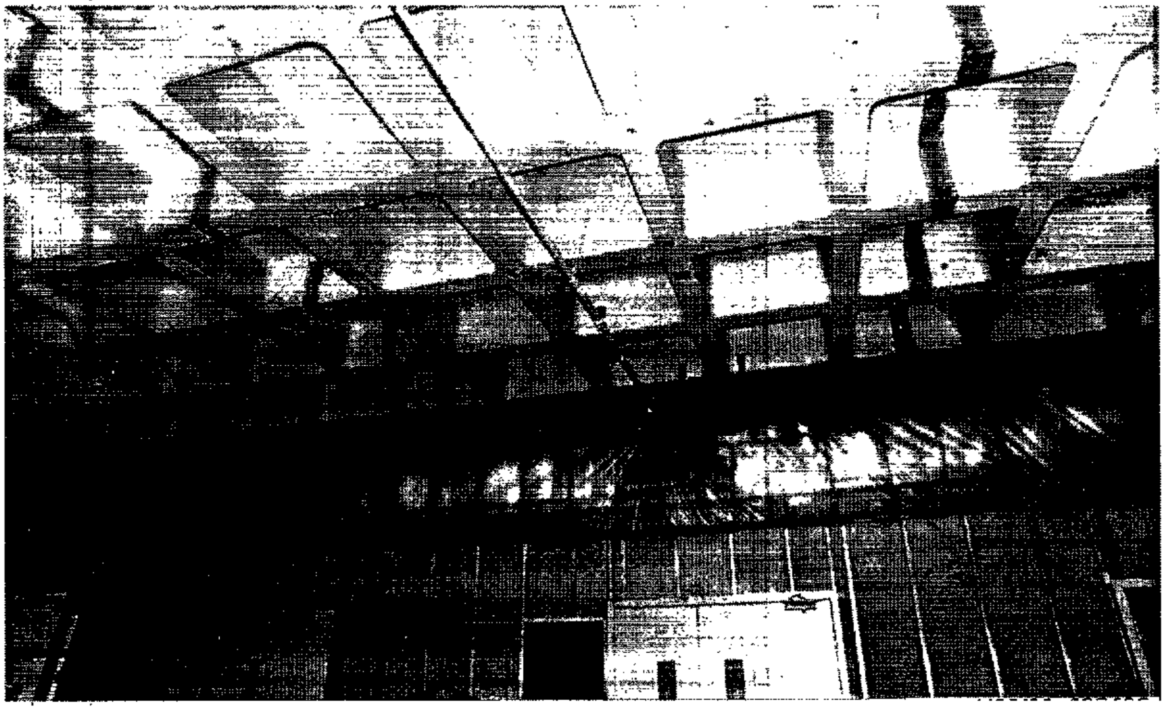

Figure 18. Removing the interior walls.

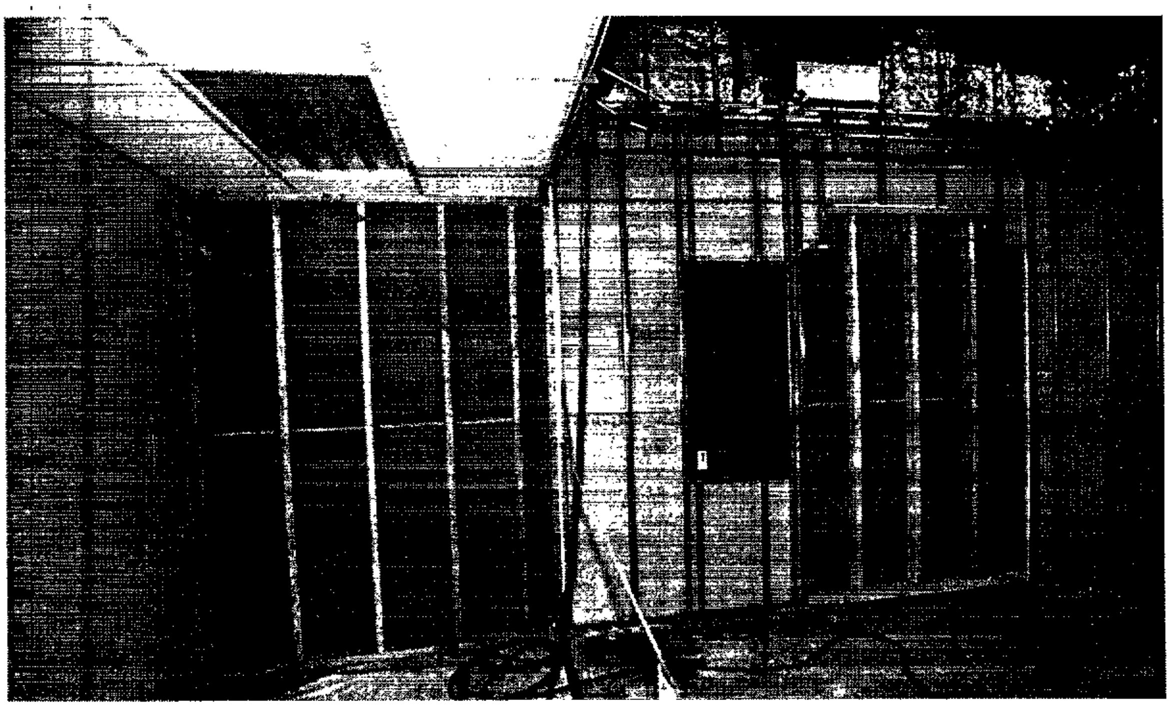

Figure 19. Removing the interior walls.

