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Abstract

This report documents the activities that lead up to the stabilization of the 233-S Building and describes the current physical status of the facility.

Project work included: (1) Setting up containment structure for access control, (2) Ventilation system repair and modification, (3) Performing non-destructive analyses in contaminated areas, (4) Outside area decontamination, (5) Building interior decontamination and stabilization and performance of the final radiological survey to evaluate effectiveness of project activities.

(*) Removed per J.D. Watrous by M. Bostan 5/27/92

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PHYSICAL STATUS AND POST STABILIZATION ACTIVITIES REPORT FOR THE 233-S BUILDING

1.0 INTRODUCTION

This report documents the contamination stabilization activities of the 233-S REDOX Plutonium Concentration Building located in the 200-W Area of the Hanford Site in the State of Washington. The 233-S Building provided final purification of plutonium and neptunium nitrate solutions from the 202-S REDOX Building. This report also summarizes the current physical and radiological status and configuration of the 233-S Building with reference to past Decontamination and Decommissioning activities.

The ultimate objective of the stabilization activities was to prevent contamination from spreading within the facility and into the environment, thus compounding the final decommissioning activities, and to enable surveillance and maintenance personnel to operate in the facility with a minimum of effort and manpower.

The stabilization project was initiated as a result of surveillance reports indicating deteriorating physical and radiological conditions in and around the 233-S Building. Contamination of undetermined origin had been found on the ground surface adjacent to the 233-S Building. Surface contamination levels within the building had increased, causing an increase in the airborne concentration levels.

A radiological assessment (Reference 1) was conducted in February 1987 to determine whether or not contamination was escaping from the building and to recommend methods for stabilizing the worsening conditions within the structure. Stabilization activities were initiated in the summer of 1987 and completed on December 30, 1987.

Stabilization activities were limited to containing the high levels of contamination inside the Process Hood; decontamination of the Viewing Room, Stairwell and Loadout Room; and cleanup of the adjacent areas outside the 233-S Building. No decontamination activities were attempted inside the Process Hood or Pipe Gallery.

Project work included:

- Pre-job Preparation
- Ventilation System Repair and Modification
- Outside Area Decontamination and Stabilization
- Building Interior Decontamination and Stabilization
- Final Radiological Survey

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION

2.1 History

The original 233-S structure was built in 1954-55 and put into service in March 1955. During the initial process, a dilute plutonium nitrate solution was transferred from the 202-S (REDOX) Building to the 233-S Building. In the 233-S Building, the plutonium solution was concentrated and loaded into Product Removal (PR) cans for transport to Z-Plant for further processing. In 1962, the operation was expanded to include a neptunium concentration and loadout process, along with an ion exchange plutonium purification process.

The neptunium process was much like the initial plutonium process. Neptunium solution was received from 202-S Building and concentrated on a batch basis. The concentrated neptunium solution was then loaded into transfer cans and transported to the PUREX Plant for further processing.

In the Ion Exchange Process, solutions containing plutonium and undesirable impurities were passed through a resin bed where the plutonium absorbed onto the resin, while the impurities remained in solution and left the system. The purified plutonium was then chemically removed from the resin, concentrated, and loaded into PR cans for transport to Z-Plant.

A chemical reaction within the ion exchange unit caused a fire in November 1963. This fire caused extensive damage to the process equipment, gross alpha contamination within the process area, and general contamination spread to other portions of the facility. Top priority was placed on restart of the facility because of the demand for plutonium at that time. The building was decontaminated to practical levels in an intensive six-week program. Remaining surface contamination was sealed, and operations were resumed without the ion exchange process.

In 1967 the REDOX 202-S Building, along with the 233-S Building, was shut down and placed in a layaway status. Some of the tasks that were performed during the layaway of the 233-S Building were:

- Process equipment and vessels were internally flushed for product removal.
- The equipment inside the Process and Loadout Hoods was externally flushed and the interiors of the hoods were decontaminated to remove gross contamination. (Equipment inside the Loadout Hood was removed in 1979).
- Combustibles, tools, supplies, and unneeded portable equipment were removed.
- Loose paint was removed and bare spots were repainted.
- Internal walls and floors were cleaned to levels of smearable contamination considered acceptable for layaway.
- Some surface contamination was fixed beneath applications of paint.

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION (Cont.)

2.1 History (Cont.)

- Air sampler valves were closed.
- Unneeded monitoring equipment and utilities were deactivated.
- Some doors were sealed closed, and entry doors were locked.

When it became evident that the REDOX Plant would not be restarted, layaway status was changed to Layaway Condition, Abandonment Category V (Retired) on August 8, 1969.

Decontamination and Decommissioning activities were performed on approximately 25% of the facility during FY 1979 and FY 1980. Further D&D work was scheduled for FY 1981 but was deferred due to budget constraints.

2.2 Location

The 233-S Building is located 24 ft north of the west end of the 202-S (REDOX) Building on the 200-W Area site. The 200-W Area is located approximately in the center of the Hanford Site (Figure 1). The 200-W Area and location of the 233-S Building within the site are shown in Figure 2. The location of the 233-S Building in relationship to the 202-S Building is shown in Figure 3.

2.3 Physical Description

The 233-S Building is approximately 85 ft long, 37 ft wide, and 32 ft high, with 3,100 ft^2 total ground floor area. The building is constructed of reinforced concrete, with 8-in. thick walls and 6-in. thick floors, consisting of ten rooms plus air locks, and including a high-bay process area. (Figure 4). Storage and change rooms are one story high. The high-bay area (Process Cell) is four stories (32 ft) high and is divided into two zones vertically by a partition of transparent plastic panels reinforced with structural steel. The reinforced concrete walls around the Process Cell are 1 ft thick. One zone (Viewing Room) is a maintenance and viewing area with four working levels, the top three of which have open-grate flooring. External access to this zone is provided through a sheet metal enclosed stairwell addition. The other zone (Process Hood), designed for contact maintenance by direct entry or glove port access or both, contains the stainless steel, titanium, and glass process equipment. The facility is connected to the REDOX 202-S Building via a pipe trench which houses blanked-off solution transfer lines.

The 233-SA Filter Building, located adjacent to and east of the 233-S Building, contains two sets of filter banks. (Figure 5). Each filter bank contains a roughing filter and two High Efficiency Particulate Air (HEPA) filters in series. The two exhaust fans are located external to the building. The filter systems are equipped with radiation monitoring equipment and alarms, including continuous stack effluent monitoring.

