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105-F REACTOR BUILDING

DECOMMISSIONING PROJECT (PHASE I) ASBESTOS REMOVAL

PHASE REPORT

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105-F REACTOR BUILDING

DECOMMISSIONING PROJECT (PHASE I) ASBESTOS REMOVAL

PHASE REPORT

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ABSTRACT

Prior to the beginning of fiscal year 1987 the U.S. Department of Energy, Richland, Washington, had a contract with UNC Nuclear Industries (UNC) to provide for the decommissioning of facilities in five separate shut-down reactor areas of the Hanford Site. The areas include the 100-B/C, 100-D/DR, 100-F, 100-H, and 100-KE/KW Reactor Sites.

The 105-F Phase I project work was performed by UNC prior to the preconsolidation of Hanford Site Decommissioning under Rockwell Hanford Operations. However, the Phase Report was finalized after the October 1, 1986 preconsolidation date.

As part of the overall long-range plan to decommission these reactors, asbestos removal from the 105-F Reactor Building was identified as necessary prior to final disposition of the reactor block.

UNC cleaned up and removed asbestos from interior and exterior piping and equipment, reducing the volume of hazardous material in the facility. This project removed 56 ft^3 of low-level contaminated asbestos waste, 1748 ft^3 of non-contaminated waste, and 300 ft^3 of contaminated bird droppings and other debris. Contaminated waste was disposed of in the Hanford Site 200 Area burial ground, and the non-contaminated waste was buried in the Central Landfill, also located on the Hanford Site. The physical work was performed by Decontamination & Decommissioning Workers (classification for Rockwell Hanford Operations personnel), wearing appropriate protective equipment, under the supervision of UNC personnel. UNC craft support was also used as necessary.

The safety record for this project was excellent. There were no first aid injuries and no lost time or OSHA recordable injuries.

The project underran the budget cost of $346,300 by $40,900 or 12%. The project was completed on schedule. The reactor building is ready for Phase II engineering and planning activities which will ultimately decommission the building pending the outcome of the National Environmental Policy Act (NEPA) process.

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to discuss and document the significant activities related to the asbestos removal phase of decommissioning the 105-F Reactor Building Facility.

1.2 Scope

This report covers the removal of friable asbestos from all areas of the building. Included are the management, engineering and operations activities that were required for asbestos removal.

1.3 Project Background

UNC Nuclear Industries, under contract with the U.S. Department of Energy, Richland, Washington, has been decommissioning facilities in five separate shut-down reactor areas at the Hanford Site. The areas include the 100-B/C, 100-D/DR, 100-F, 100-H, and 100-KE/KW Reactor Sites.

As part of the overall long-range plan (Reference 1) to decommission these reactors, asbestos removal was identified as necessary prior to final disposition of the reactor blocks. By removing the asbestos, the inventory volume of radiological waste and hazardous waste materials was reduced, thus placing the reactor building in a more stable mode while awaiting final disposition. This work is in line with the decommissioning main objective, which is to decommission all of the shut-down 100 Area facilities in the safest and most cost-effective way possible.

As of October 1, 1986, all decommissioning activities were preconsolidated under Rockwell Hanford Operations. The project work on the 105-F Reactor Building was completed prior to this date. This report is issued in the UNC format as part of completing the UNC work.

2.0 105-F REACTOR FACILITY PRIOR TO ASBESTOS REMOVAL

2.1 History

The 105-F Reactor started up February 25, 1945, and was shutdown June 25, 1965. The graphite-moderated, water-cooled reactor was used to produce weapons grade plutonium. The reactor has been maintained in a retired mode about 20 years, and will be maintained along with the other shut-down reactor sites in a safe storage mode until the National Environmental Policy Act (NEPA) process is complete. The NEPA process underway will determine the ultimate decommissioning mode. The estimated schedule for the Record of Decision is fiscal year 1988.

2.2 Location

The 105-F Reactor Building is located in the 100-F Area, one of five shut-down reactor sites that were constructed solely for the production of plutonium. These sites are located along the south shore of the Columbia River where it traverses the northern part of the Hanford Site in Washington State (Figure 1). The site boundaries of the 100-F Area, and the location of the 105-F Reactor Building within the site, are shown on the map in Figure 2, Hanford 100-F Area.

2.3 Physical Description

The reactor building houses the production reactor and related systems and equipment. Except for the reinforced concrete portions, this facility can be classified as a light, non-airtight, industrial structure. The reactor building is a reinforced concrete and concrete block structure some 250 ft long by 230 ft wide by 95 ft high. Massive (3 ft to 5 ft thick) reinforced concrete walls around the reactor block at the lower levels provide additional radiation shielding, with lighter concrete block construction above. Roof construction is poured insulating concrete and precast concrete panels. Figure 3 shows the 105-F Reactor Building which includes a reactor block, control room, fuel storage basin and associated fuel handling equipment, fan ducts for the ventilation, and supporting offices, shops and laboratories.

2.4 Radiological Condition

In previous years, the readily accessible portions of the building were cleaned of smearable radioactive contamination and areas with radiation exposure rates greater than 1 mrem/hr were identified and appropriately marked. The majority of the radioactivity is still contained in or adjacent to the reactor block and is not readily accessible.

For this phase of work, surveys were done along all sections of asbestos-covered pipe and in all areas where asbestos pipe covering was found. Surveys showed that a small portion of the asbestos covering (lagging) and debris found on the floor would require disposal as low-level radioactive contaminated hazardous material.

3.0 DECOMMISSIONING OBJECTIVE AND WORK SCOPE

3.1 Objective

The objective for Phase I decommissioning was to prepare the 105-F Reactor Building for Phase II by removing friable asbestos from all piping and equipment. Asbestos removal reduced the inventory volume of radiological waste and hazardous material.