4.3 DRAIN LINE REMOVAL

There were non-functional remnants of the industrial drain and cooling water return line under the Helium Laboratory slab. The location of the underslab drain lines was marked on the floor according to the building blueprints. Structural Engineering examined the site and verified that saw cutting the slab in the marked locations would not jeopardize the structural integrity of the second floor support columns. The concrete slab was saw cut one foot on either side of the drain (Figure 20). Because the operation was indoors, an electric-powered concrete saw was used instead of a gas-powered saw. The slab was saw cut at night to minimize interference with normal activities in the building. After breakup and removal of the saw cut slab, the trench was excavated to expose the drain line (Figure 21). The initial coarse trenching was done with a small diesel powered tractor-backhoe. The diesel exhaust fumes were vented outside through a portable HEPA filter system. The final digging around the pipes was done with hand tools. During the excavation, the soil in areas that showed any detectable radiation was removed together with the soil from the surrounding area and packaged as LLW. The cooling water return line was surveyed and was not contaminated. The cooling water return line was disposed of as conventional waste. As a safety precaution during the drain removal, the workers wore respirators with cartridges for protection against mercury. The workers were also monitored for mercury exposure with lapel samplers. The results of the exposure monitors were negative. Mercury vapor analyses performed on all drain line systems were negative. The contents of the industrial waste drainline system were characterized as hazardous waste containing radioactive contaminants. It was packaged and sent to the Radioactive Material Handling Facility pending disposition of treatment and final off-site disposal. The leaded pipe joint seals were removed, surveyed, found to be clean, and the lead recycled. The drain line piping was size reduced and packaged for disposal as LLW in accordance with established procedures. Figure 22 shows the trench after the drains were removed.

Figure 20. The slab was saw cut and removed from the area over the drains.

Figure 21. A trench was excavated to expose the drain lines.

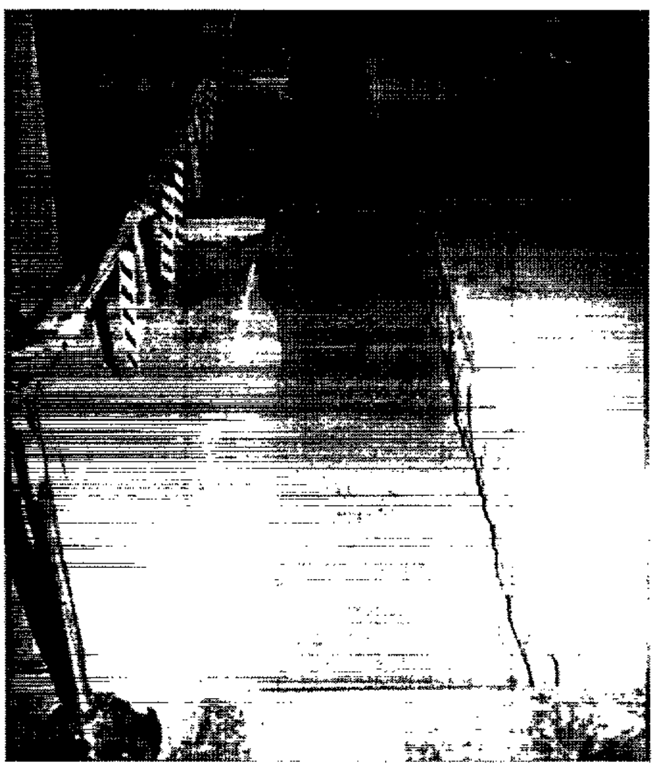

Figure 22. Trench after removal of the drain lines.

4.4 VENTILATION SYSTEM

The radioactive ventilation system consisted of fume hoods and ducting in the Helium Lab, two vertical ducts that ran through the second floor to the roof in a walled in section of the second floor, and a HEPA filter bank on the roof (Figure 23). The fume hoods were removed with the fixtures and equipment. The ducting in the lab was removed back to the vertical ducts. A radiological survey of the inside of the vertical ducts found no radiological contamination. The vertical ducts were cut in sections (during off-hours to minimize disturbance of ongoing office activities). Some of the sections were lowered into the Helium Lab and the remainder were raised to the roof. A portable HEPA ventilation system was installed while the rest of the Helium Laboratory HEPA system was dismantled. Rainwater had entered the original HEPA unit on the roof and was pumped out prior to the demolition of the HEPA unit. The rainwater was characterized as hazardous waste containing radioactive contamination. It was packaged and sent to the Radioactive Material Handling Facility pending disposition of treatment and final off-site disposal.