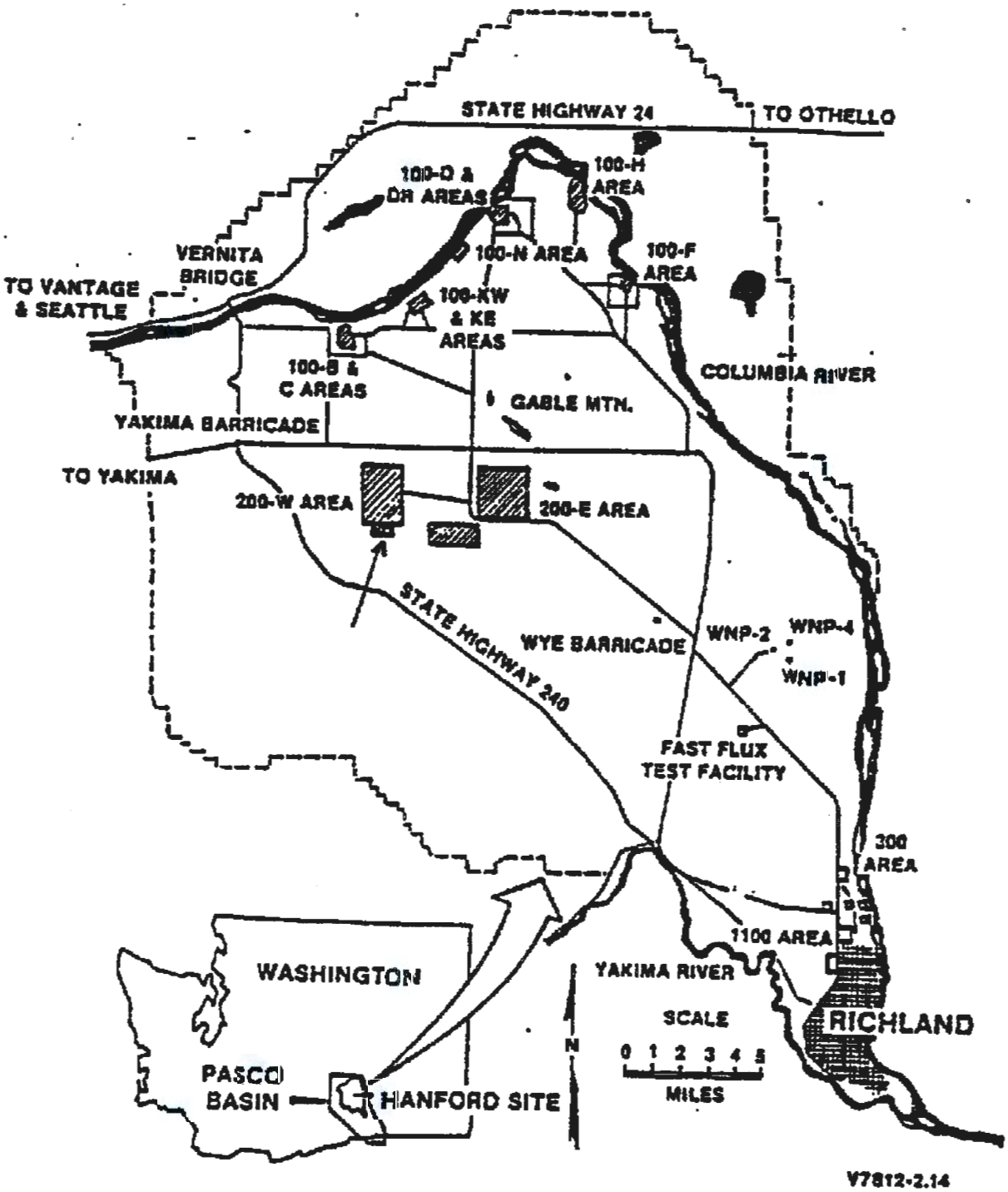

Figure 1. Location of Hanford Site

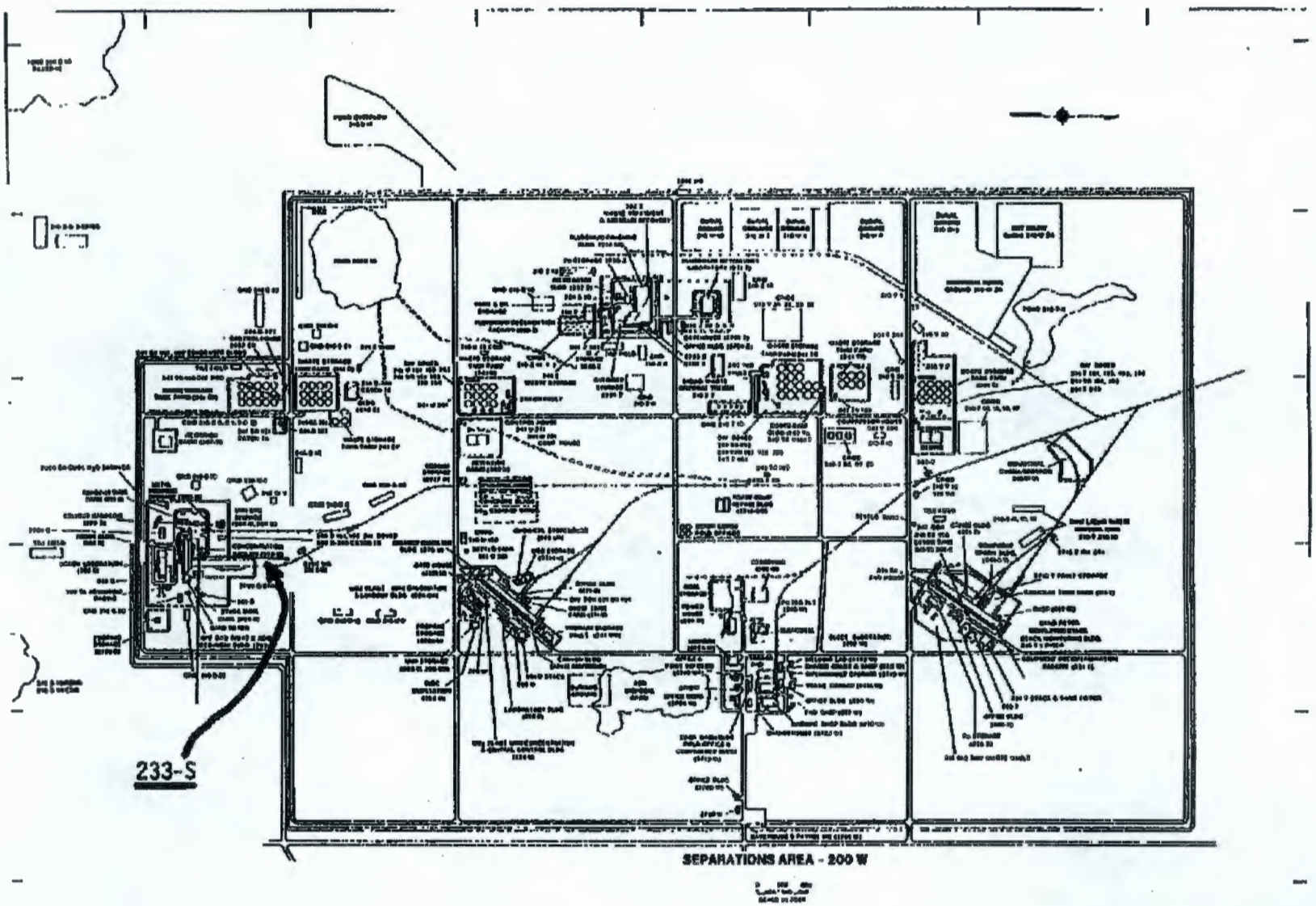

Figure 2. 200-W Area

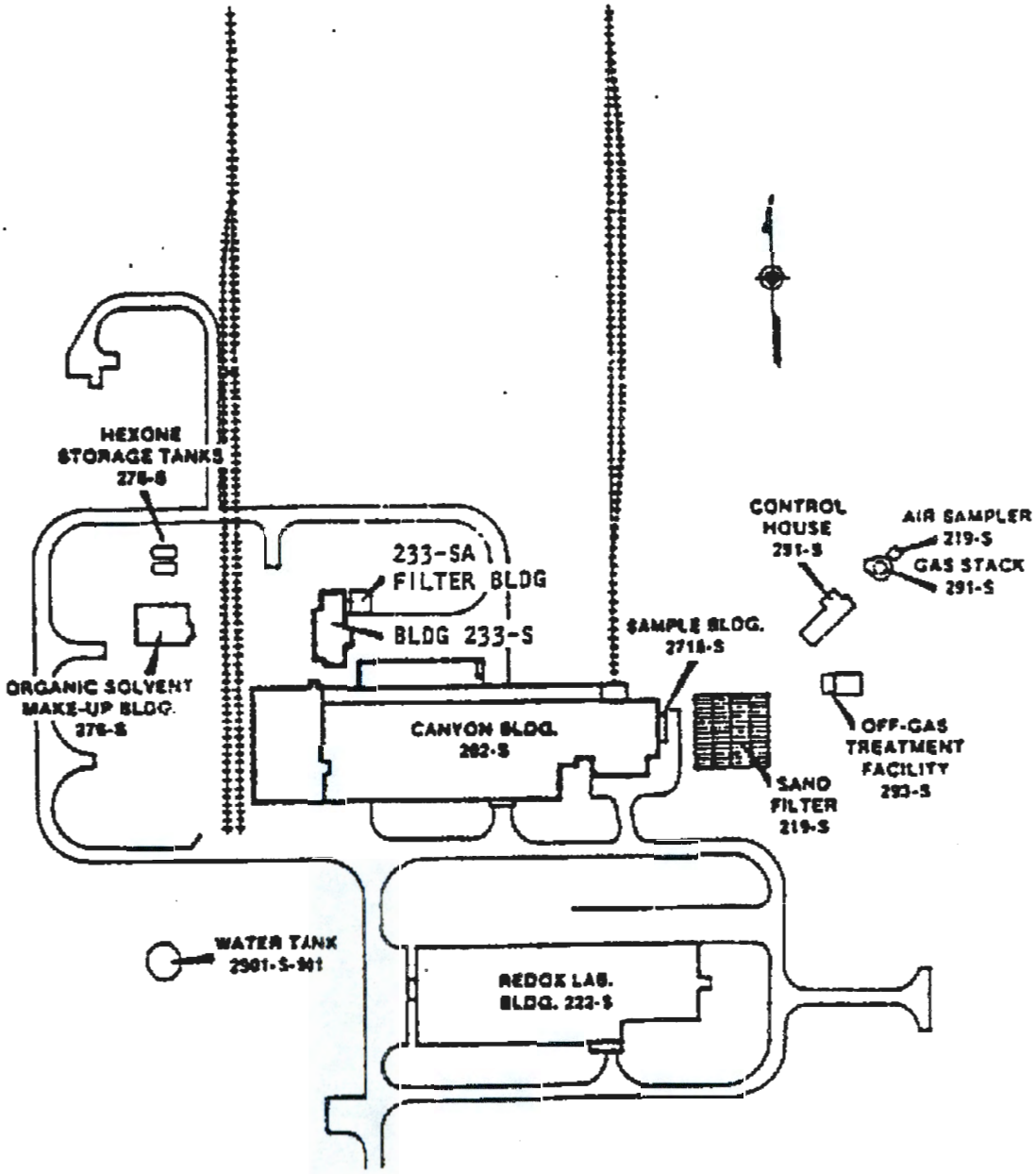

Figure 3. Location of 233-S Building