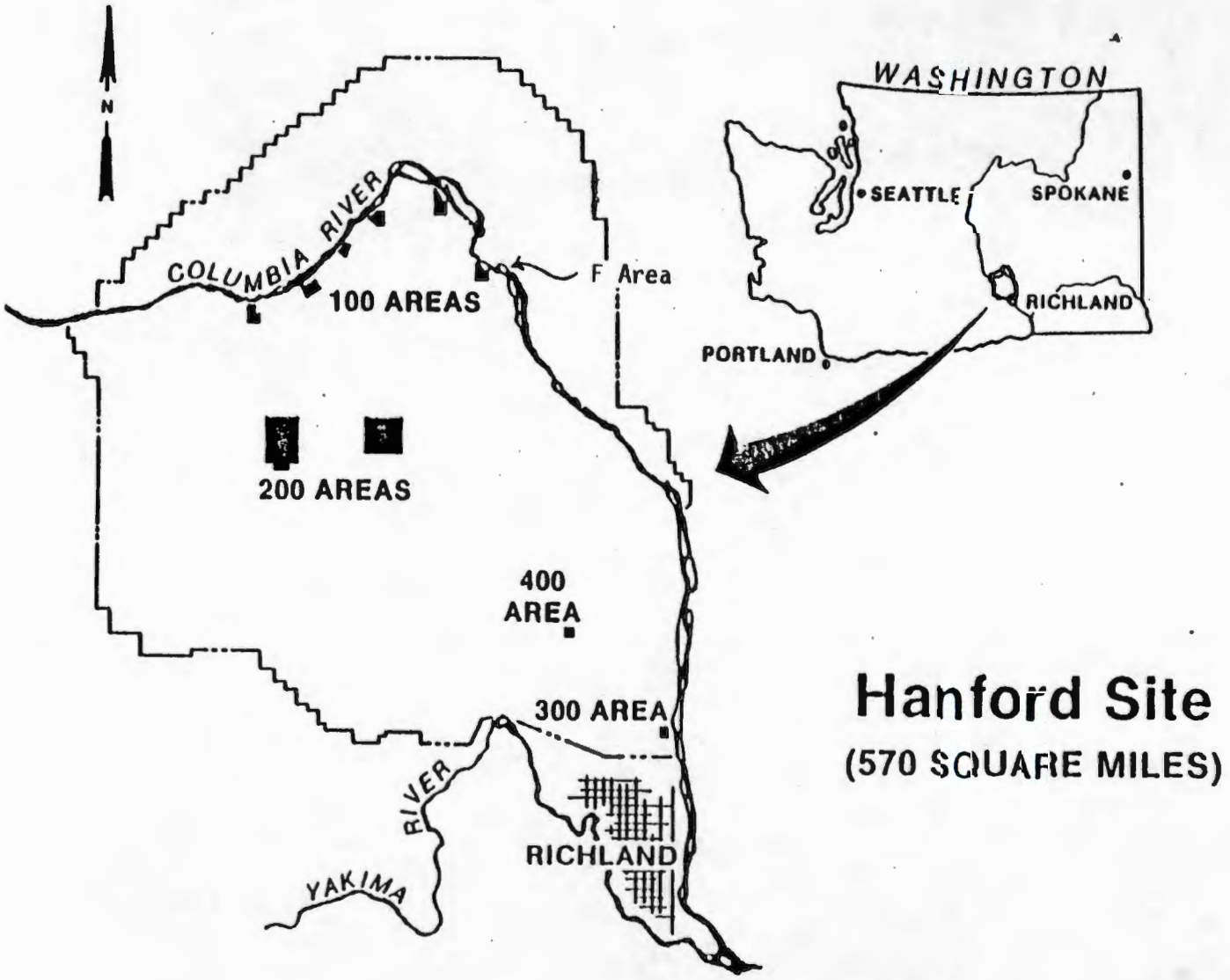

Figure 1. Location of Hanford Site

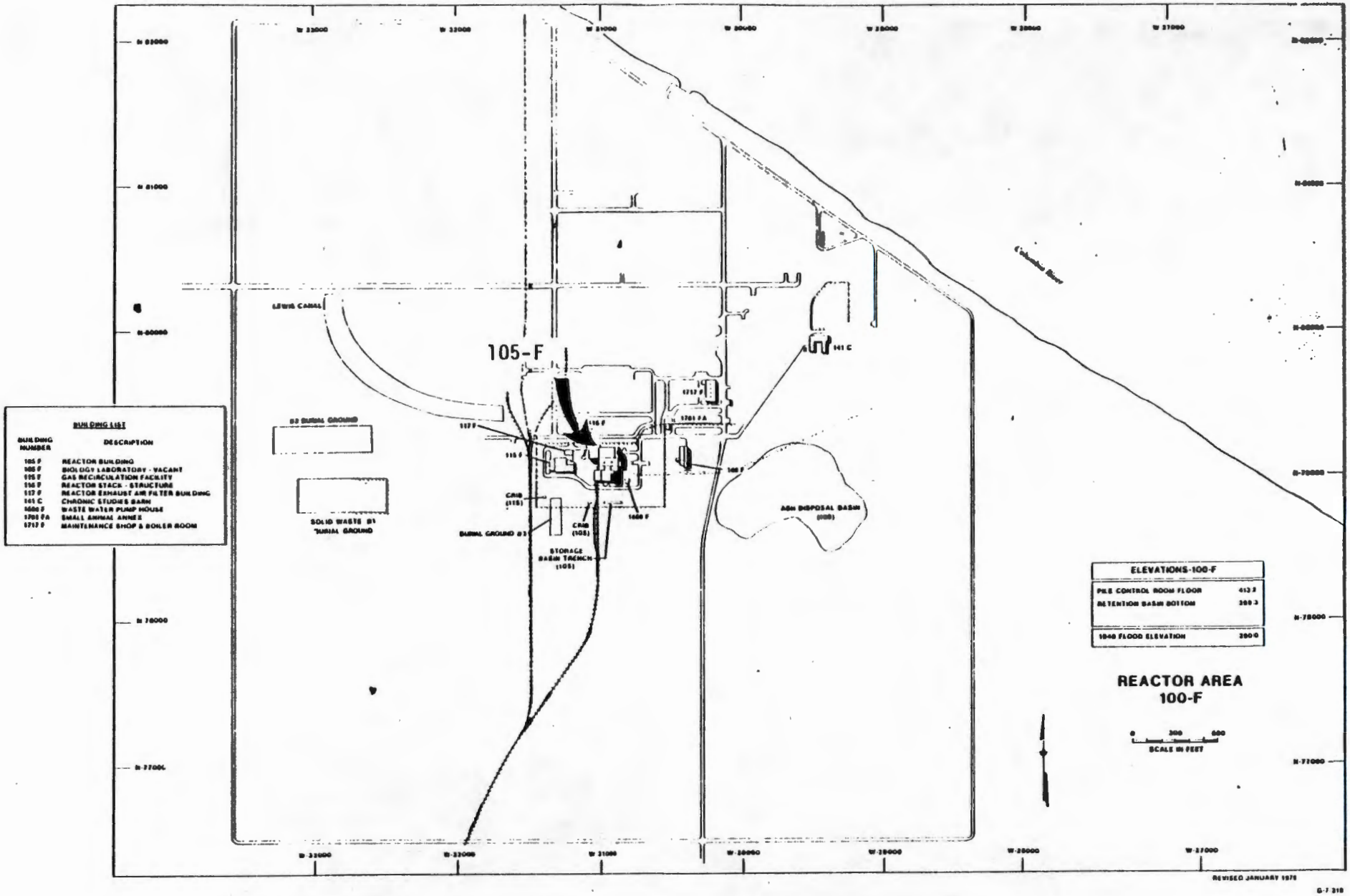

Figure 2. Hanford 100-F Area

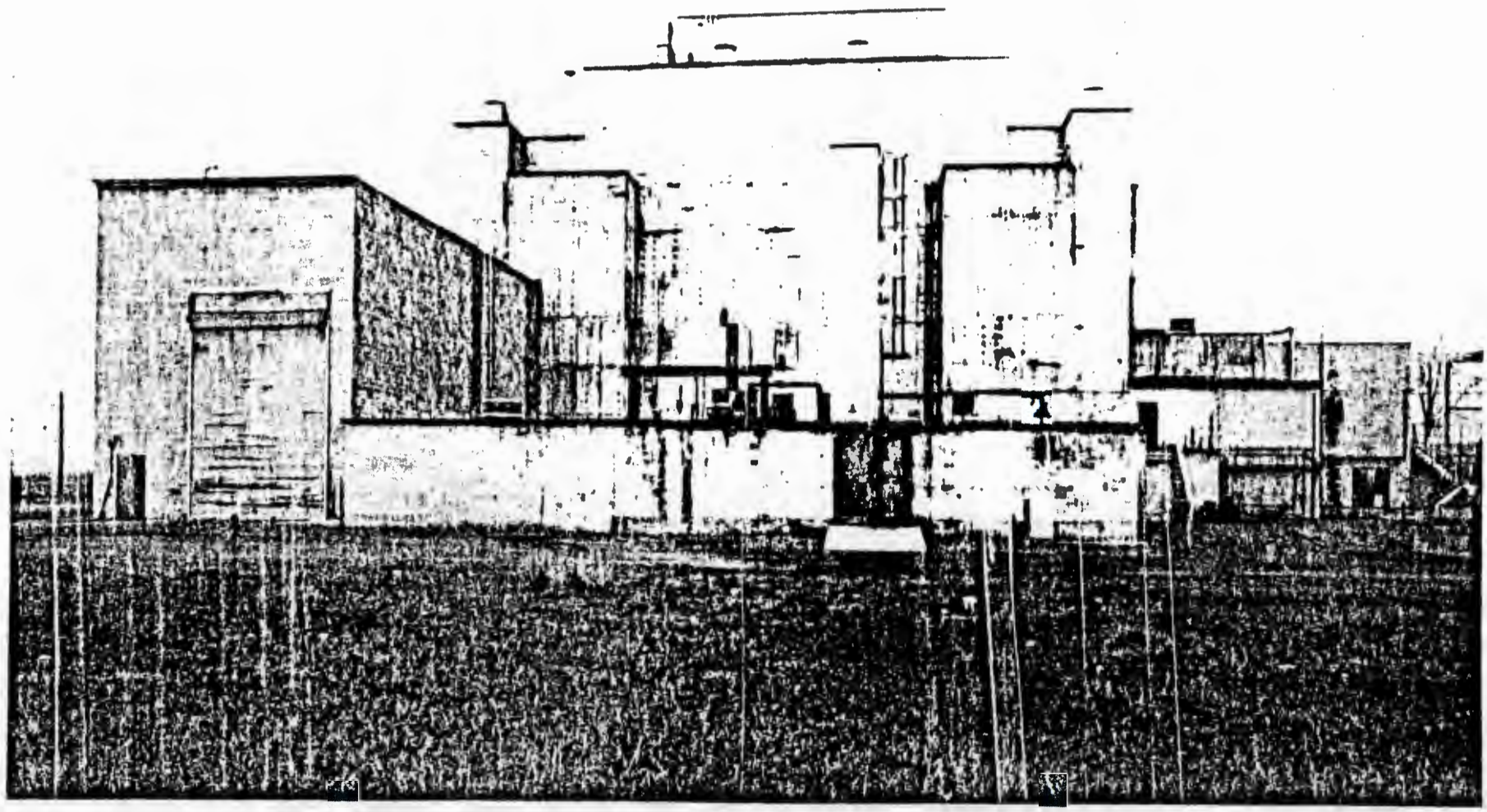

Figure 3. 105-F Reactor Building (Fuel Storage Basin/Transfer Bay South Side)

3.2 Work Scope

The work was limited to asbestos removal from piping and equipment throughout the entire 105 Building. As part of the project, all removal areas were washed down to assure residual fiber removal.

