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AI-ERDA-13158

BUILDING 003
DECONTAMINATION AND DISPOSITION
FINAL REPORT

ERDA Research and Development Report

Prepared for the United States
Energy Research and Development Administration,
Environmental Controls Technology Division
under Contract Number AT(04-3)-701.

Rockwell International

Atomics International Division
8900 DeSoto Avenue
Canoga Park, California 91304

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WASTE MANAGEMENT
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FINAL REPORT

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Rockwell International

Atomics International Division
8900 DeSoto Avenue
Canoga Park, California 91304

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DISTRIBUTION

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ABSTRACT

The decontamination and disposition (D&D) of the contaminated facilities in Building 003 are complete. The Hot Cave, the building radioactive exhaust system, the radioactive liquid waste system, and the fume hoods were removed. The more significant D&D activities are summarized, special techniques are noted, and problems and their resolution are discussed. Results of the radiological monitoring are presented.

I. INTRODUCTION

The Hot Cave in Building 003 had been inactive since the close-out of the SNAP Program in GFY 1973. Prior to that time, the facility had been used for the analysis of SNAP fuel burnup samples and evaluation of irradiation experiments. The inner surfaces of the Hot Cave were grossly contaminated with mixed fission products. Containment of this high level contamination required continuous radiological surveillance and maintenance of the radioactive exhaust system. Since Building 003 facilities were declared "excess," decontamination and dismantling of the contaminated facility proceeded as described in the Decontamination and Disposition of Facilities Program Plan No. PP-704-990-002.

The Hot Cave (Figure 1) was totally dismantled and all materials and equipment removed from the site. Dismantling included removal of:

1) Block and steel structure
2) Floor and footings down to original earth
3) Radioactive liquid waste
4) Air exhaust systems
5) Electrical and water support systems.

Figures 2, 3, 4, and 5 present views of the Hot Cave front, side, rear, and top respectively, prior to dismantling.

Other contaminated facilities removed from Building 003 were:

1) Fume hoods
2) Radioactive waste sinks
3) Drain lines
4) Holding tanks
5) Facility exhaust system.

In addition, test and experimental equipment used in other Building 003 activities were removed.