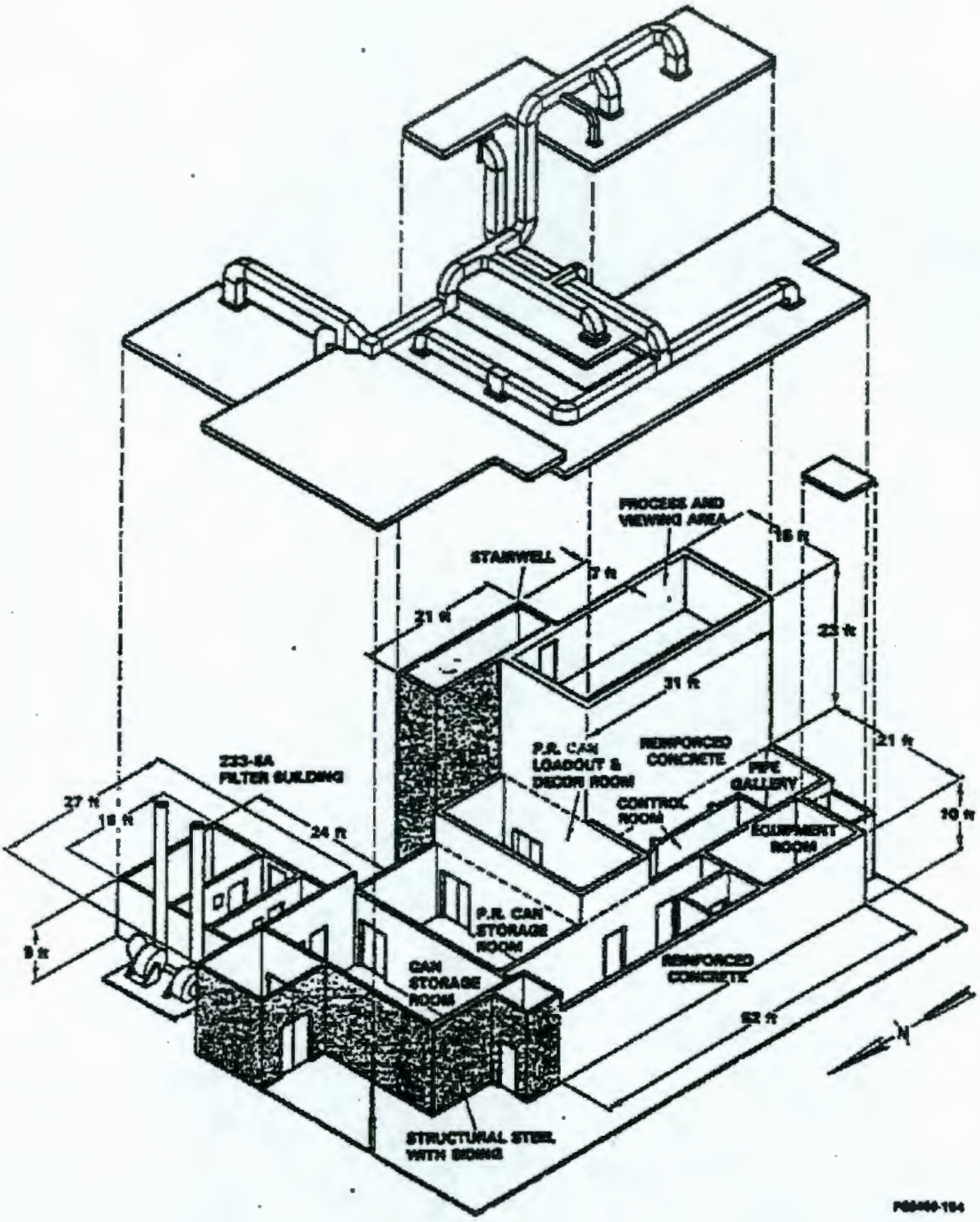

Figure 4. 233-S Plutonium Concentration Facility and 233-SA Filter Building

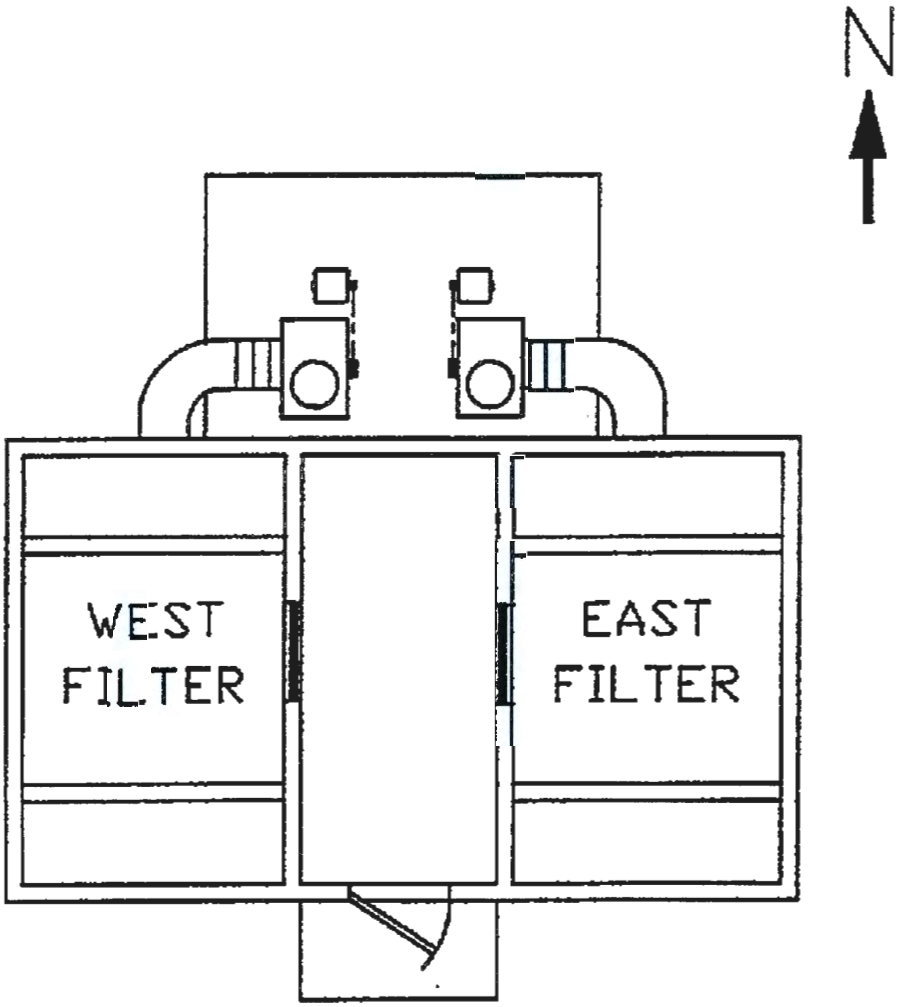

Figure 5. 233-SA Filter Building

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION (Cont.)