4.0 WORK PERFORMED

4.1 Project Management

Project Management is delineated in the Decommissioning Services Management Guide, UNI-3073 (Reference 2). The guide describes the decommissioning organization, responsibilities, relevant documents, and other related aspects to decommission the 100 Area shut-down facilities in a safe and cost-effective manner.

A detailed Work Breakdown Structure (WBS) and Task/Work Packages were developed for the project, so that all incurred project costs could be monitored and controlled. The requirements of UNC's Cost/Schedule Control System (C/SCS) as outlined in UNI-M-109 (Reference 3) and delineated in the Decommissioning C/SCS Implementation Plan for FY 1986, dated August 26, 1985, and approved by DOE-RL on September 23, 1985, were implemented. This system aided in monitoring and statusing the project.

The project progress was tracked and reported/monitored through the weekly subsection highlights, monthly status reports and monthly schedule statusing. Weekly schedule meetings were held as required to discuss problem areas, progress, and assign action item responsibilities.

The decommissioning project was subjected to a Decommissioning Project Readiness Review (DPRR) in accordance with UNI-M-176 (Reference 4). The process, subject to DOE-RL and management review up through the Director level, assured that every effort had been taken to make the job as safe as possible, avoid delays, and to be certain that all necessary approvals were in place. Only when management was convinced that all aspects of the project were covered and all organizations were ready to support the project was actual work allowed to commence.

As part of the requirements for keeping both management and DOE informed of the progress on the project, Decommissioning Engineering was responsible for obtaining photographs of the projects before, during, and after decommissioning. These photographs become part of the permanent project documentation and are extremely useful in making presentations to DOE and all management levels within UNC.

4.2 Decommissioning Engineering

Prior to removing asbestos from 105-F, a Decommissioning Project Readiness Review (DPRR) was prepared by Decommissioning Engineering. The DPRR covered the documentation required to remove asbestos from the facility. The documentation included a Detailed Work Procedure (DWP), Job Safety Analysis (JSA), a Safety Hazard Assessment, an Environmental Evaluation Checklist, an Authorization to Proceed notice, and a Radiation Work Permit (RWP). The purpose of the documentation was to ensure that the project was performed in a safe and efficient manner. Prior to finalizing the DPRR and as part of the overall process, Engineering and Operations made a walk-through of the building (with Radiation Monitors from Radiation and Water Quality Control, R&WQC). A DWP (105-F-1) and RWP were written to cover the necessary requirements to remove asbestos.

The DPRR was approved on June 5, 1986, allowing the Operations Subsection to begin physical work in all areas of the facility.

4.3 Decommissioning Operations

4.3.1 Site and Facility Preparation

Site and facility preparation were performed by Surveillance and Maintenance (S&M). Air locks made of plastic sheeting were installed appropriately. Power and lights to the 105 facility were upgraded. The refurbishing also included the lunchroom, dressing room, shower room and provided sanitary water to the facility. Plywood sheets were laid down in the fuel storage basin area, to provide an even footing surface for workers. (The storage basin area had been filled with soil in previous years.) A swarm of bees was removed from the facility by PNL.

4.3.2 Asbestos Removal Sequence

General cleanup of this facility began June 16, 1986, after the DPRR had been approved. Workers removed the debris and bird droppings in the transfer bay between June 16 and 18, 1986 (Figures 4 and 5). All mobilization and preparatory work was completed on June 25, 1986. On June 26, 1986 scaffolds were erected in the fuel storage basin and asbestos removal operations in the fan rooms were initiated. The fan rooms were completed July 3, 1986 and work progressed into the pipe gallery. The work then progressed into the outer rod room, accumulator room and hallways (Figures 6 and 7). These areas were finished July 11, 1986. Asbestos removal continued in the storage basin and was completed July 24, 1986 (Figures 8 and 9). The work then proceeded on to the rear stairwells after which the outside asbestos removal was completed July 30, 1986. Final washdown of the building proper was completed August 4, 1986. Asbestos was removed