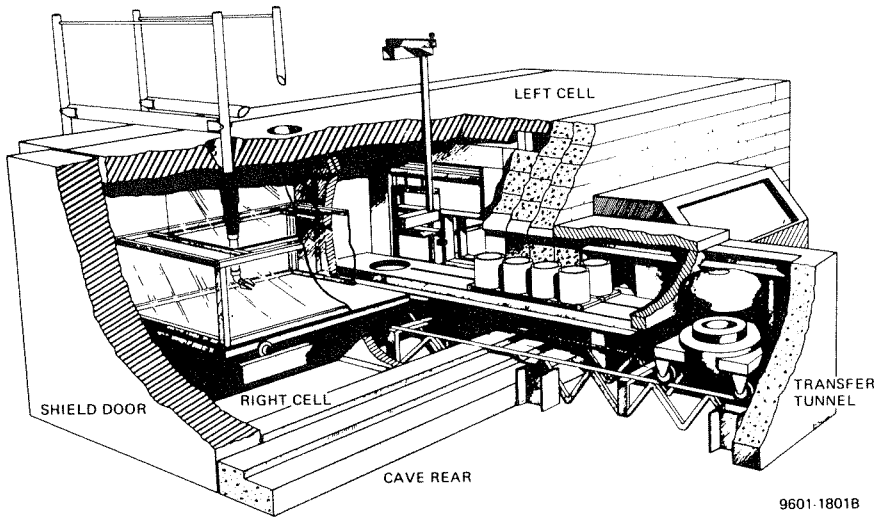

Figure 1. Hot Cave Layout

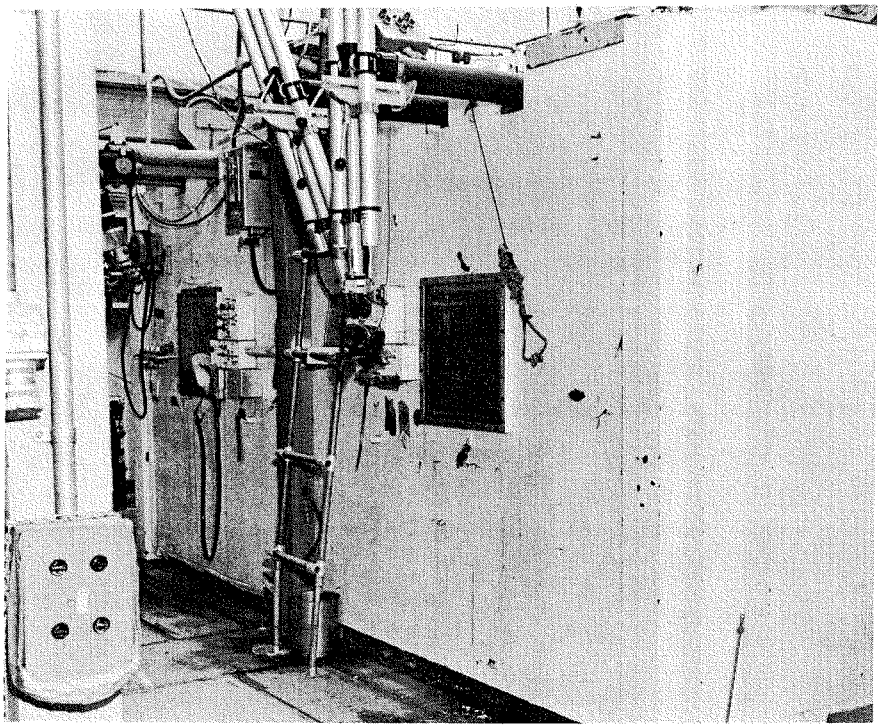

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Figure 2. Front of Hot Cave

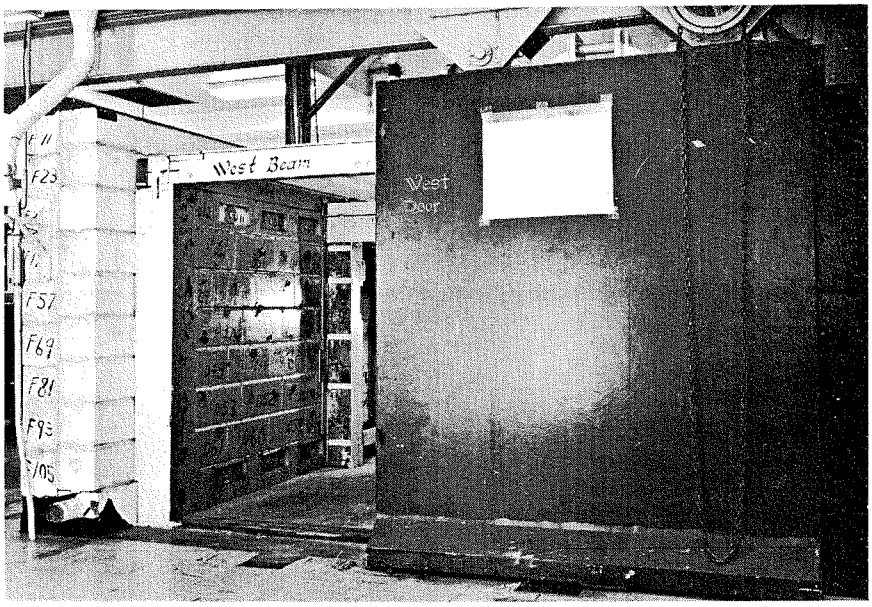

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Figure 3. Side View of Hot Cave