2.4 Building Layout

The 233-S facility is partitioned into ten major rooms (Figure 6). These rooms are:

- SWP Change Room
- Equipment Room
- Control Room
- Pipe Gallery
- Can Storage Room
- PR Can Storage Room
- PR Can Loadout Room
- Stairwell
- Viewing Room
- Process Hood

All outside doors, except the north stairwell exit floor, are equipped with air locks. These air locks, which are small vestibules with a door on each end, serve to maintain the proper building ventilation air balance.

The Main Entrance Air Lock, SWP Change Room, Toilet, Equipment Room and Control Room are considered the radiologically "clean areas" of the facility.

Main Entrance Air Lock

The Main Entrance Air Lock is located at the northwest corner of the building, and was used for entry into the contaminated portions of the building via the SWP Change Room. Currently, this air lock only provides access into the radiologically clean areas of the facility.

SWP Change Room

Before deactivation, the SWP Change Room contained lockers for personal clothing, a stock of SWP clothing and radiation survey instruments. This room was used for changing clothing, making normal entries into and exits from the radiological controlled areas via a doorway into the PR Can Loadout Room. The access door into the PR Can Loadout Room is currently kept locked, except when personnel are working in the contaminated areas of the building for purposes of emergency egress.

Equipment Room

The Equipment Room originally housed the ventilation supply fan, heating and air conditioning equipment. The supply fan is currently operational, however, the heating and air conditioning equipment are no longer in service. The supply fan provides air only to the SWP Change Room, Control Room and Can Storage Room.

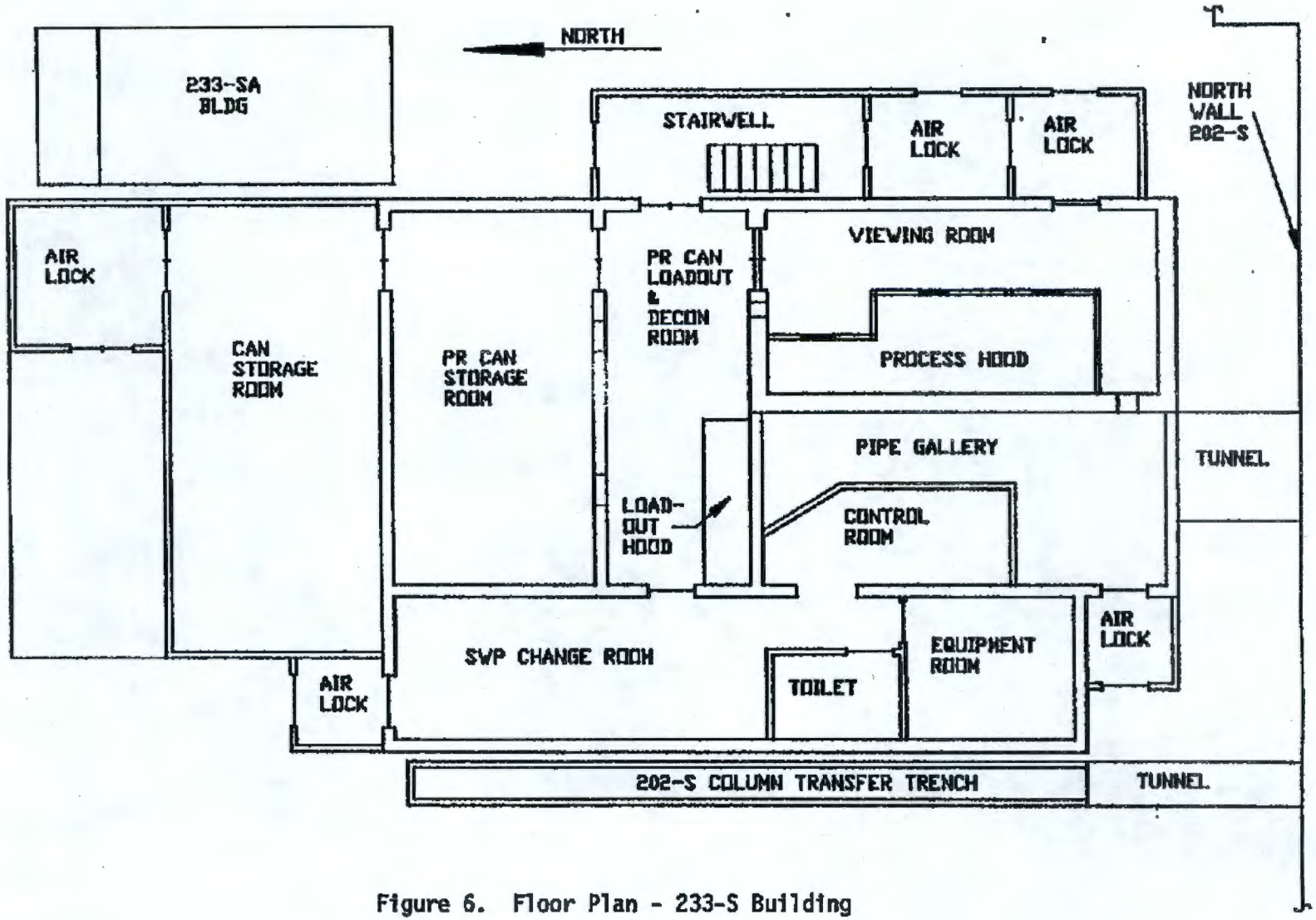

Figure 6. Floor Plan - 233-S Building

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION (Cont.)

Control Room

The Control Room contains the panel board, associate instrumentation and controls that were used for remote operation of the process equipment. The following were not deactivated during the facility layaway:

- Ventilation supply and exhaust instrumentation
- Process Hood sump instrumentation
- Fire detector and alarm instrumentation

Pipe Gallery

The control panel board with metal and rigid plastic walls partition the "clean" Control Room from the radiologically posted Pipe Gallery. Entry into the pipe gallery is made through an outside air lock located at the southwest corner of the building. Control and service piping penetrate the pipe gallery wall into the Process Cell. Some of these lines are:

- Instrument Sensing Lines
- Control Air Lines
- Chemical Addition Lines
- Water Lines
- Steam Lines
- Air Lines

Currently, low levels of contamination exist within the Pipe Gallery. The south end of the east wall contains an opening for air flow into the Viewing Room. The air lock at the southwest corner also contains low levels of contamination.

During the operation of the 233-S Building, the Can Storage Air Lock, Can Storage Room and PR Can Storage Room were maintained as areas free of smearable radioactive contamination.

Can Storage Air Lock

This air lock was used to maintain ventilation air balance during Product Removal (PR) can shipment from, and recycle can receipt into the facility.

Can Storage Room

The Can Storage Room was used to store canned recycle solutions received from Z Plant.

PR Can Storage Room

The PR Can Storage Room was used for storing canned product solutions awaiting shipment to other facilities. Entry into this room is made through the air lock at the northeast corner of the building or the door leading from the PR Can Loadout Room.

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION (Cont.)

PR Can Loadout Room

The PR Can Loadout Room was maintained at a low level of alpha contamination. The inside of the Loadout Hood was usually grossly contaminated with alpha.

Empty PR cans were placed into the Loadout Hood, loaded with product solution, removed from the hood, decontaminated and weighed. This room was also used for transferring recycle solution back into the process system. The Loadout Hood contained the tanks, valves, and equipment used for transferring concentrated solutions into and out of the transport cans.

The equipment was removed from the Loadout Hood during the 1979-80 D&D activities. Attempts were made to decontaminate the hood and the remaining contamination was fixed with paint. HEPA filters were placed on the air inlets to the hood, however, the three filters on the top were fixed only with tape for a seal. The interior of the hood still remains highly contaminated.

Normal entry into the Loadout Room was made through the door leading from the SWP Change Room. This is no longer current practice. The SWP Change Room door is normally kept locked except when personnel are making entries into the Process Area, and then it is to be used only as an emergency exit. Routine entry is currently made through the PR Can Storage Room.

Stairwell

The Stairwell, located on the east side of the high bay area, contains three flights of stairs with landings on each level. Normal stairwell entry and exit is made through the east door of the PR Can Loadout Room.

An air lock, connecting the first level viewing room and an east outside exit, is located south of the stairwell. There is an emergency exit on the north end, first level, of the stairwell. This door does not have air lock protection.

Viewing Room

The Viewing Room is one of three rooms (Stairwell and Process Hood) that make up the four-story High Bay area. Before stabilization, alpha contamination levels varied from low levels of loose surface contamination to gross levels of fixed contamination.