Figure 4. Transfer Bay Before Cleanup

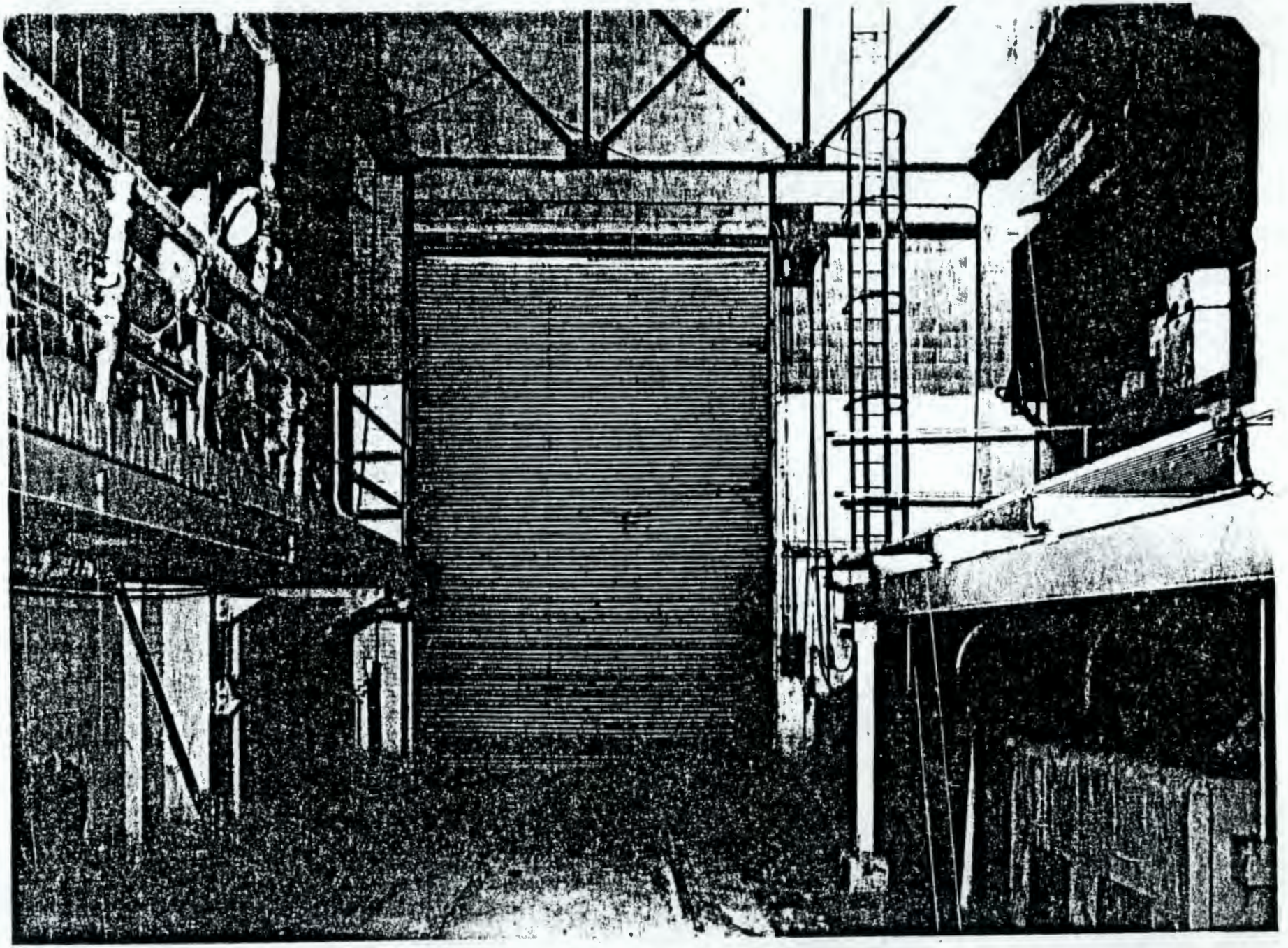

Figure 5. Transfer Bay After Cleanup

Figure 6. Hallway Before Asbestos Removal

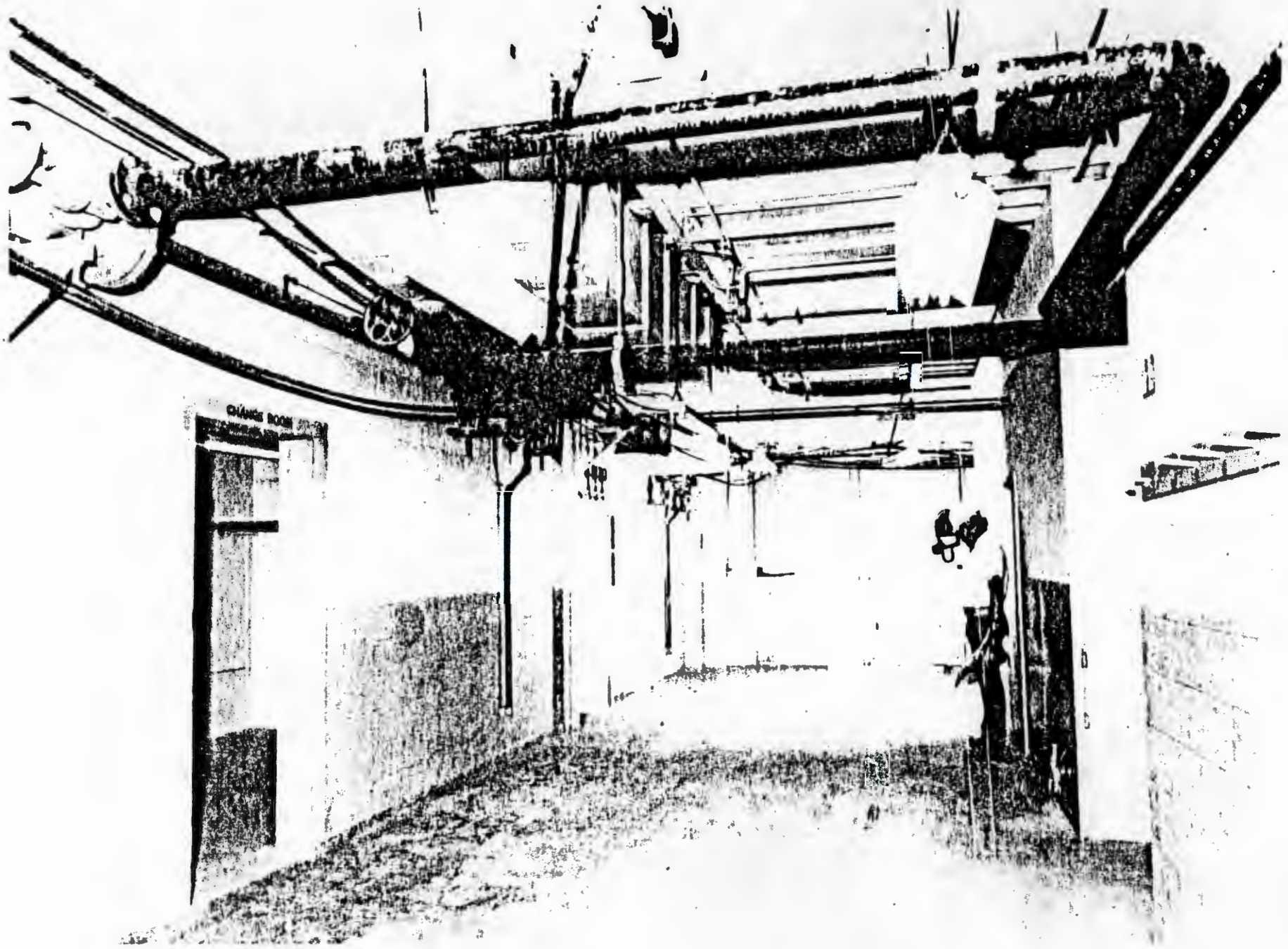

Figure 7. Hallway After Asbestos Removal

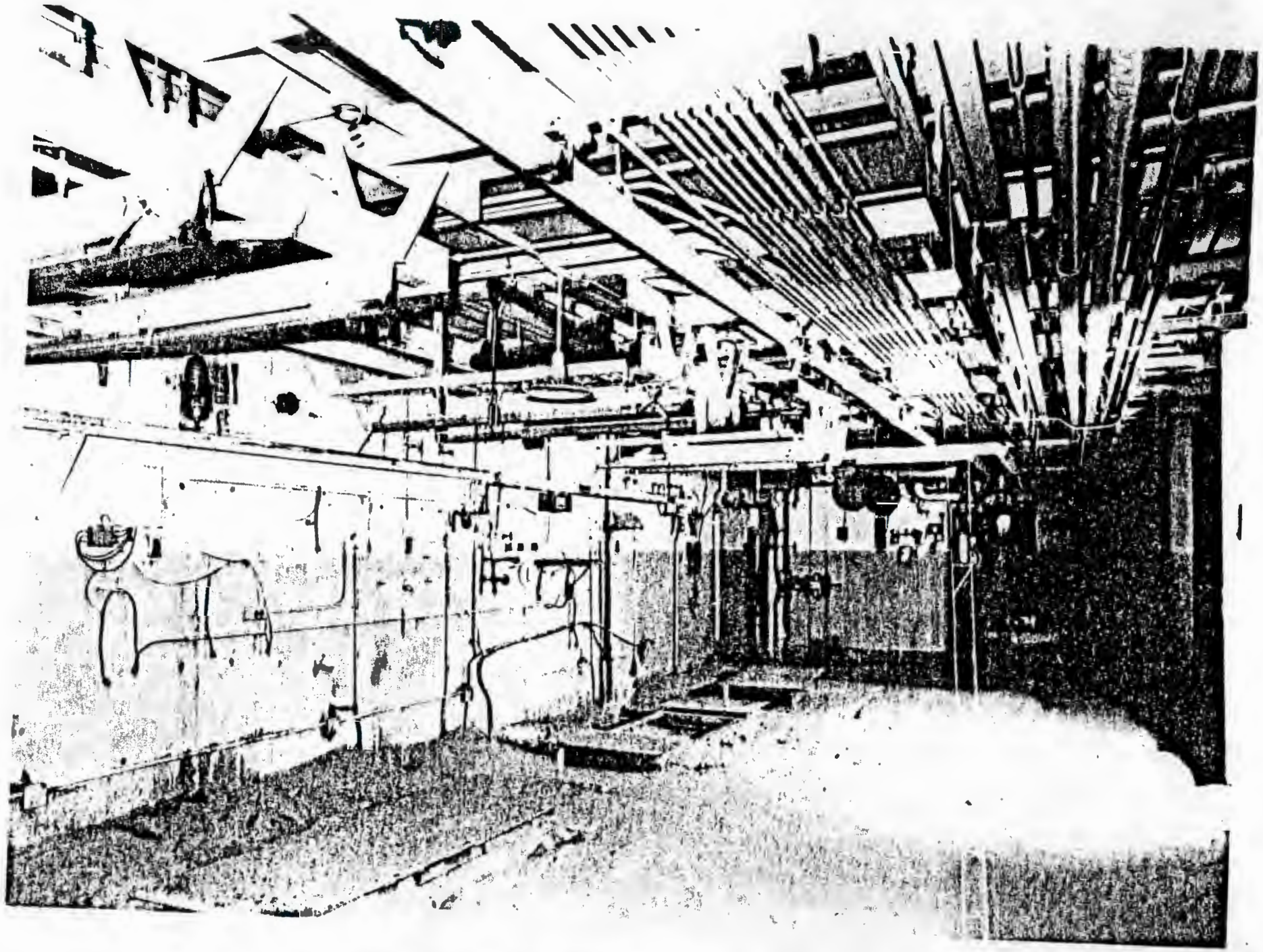

Figure 8. Fuel Storage Basin Before Asbestos Removal

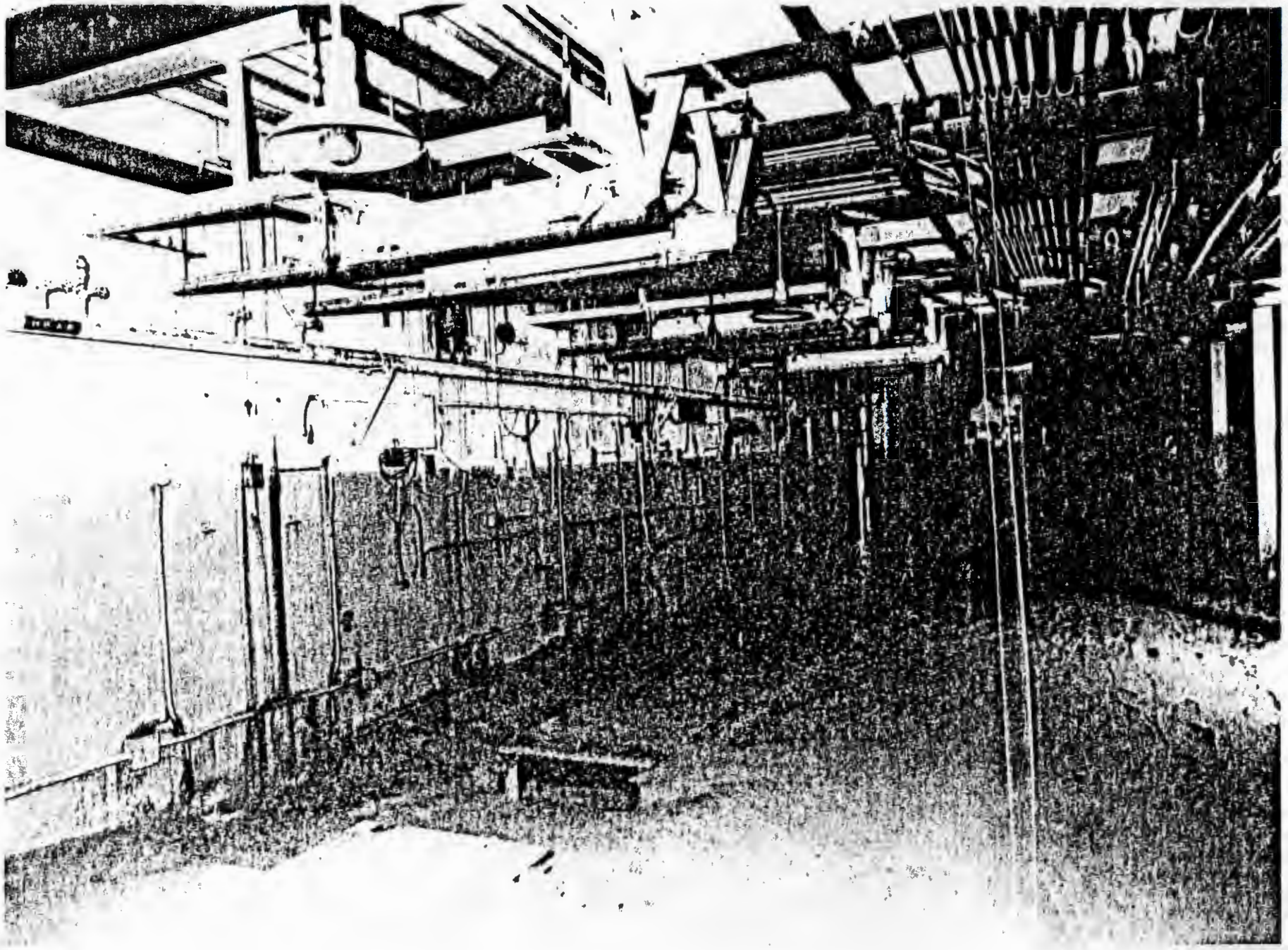

Figure 9. Fuel Storage Basin After Asbestos Removal

4.3.2 Asbestos Removal Sequence (Cont'd)

from the lunchroom and dressing room on August 8 and the final washdown was completed August 11, 1986. Hanford Environmental Health Foundation (HEHF) performed air monitoring and final release survey for asbestos particles. HEHF gave verbal release of the facility on August 15, 1986. Written verification was transmitted on August 18, 1986.

A project walk-through was completed on August 26 by Engineering and Operations representatives. No specific problems were noted.

The actual asbestos removal was performed by D&D workers in full protective clothing including a powered air purifying respirator (PAPR).

The work practices within the facility followed the steps listed below in Section 4.3.2.1 and 4.3.2.2, depending on the condition of the equipment and work area.

4.3.2.1 Work Area Containment Practice

Containment of asbestos fibers involved isolating the portions of the building by posting warning signs, sealing ventilation, wetting asbestos, and controlling access to asbestos areas being worked. This control was maintained until monitoring by Hanford Environmental Health Foundation (HEHF) indicated that asbestos restrictions could be released. Access to areas being worked required full protective clothing including a PAPR. Bottled air was required in the Transfer Bay because of work with bird droppings.