The existing Helium Laboratory HEPA filters had been changed after the operation of the Helium Laboratory had been terminated. A radiological survey of the system found the radioactive contamination levels were very low. The HEPA filters were removed and packaged as LLW. Because the HEPA housing was 43 feet from the edge of the roof, a helicopter was considered to lift the housing off the roof. However, it was felt the housing could not withstand the stresses involved. The results of the radiological survey indicated that it was practical to cut up and package the HEPA housing in situ. The housing was sectioned and packaged as LLW. Because the structural load limits of the roof would not support a loaded containment box, the HEPA filter housing was cut into small pieces and placed in smaller interim containment boxes whose weight could be safely transported across the roof. These small boxes were transported from the roof and then the contents were transferred within a controlled area to large containment boxes. The dismantling of the HEPA filter system necessarily created openings in the roof. Therefore, this phase of the work was closely coordinated with maintenance to minimize the time the roof was open during survey and D&D.

Figure 23. Partially dismantled HEPA filter bank on the roof.

4.5 FINAL CLEANING AND FINAL SURVEYS

The Helium Laboratory was now completely dismantled. A final structural surface cleaning of walls, ceilings and floors was performed using a HEPA-filtered vacuum system.

The Final Radiological Release Survey was initiated in June, 1998, and was completed in September, 1998 (Reference 8). This survey of the Helium Mass Spectrometer Laboratory documented that the D&D project had met its goals. All radiation measurements are below the Rocketdyne release limits approved by the DOE and DHS and the facility is now suitable for unrestricted use.

In September 1998, the Oak Ridge Institute of Science and Education (ORISE) performed a verification survey of the Helium Mass Spectrometer Laboratory. This survey confirmed that the facility met the approved limits for release for unrestricted use (Reference 9).

In October 1999, the Department of Health Services, Radiologic Health Branch (DHS/RHB) performed a verification survey of the facility. This survey confirmed that the facility met the approved limits for release for unrestricted use.

Based on the results of surveys by Rocketdyne, ORISE, and DHS/RHB, the DHS formally released the facility for unrestricted use on August 17,1999 (Reference 10).

Clean soil and building debris generated during the excavation of drain lines and demolition of the interior structure was also surveyed by Rocketdyne and DHS/RHB, and verified the absence of contamination. Based on these surveys the DHS/RHB released the material for unrestricted use (References 11 and 12).

5.0 WASTE GENERATION SUMMARY

The D&D of the Helium Mass Spectrometer Laboratory generated 47 boxes of LLW waste totaling 4,754 cubic feet with a total activity of 0.95 mCi. The LLW was shipped to Hanford in four shipments between March and August 1998.

Three hundred twenty five cubic feet of hazardous waste containing radioactive contamination from the project remains at our Radioactive Material Handling Facility pending shipment to an approved site for final treatment and/or disposal.

6.0 COST SUMMARY

The total cost of the project was $775,000. The costs were rounded and summarized in the Table 1.

Table 1. Cost Summary

Engineering Planning and Supervision	55K
Health Physicist Operations Support	50K
Operations Labor	270K
Final Release Survey and Report	170K
Maintenance and Craft Support	25K
Materials, Leases, Subcontracted Services	130K
Waste Disposal Transportation and Fees	75K
TOTAL	$775K

7.0 EXPOSURES

There was no measurable exposure to the staff from the D&D of the Helium Mass Spectrometer Laboratory.

8.0 REFERENCES

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2. 104-AN-0001, "Building 104 Remediation Plan", P. Waite and R. D. Meyer, 12/5/97

3. 104-AN-0002, "Building 104 Safety Analysis Document", P. Waite, W. McDowell, R. D. Meyer, 12/5/97

4. 104-SP-0001, "Building 104 Surface Cleaning Procedure", P. Waite and R. D. Meyer, 12/5/97

5. 104-SP-0002, "Building 104 Drainline Removal", P. Waite, R. D. Meyer, B. Sujata 1/20/98

6. 104-SP-0003, "Building 104 HEPA Exhaust System Removal", P. Waite and T. C. Venable, 2/18/98

7. N001SRR140129, "DeSoto Mass Spectroscopy Laboratory Final Status Survey Plan", P. Liddy, 8/26/98

8. N001SRR140130, "DeSoto 104 Mass Spectroscopy Laboratory Final Status Survey Report", P. Liddy, 12/16/98

9. ORISE Report 99-0983, "Verification Survey of the Desoto Mass Spectroscopy Laboratory (Building 104), Boeing North America Inc., Canoga Park, CA", June 1999

10. Amendment 103 to Radiation Materials License 0015-19 releasing the Mass Spectroscope laboratory for unrestricted use. Letter from J. Rexroth to J. Barnes, untitled, 005024RC, July 30,1999

11. Letter from Gerard Wong to Phil Rutherford, untitled, 005330RC, August 17, 1999

12. Letter from Roger Lupo to Phil Rutherford, untitled, 005427RC, August 20, 1999