The first level has a concrete floor and the second, third, and fourth floors are made of steel grating. Entry to the first level is made through a heavy shielded double door leading from the PR Can Loadout Room. A rear door near the southeast corner leads to an air lock which connects to an east outside exit.

2.0 DESCRIPTION OF FACILITY PRIOR TO STABILIZATION (Cont.)

Viewing Room (cont.)

In the event normal exit doors are blocked, emergency escape can be made via a steel ladder, which runs from the fourth level to the first level, in the southwest corner of the Viewing Room.

The Viewing Room is partitioned from the Process Cell with a metal framework and removable transparent plastic panels.

When the access doors into the Viewing Room are shut, normal airflow into the room is provided by two openings; one in the north wall and one in the west wall. These openings had no reverse flow protection, such as filters, to prevent the release of contamination.

Process Hood

The majority of the plutonium and neptunium process equipment is located within an isolated area identified as the Process Hood. The hood comprises one area, four stories tall. Entry into the hood may be made through a manway port on the first level. When the building was operational, access to equipment on the first and second levels was provided by using portable stepladders. Access to levels above the second floor was made by removing partition panels on the respective Viewing Room level and installing scaffold planks on the existing horizontal steel framework.

The Process Cell is the central feature of the 233-S Building, since all airflow in the facility enters the hood via the Viewing Room before being exhausted to the 233-SA Building. The Process Hood is also the most contaminated area in the building. Quantities of transuranic isotopes within the Process Hood have been estimated to be about 2,000 grams. The Process Hood did not have isolation containment. The four air flow inlet openings in the cell could not be closed or sealed. Therefore, there was nothing to prevent contamination from escaping from the cell into clean areas of the building if there was a loss of power to the exhaust fans for any length of time.

2.5 Radiological Status

Figure 7 identifies the contaminated areas inside the 233-S Building and the areas subject to the scope of the decontamination and stabilization activities. A comprehensive radiation survey was conducted on January 16, 1987 to determine the overall extent of contamination (Survey No. 00137-875). A summary of the survey results are listed in Table 1. The survey was performed using standard Hanford radiation survey meters.

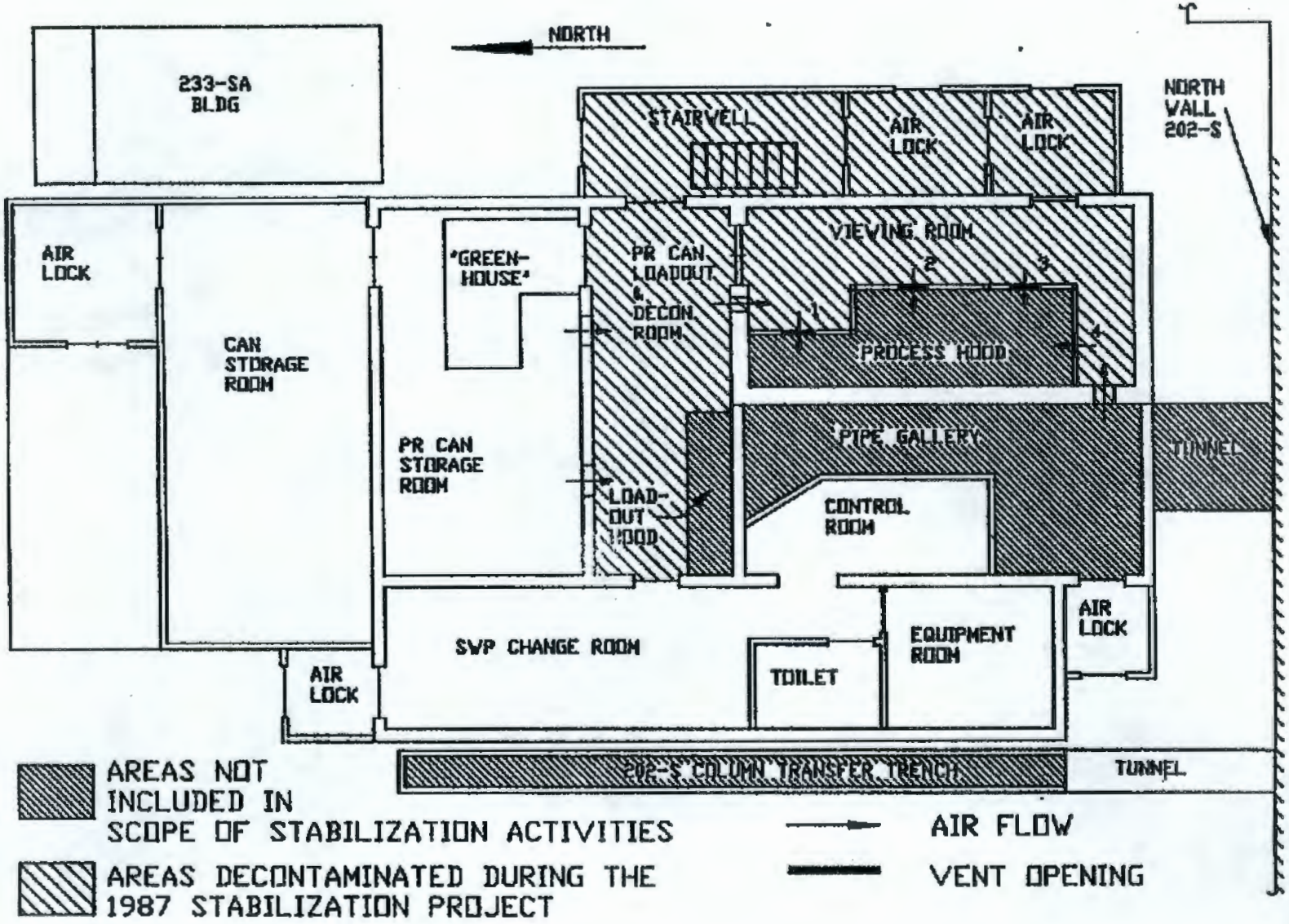

Figure 7. Contaminated Areas in 233-S

Table 1. 1987 Radiological Direct Survey Results - 233-S Building

LOCATION	DPM ALPHA/Probe Area
1. Loadout Room	
Dust on Criticality Detector	42,000
Floor near SOP to Stairwell	49,000
Floor near door to Process Area	49,000
Floor near door to Process Area	49,000
Dust on pipe - South Wall	175,000
Top of Loadout Hood	700
Top of Loadout Hood	1,000
Top of Loadout Hood	1,000
Floor, northeast corner of Loadout Hood *	7,000
Floor near North Wall	<Detectable
Floor near North Wall	<Detectable
* Dose rate at this location 10 mr/hr	
2. Air Lock (southeast)	
Floor	2,500
Floor	1,500
Floor	2,000
3. Stairwell	
Rails	17,500
Floor, bottom of Landing	35,000
Stairs	31,500
4. Viewing Room	
Vent Opening #1	17,000,000
Vent Opening #1	3,000,000
Floor - front of Vent #1	350,000
East Wall	364,000
North doors - to Loadout Room	210,000
Panel Ledge - center (west)	3,000,000
East Wall	70,000
Panel Ledge above Vent #2	42,000
Panel Ledge above Vent #3	35,000
Panel south of Vent #3	560,000
Floor near door to Air Lock	28,000
Wall near door to Air Lock	24,500
Ceiling - center	63,000
Panel - south of Vent #1	3,000,000
Door Handle to Air Lock	56,000
Light fixture	35,000

General Area dose rate - 20 mr/hr
Dose rate in contact with panel near Vent #1 - 180 mr/hr

3.0 IDENTIFICATION AND QUANTIFICATION OF RADIONUCLIDES

3.1 Administrative Controls

Decontamination work within the 233-S Building required the use of an industrial-type vacuum cleaner. The only vacuum cleaner authorized at the time was the "Minuteman X-100" utilizing a 55-gallon drum. Additional limitations specified that a vacuum could not be used in areas known to contain greater than 400 grams of fissile material, as established by nondestructive assay estimates prior to start of work. However, no limitations govern the use of vacuum cleaners if it could be determined that the quantity of fissile material in the designated work area was less than 10 grams, determined by the same nondestructive methods. Therefore, a nondestructive assay was performed in the Viewing Room and Stairwell to determine vacuum cleaner requirements and whether or not fissile inventory had changed since the last assay that was performed in the late 1970's.