All asbestos removal was handled in accordance with UNI-M-38, Industrial Safety Manual, Control No. 101, and a hazardous work permit obtained in accordance with Control No. 110. The removed asbestos was doubled-bagged in 10 mil thick plastic, sealed, marked and stored in a safe and secure area until disposed of.

All radioactive waste from the project was packaged and transported in compliance with the regulations and requirements described in UNI-M-29, Shipment of Radioactive and Other Hazardous Materials. Packages were surveyed and transported by truck approximately 15 miles to the 200 Area burial grounds. All waste was buried in accordance with Rockwell Hanford Operations disposal criterion (RHO-MA-222). The nonradioactive asbestos material was transported for disposal in the Rockwell-operated central landfill.

4.3.2.1 Work Area Containment Practice (Cont'd)

The work area was thoroughly cleaned after asbestos removal using high pressure sprayers and vacuums. The vacuum cleaners were approved for asbestos use. A monitoring program was conducted by HEHF to provide representative measurement of asbestos fiber concentrations which employees were exposed to and for final release of asbestos restrictions after completion of the project.

4.3.2.2 Asbestos Removal Practice

The majority of pipe lagging and duct/equipment insulation were thoroughly wetted with a fine water spray from hoses connected to a manifold on the main water line. Most of the project was done without a wetting agent (Spic and Span) normally carried in two-gallon backpacks for large surfaces or plastic spray bottles for small jobs. The asbestos was stripped from all piping and components. The asbestos material was kept wet during removal and handling.