3.2 Transuranic Isotope Inventory

Previous analyses of the contaminated areas in the 233-S Building (primarily Process and Loadout hoods), indicated total plutonium inventory to be about 2.0 kilograms ± 50%. (Reference 2). Table 2 lists the estimated quantities of plutonium in the 233-S Building based on previous Non-Destructive Analyses surveys performed in 1978.

Table 2. 1978 Estimated Plutonium Inventory - 233-S Building

Locations	Grams of Plutonium
SWP Change Room	Decontaminated (1)
Control Room	Decontaminated (1)
Can Storage Room	Decontaminated (1)
PR Can Storage Room	Decontaminated (1)
PR Can Loadout and Decontamination Room	Trace
Loadout Hood	20 ± 50% (2)
Stairwell Air Lock	Trace
Stairwell	Trace
Viewing Room	≈3
Process Hood	2,000 ± 50% (2)
233-SA Building	<30
Ventilation Ducts	<30
Pipe Trench	Not Determined
Pipe Gallery	Not Determined

(1) Decontaminated previous to 1980

(2) NDA performed in November 1978

3.0 IDENTIFICATION AND QUANTIFICATION OF RADIONUCLIDES (Cont.)

3.3 Non-Destructive Analysis (NDA)

The NDA was performed in November of 1987. The analytical method for determining total fissile inventory was based on gross alpha measurements of removable and fixed contamination levels at sample locations on each major surface area. Total inventory values were obtained by assuming that Pu-239 was the principal contaminating radionuclide in the areas adjacent to the Process Hood, and was due to the fire and explosion in the plutonium ion column in 1963. The approximate isotopic composition of plutonium in the 233-S Building, based on earlier findings (Reference 2), was ≈93.5% Pu-239, ≈6% Pu-240, ≈0.2% Pu-241, and ≈0.3% Am-241.

3.4 D&D Stabilization Project

The purpose of the D&D stabilization activities was to remove loose surface contamination from the rooms and spaces adjacent to the Process Hood (excluding the Process Hood and Pipe Gallery). One of the planned decontamination methods was to use vacuum cleaners to remove the large quantity of dust and dirt that had accumulated in the Stairwell and Viewing Room. In order to verify that the plutonium inventory in the building had not changed, and to determine that criticality standards would not be required during vacuum operations, the Stairwell and Viewing Room were again surveyed to establish plutonium inventories in November of 1987. The results of the analysis and the inventory status of the 233-S Building are listed in Table 3.

Table 3. 1987 Status and Plutonium Inventory - 233-S Building

Locations	Grams of Plutonium
SWP Change Room	Decontaminated (1)
Control Room	Decontaminated (1)
Can Storage Room	Decontaminated (1)
PR Can Storage Room	Decontaminated (1)
PR Can Loadout and Decontamination Room	Trace (2)
Loadout Hood	Trace (3)
Stairwell Air Lock	Trace
Stairwell	≈0.1 (4)
Viewing Room	≈3.3 (4)
Process Hood	2,000 ± 50% (5)
233-SA Building	<30
Ventilation Ducts	<30
Pipe Trench	Not Determined
Pipe Gallery	Not Determined

(1) Decontaminated previous to 1980.
(2) Decontaminated, 1979-1980, to low detectable levels of alpha contamination.
(3) Loadout Hood was decontaminated to remove gross levels of alpha contamination. The remaining contamination within the hood was fixed with paint.
(4) NDA performed in 1987.
(5) 1978 NDA results.

3.0 IDENTIFICATION AND QUANTIFICATION OF NUCLIDES (Cont.)

3.5 Analytical Results

Initial NDA results indicated that the Pu-239 inventory was less than 10 grams within the Viewing Room and Stairwell. Therefore, no administrative controls were required to operate the vacuum cleaner. Final NDA results, documented in Reference 3, estimated the total Pu-239 inventory in the Viewing Room and Stairwell to be 3.4 grams. Table 4 summarizes the final NDA results for the designated areas in the 233-S Building.

Table 4. Pu-239 Levels (Micrograms) in the 233-S Building

LEVEL	VIEWING ROOM			STAIRWELL
	SOUTH	MIDDLE	NORTH	
4	2,000	2,100	12,000	5,000
3	1,600	2,600	21,000	9,500
2	3,000	2,500	200,000	85,000
1	5,500	22,000	3,000,000	6,000

TOTAL: 3.38 G Pu-239

Note: Numbers include best estimates of Pu-239 in dust on all horizontal surfaces in areas indicated.

4.0 STABILIZATION WORK SEQUENCE

In general, the 233-S stabilization project consisted of four major tasks. These tasks were pre-job preparation, outside area cleanup, decontamination and stabilization of designated interior areas and completion of the final radiological survey to establish the effectiveness of the decontamination activities.

4.1 Pre-Job Preparation

4.1.1 Contamination Control

Stabilization of the 233-S Building required that preliminary tasks be completed prior to initiation of the interior decontamination activities. These tasks were: ventilation system repair and modification; installation of access containment; installation of continuous air monitors in the designated work areas, and completion of the Non-Destructive Analysis (NDA). The NDA was performed in November of 1987 and is discussed in detail in Section 3.0 above. The results of the NDA estimated the Pu-239 inventory to be approximately 3.4 grams in the areas designated.

4.0 STABILIZATION WORK SEQUENCE (Cont.)

4.1 Pre-Job Preparation (Cont.)

4.1.1 Contamination Control (cont.)

A prefabricated metal containment structure (greenhouse) was installed in the PR Can Storage Room at the entrance to the PR Can Loadout Room. The "greenhouse" was installed primarily for contamination control due to increased traffic in and out of the highly contaminated areas. In addition, the "greenhouse" also served to maintain proper air balance in the building.

Continuous Air Monitor (CAM) units were installed in the Loadout Room, PR Can Storage Room, Stairwell and Viewing Room.

4.1.2 Ventilation System Repair and Modification

The 233-S ventilation system consists of one supply fan, two exhaust fans, HEPA filters and associated supply and exhaust ducts. Fresh air is drawn in from outside the building by the supply fan and directed to clean (noncontaminated) rooms and spaces. The exhaust system draws a vacuum only on the Process Hood and the Loadout Hood in the PR Can and Decontamination Room. Therefore, air flow is from "clean" areas into progressively more contaminated areas before it is directed to the 233-SA filter building.

From the beginning, two items relating to the stabilization activities inside the building were of critical concern. First, the damper for the east exhaust fan required repair before personnel could begin work on a continuous daily basis. Secondly, the Process Cell, which contains the highest inventory of Pu-239 in the building, did not have containment isolation. Therefore, there was nothing to prevent contamination from escaping from the cell through the inlet openings should an air reversal occur.

The damper for the east exhaust fan, which would not close properly, was repaired prior to the start of decontamination activities inside the building. HEPA filters were installed over the four inlet openings (See Figure 8) to the Process Cell at the completion of decontamination activities. The reason for installing the HEPA filters after completing the contamination stabilization activities was to prevent the filters from getting clogged during the application of paint. The purpose of placing HEPA filters over the Process Cell inlet opening is to prevent contamination from escaping should an air reversal occur.

4.2 Outside Area Decontamination and Stabilization

Radiation surveys conducted prior to the start of the stabilization project identified several areas around the perimeter of the 233-S Building where alpha contamination averaged 2,000 dpm (average) and 20,000 dpm (max.) per probe area (50 cm^2), using the standard Hanford portable alpha meter (PAM). These areas included: the ground surface east and adjacent to the 233-S Building; the ground area between the 233-S Building and the 202-S Building; and the concrete curbs and diamond plate covers over the 202-S column transfer tunnel located to the west of the 233-S Building. (See Figure 9).

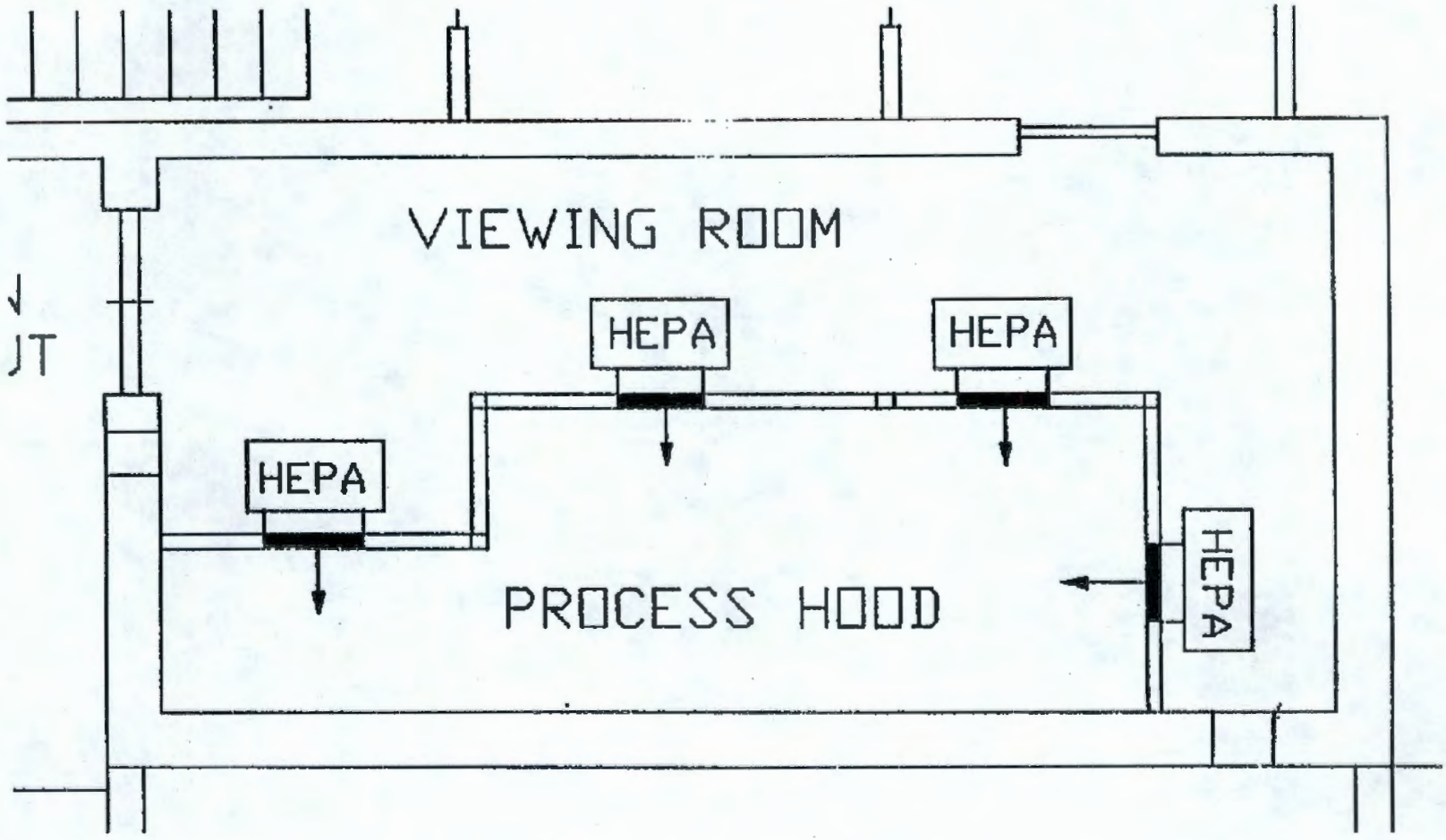

Figure 8. 233-S Process Cell Showing HEPA Filter Locations

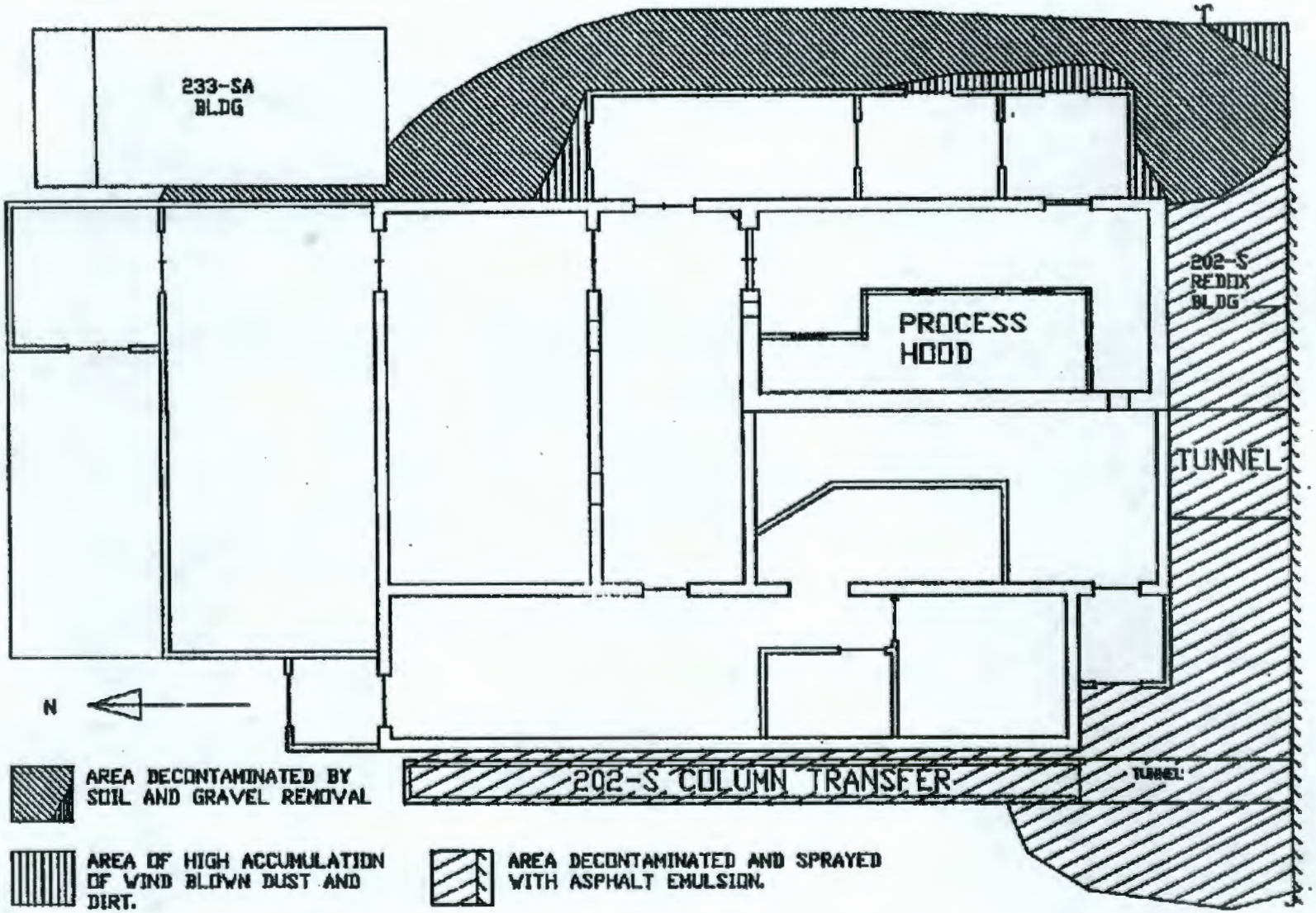

Figure 9. Boundaries of Contamination - 233-S Perimeter

4.0 STABILIZATION WORK SEQUENCE (Cont.)

4.2 Outside Area Decontamination and Stabilization (cont.)

The ground surface around the 233-S Building was covered with a layer of asphalt during the 1965 post-accident decontamination activities. The surface contamination along the east side of the 233-S Building was found primarily in the deposits of dirt and sand that collected where the prevailing winds created eddies next to the building. No contamination was found in the asphalt surface with direct reading survey instruments. Contamination levels along the east side of the 233-S Building ranged between zero and 20,000 dpm alpha per PAM probe area.

Decontamination activities consisted of picking up the loose dirt, sand and rock with shovels and placing the material in 55-gal. waste drums for disposal.

The source of contamination around the 233-S Building most probably originated from the north wall of the 202-S Building. The north wall surface of the 202-S Building, in the vicinity of the 233-S Building, had been left heavily stained from previous operational activities. The contamination levels on the north wall of the 202-S Building ranged between 20,000 and 50,000 dpm alpha per PAM probe area surveyed.

Decontamination activities in the area between the 202-S and 233-S Buildings consisted of removing the deteriorated protective covering over the connecting tunnel between the two buildings and applying a new protective barrier over the tunnel consisting of a thick layer of ALARA Coat. The original protective covering over the tunnel along with all the loose dirt and gravel in the area were placed in 55-gal. waste drums. The ground surface between the two buildings and the north wall of 202-S was then sprayed with asphalt emulsion to fix the remaining contamination.