The asbestos hopper, designed during the 105-D asbestos removal project, was utilized to collect and package asbestos removed from piping on this project. It proved to be safer and more expedient than conventional methods for handling asbestos.

All asbestos coverings were stripped and placed in double plastic bags approved for asbestos use or 6 mil plastic. Packaged asbestos was again wetted before sealing.

No equipment or component with asbestos covering was sectioned and packaged for disposal. This reduced waste volume and therefore reduced burial costs. The removed asbestos was segregated into contaminated and noncontaminated lots, packaged, sealed, marked and stored in separate secure locations prior to shipment to the central landfill or 200 Area burial grounds for burial.

4.3.2.3 Asbestos Waste Volume

This project contained much less asbestos than the previously completed 105-H Facility because there was no gas processing wing in the facility. Most reactors in the 100 Areas had gas processing equipment housed in a separate building.

4.3.2.3 Asbestos Waste Volume (Cont'd)

Approximately 3% of the asbestos removed from the 105-F Reactor Building was disposed of as low-level radioactive waste and amounted to 56 ft^3 in volume. The bulk of the low-level contaminated material was not asbestos and was obtained from removing the 300 ft^3 of bird droppings and other miscellaneous debris found mainly in the transfer bay.

The remaining 97% of asbestos, which was disposed of as nonradioactive hazardous material, amounted to 1748 ft^3 in volume.

The total asbestos removed was 1,804 ft^3.

4.3.3 Transfer Bay Work

Due to the health hazards associated with bird droppings in the transfer bay, Industrial Safety required bottled fresh-air units for personnel removing the bird droppings. The bird droppings were placed in nine 55-gallon drums. The other miscellaneous contaminated waste, plastic, and equipment (no longer serviceable) were placed in 4 x 4 x 8 ft plywood and fiberboard burial boxes. The transfer bay was cleaned prior to asbestos removal. All bird entrance openings were sealed.

4.3.4 Facility Condition After Project Completion

All friable asbestos has been removed from the facility. The nonfriable transite wall material is addressed in the facility final decommissioning. The asbestos removal areas have been washed down and mopped. Miscellaneous debris in hallways and rooms was disposed of. Some of the air locks have been left in place as a cost-saving measure.

As mentioned previously, Hanford Environmental Health Foundation personnel monitored the facility for residual asbestos fiber concentrations following this cleanup effort. The results showed fiber concentration levels were less than or equal to 0.01 fibers/cm^3, which is less than the DOE-prescribed limits of 0.02 fibers/cm^3 (Reference 5). These results indicate an adequate cleanup effort.

5.0 COST AND SCHEDULE

5.1 Project Cost

The estimated budget for the 105-F asbestos removal project, including General Support (Advance Engineering, Advance Characterization, and Program Support), was $346,300. The actual project cost was $305,400, which represents a favorable cost variance of 11.8% or $40,900 underrun (Table 1).

TABLE 1

HANFORD DECOMMISSIONING
105-F ASBESTOS REMOVAL PROJECT
PROJECT COSTS

($ in 000's)

Project Management	$7.7
Engineering	2.1
Characterization/HP Support	1.7
Decontamination (Asbestos Removal)	50.8
Demolition	---
Direct Materials	3.7
Waste Disposal	1.5
General Support*	157.7
General and Administrative Department Overhead	80.2
TOTAL	$305.4

* Includes the liquidation of costs associated with Advance Engineering, Advance Characterization, and Program Support.

5.1 Project Cost (Cont'd)

The variance results from less asbestos in the facility (1,804 ft^3) than estimated (4,200 ft^3). Also contributing to the variance is the respective general support cost applied to the project.

5.2 Project Schedule

The 105-F asbestos removal Decommissioning Project Readiness Review (DPRR) was originally scheduled on May 23, 1986. The operations phase was to be completed by July 31, 1986, and the Engineering Phase Report was scheduled for October 31, 1986. However, because of the "Gramm-Rudman" budget bill, budgets were reduced significantly in the 100 Areas decommissioning project activities for FY 1986. To best utilize available resources and minimize impacts, a revised schedule of the FY 1986 projects was prepared in February/March of FY 1986. The 105-F asbestos removal project was deleted and replanned for FY 1987. Later additional funding became available and the project was reinstated.

In summary, the project activities went as follows: the DPRR meeting was held June 5, 1986; site preparation began May 12, 1986 and was completed June 11, 1986; mobilization began June 9, 1986 and was completed June 13, 1986; asbestos removal was initiated June 16, 1986 and finished August 11, 1986; and the project was completed August 15, 1986 with Hanford Environmental Health Foundation (HEHF) declaring the facility on August 18, 1986 free of friable asbestos.

6.0 ENVIRONMENTAL, RADIOLOGICAL AND INDUSTRIAL SAFETY

6.1 Environmental Safety

Environmental safety was improved as a result of this project. Asbestos was effectively isolated from the environment when it was wetted, removed, and double bagged for subsequent burial in an approved disposal area. The net result is that exposure to asbestos fibers to all persons has been reduced.

6.2 Radiological Safety & Personnel Exposure

No radiological internal or skin contamination cases occurred during the asbestos removal project. The occupational radiation exposure to personnel during this asbestos removal phase of decommissioning was essentially zero.

The removal of low-level radioactive contaminated waste has resulted in a radiologically cleaner environment for future work by reducing possible dose rates and contamination.

6.3 Industrial Safety

The project tasks were performed using the safety guidelines in the Detailed Work Procedure and the Job Safety Analysis. There were no lost work day or OSHA recordable injuries. No incidents occurred during this project.

7.0 CONCLUSIONS AND LESSONS LEARNED

This project was very similar to other asbestos removal projects performed in the 100 Areas. The techniques to control asbestos fibers have been well established and removal has become routine. All decommissioning activities were performed with the utmost regard to the personnel involved. Special Work Procedures (SWP's) clothing and equipment, including full face respirators, were provided. Personnel working in the controlled zones utilized the equipment and clothing throughout the asbestos removal operation.

The uneven footing surface caused by soil backfill in the fuel storage and transfer areas presented the same problem as for 105-H. Here, plywood was installed to provide an even footing surface prior to asbestos removal.

No personal injuries and no radiological internal or skin contamination cases occurred during the asbestos removal project. The occupational radiation exposure to personnel during this asbestos removal phase of decommissioning was essentially zero.

8.0 REFERENCES

1. Hanford 100 Area Long-Range Decommissioning Plan, UNI-2533, UNC Nuclear Industries, Inc., Richland, Washington, 1984.

2. Decommissioning Services Management Guide, UNI-3073, UNC Nuclear Industries, Inc., Richland, Washington, 1985.

3. Projects/Programs Services Section, Cost/Schedule Control System Manual for Projects and Programs, UNI-M-109 REV1, UNC Nuclear Industries, Inc., Richland, Washington, 1982.

4. Tyler, D.K., Decommissioning Project Readiness Review Manual, UNI-M-176, UNC Nuclear Industries, Inc., Richland, Washington, 1984.

5. Industrial Safety Manual, UNI-M-38, UNC Nuclear Industries, Inc., Richland, Washington, 1975.

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Internal Letter

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105-F Reactor Building Facility Decommissioning Project (Phase I) Asbestos Removal Phase Report.