The 202-S Column Transfer Trench, though not associated with the 233-S Building, is located on the west side of the building. The trench is a deep underground structure that was used to transfer large ion exchange columns in and out of the 202-S Building. The top of the trench is covered with diamond plate panels. The inside to the trench is contaminated, and radiation surveys had identified loose surface contamination along the concrete curbs which hold the steel panels.

The joints between the steel cover panels and along the concrete curbs were sealed with cloth tape and coated with asphalt emulsion to prevent further release of contamination.

4.3 Interior Decontamination and Stabilization

The purpose of the stabilization activities in the 233-S Building was to decontaminate the rooms and spaces adjacent to the Process Cell and to provide containment isolation for the Process Cell and building proper. The rooms and spaces identified for decontamination activities were the PR Can Loadout Room, Stairwell, the two air locks adjacent to the stairwell and Process Cell Viewing Room.

4.0 STABILIZATION WORK SEQUENCE (Cont.)

4.3 Interior Decontamination and Stabilization (Cont.)

The original decontamination plan was to vacuum and wipe down with damp rags all surfaces in the contaminated areas. In the early stages of the decontamination process, it was discovered that wiping down the surfaces was ineffective. Decontaminated areas were soon recontaminated due to the high degree of air turbulence from the ventilation system. Therefore, the practice of wiping surfaces with damp rags was discontinued on the ground floor, except in the PR Can Loadout Room, where air turbulence was most significant, and emphasis was placed on fixing the contamination with paint.

4.3.1 PR Can Loadout Room

Entry into the contaminated areas from the access/containment structure was made via the PR Can Loadout Room. This room contained low levels of alpha contamination and was maintained as an additional buffer zone between the access/containment structure and the more contaminated rooms and spaces.

The only significant source of contamination in the Loadout Room was located inside the Loadout hood, which was not within the scope of the stabilization activities.

A total of five 55-gal. drums of waste were removed from the Loadout Room. Most of this waste was generated from housekeeping and decontamination activities. The Loadout Room was the last room to be decontaminated and was accomplished by wiping down all accessible surfaces with damp rags until no significant change in detectable alpha activity was observed with standard Hanford portable survey instruments.

The emergency door between the Loadout Room and the SWP Change Room was sealed to prevent contamination from escaping into clean areas of the building. This was accomplished by taping a strip of cheesecloth over the space between the floor and door, and around the door jambs, then fixing the strip of cloth in place with ALARA Coat. This method provides an effective barrier without preventing the door from being opened in case of an emergency.

4.3.2 Stairwell and Air Locks

The ground floor level of the Stairwell and the two Air Locks to the south contained excessive quantities of miscellaneous trash, debris and old SWP clothing. This contaminated material was placed in twelve 55-gal. waste drums along with the waste associated with decontamination activities. The upper three levels of the Stairwell were totally free of trash and debris.

4.0 STABILIZATION WORK SEQUENCE (Cont.)

4.3 Interior Decontamination and Stabilization (Cont.)

4.3.2 Stairwell and Air Locks (cont.)

The Stairwell and Air Locks were vacuumed to remove the large buildup of dust and spider webs that had accumulated over time. The upper levels of the Stairwell were wiped down with damp rags, however, a great deal of time was not expended on the task. The main emphasis was to remove the bulk of the loose surface material. After decontamination activities, the Stairwell and Air Locks were spray painted to fix the remaining contamination.

The exit doors located in each Air Lock were sealed in the same manner as the emergency door in the Loadout Room. The purpose of this action was to prevent dust and dirt from being drawn into the Air Locks through the cracks around the doors and prevent contamination from leaking out around the doors in the event of a release inside the building.

4.3.3 Viewing Room

The Viewing Room was the most highly contaminated area subject to the stabilization activities. Only two 55-gal. drums of waste were removed from this room. One drum was filled with waste material from the ground floor area and one drum from the upper three levels. The waste consisted primarily of paper, plastic, wood, cloth, tape and metal (scrap metal, nuts, bolts and old hand tools). A vacuum cleaner was used to remove spider webs and the dust and dirt that had accumulated on the horizontal surfaces. No attempt was made to vacuum 100% of the surface area in this room.

All glove port openings in the Process Hood were recapped and resealed. All observable holes and openings in the hood were also sealed. Upon completion of debris removal, vacuuming operations and sealing of the Process Hood, the entire room was sprayed with several coats of latex paint to fix the remaining contamination. After painting operations were completed, HEPA filters were installed over each of the four inlet openings in the Process Hood.

4.3.4 Final Radiological Survey

Post stabilization surveys were conducted in the Loadout Room, Stairwell and Air Locks, and the Viewing Room to establish effectiveness of the decontamination activities. Table 5 compares the results of the radiological surveys taken before and after the stabilization project.

4.0 STABILIZATION WORK SEQUENCE (Cont.)

4.3 Interior Decontamination and Stabilization (Cont.)

4.3.4 Final Radiological Survey (cont.)

Table 5. Comparison of 1987 and 1988 Direct Radiological Surveys

LOCATION	Jan.87 Survey DPM ALPHA/Probe Area	Feb.88 Survey DPM ALPHA/Probe Area
1. Loadout Room		
Dust on Criticality Detector	42,000	14,000
Floor near SOP to Stairwell	49,000	2,100
Floor near door to Process Area	49,000	700
Floor near door to Process Area	49,000	1,400
Dust on pipe - South Wall	175,000	700
Top of Loadout Hood	700	700
Top of Loadout Hood	1,000	1,400
Top of Loadout Hood	1,000	1,400
Floor, N.E. corner of Loadout Hood *	7,000	1,400
Floor near North Wall	<Detectable	1,050
North Wall	<Detectable	<Detectable
* Dose rate 10 mr/hr		
2. Air Lock (southeast)		
Floor	2,500	600
Floor	1,500	600
Floor	2,000	900
3. Stairwell		
Rails	17,500	2,700
Floor, bottom of Landing	35,000	1,200
Stairs	31,500	3,900
4. Viewing Room		
Vent Opening #1	17,000,000	3,380
Vent Opening #1	3,000,000	48,000
Floor - front of Vent #1	350,000	12,000
East Wall	364,000	1,400
North doors - to Loadout Room	210,000	900
Panel Ledge - center (west)	3,000,000	1,500
East Wall	70,000	600
Panel Ledge above Vent #2	42,000	1,500
Panel Ledge above Vent #3	35,000	9,000
Panel south of Vent #3	560,000	1,200
Floor near door to Air Lock	28,000	1,200
Wall near door to Air Lock	24,500	1,200
Ceiling - center	63,000	1,500
Panel - south of Vent #1	3,000,000	600
Door Handle to Air Lock	56,000	1,200
Light fixture	35,000	1,200

General Area dose rate - 20 mr/hr
Dose rate in contact with panel near Vent #1 - 180 mr/hr

5.0 CONCLUSION

The 233-S stabilization project was completed on December 30, 1987, with the installation of the HEPA filters on the Process Hood. The HEPA filters were installed so as to allow maximum air flow into the hood and prevent contamination from leaking out of the hood should a reverse flow in the ventilation system occur. Using extreme caution and emphasizing the principles of ALARA, personnel were able to complete the project with no radiological incidents. Based on the final radiological survey, the decontamination activities were effective measures in stabilizing the 233-S Building.

6.0 REFERENCES

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3. W. H. Ulbricht, Jr., Quantity of Dust Borne Pu-239 in Viewing Room and Stairwell Areas of the 233-S Building, SD-DD-TI-027, Rev. 0, Draft.

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5. Letter, J. F. Beckstrom/W. M. Hayward, 233-S Stabilization Project, June 19, 1987.

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7. Letter, R. P. Knight/W. F. Heine, 233-S, dated January 23, 1987.

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9. Letter, R. W. Hickman/L. E. Kusler, Surplus Facilities: Major Repairs Needed, dated October 4, 1984.

10. R. W. Hickman, Surplus Facilities Support Systems Evaluation and Work Plan to Correct Deficiencies During Fy 1984, SD-DD-ER-001, February 8, 1984.

11. Environmental Assessment - Redox Plutonium Concentration (233-S) Building, DOE/EA-0021, dated March 1978.