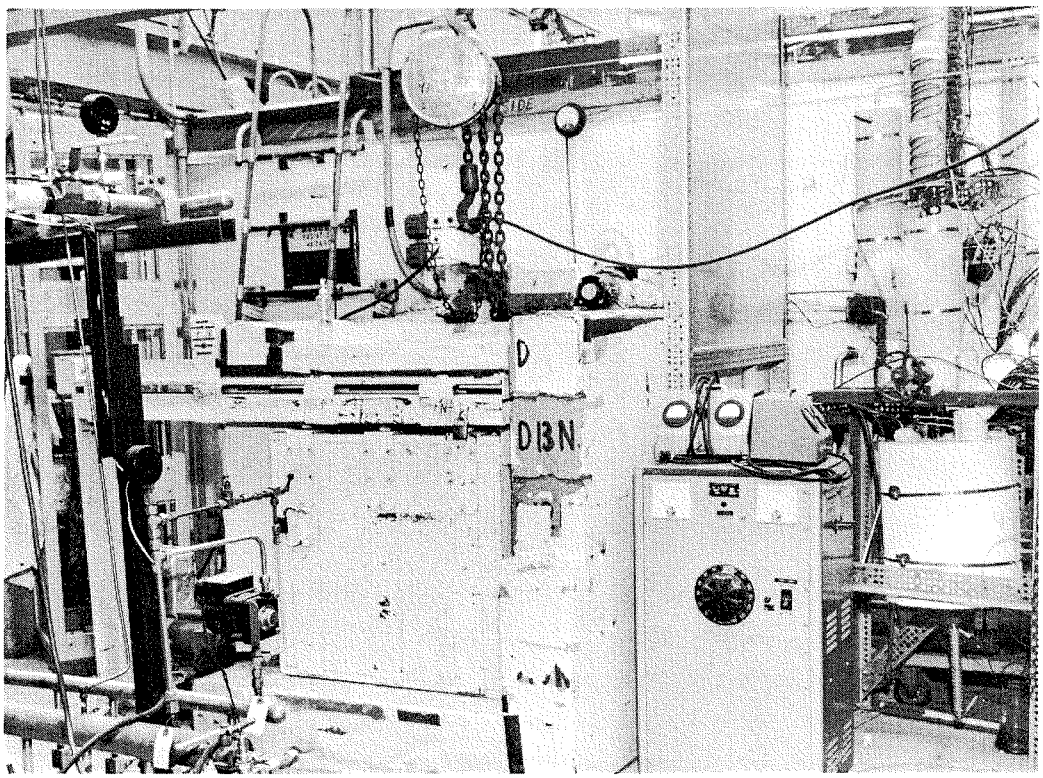

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Figure 4. Rear of Hot Cave

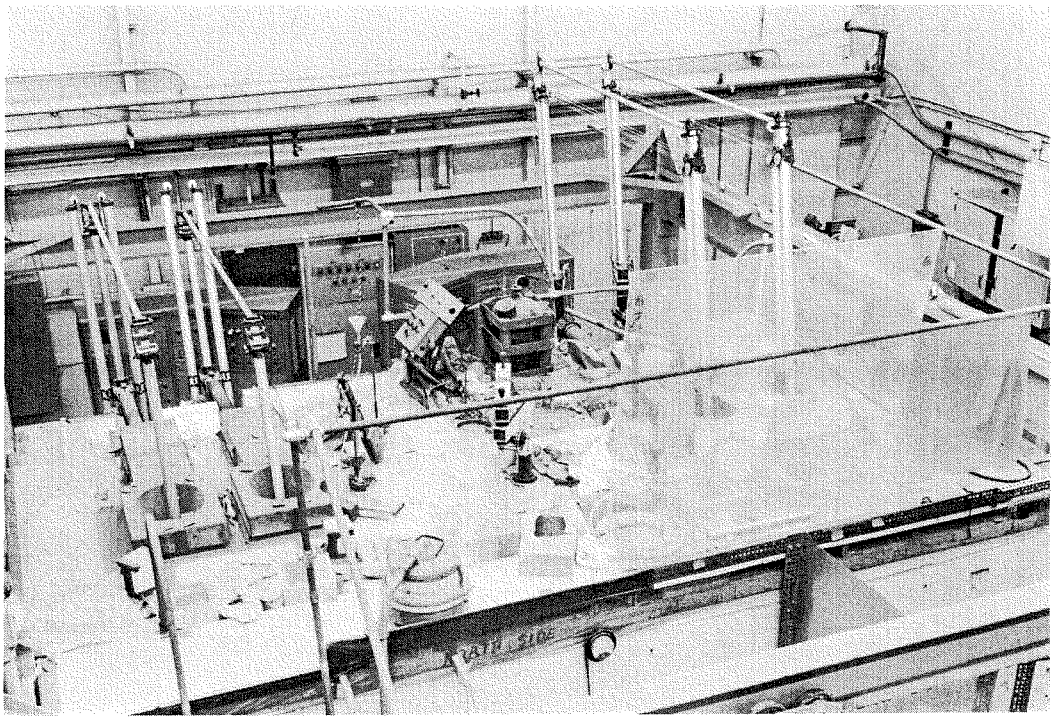

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Figure 5. Top of Hot Cave

This report summarizes the more significant D&D activities, discusses special techniques used, and reviews major problems and their resolution. The report notes the radiological surveillance conducted throughout the D&D and includes the record of the radiological survey upon completion.

II. SUMMARY OF ACTIVITIES

The actual decontamination and disposition (D&D) efforts in Building 003 began January 24, 1975, and ended June 22, 1975. The main effort, dismantling of the Hot Cave, was completed April 3, 1975. Because the facility exhaust system was needed during the decontamination and disposition construction work, the exhaust system was not removed until June 22, 1975.

A Facilities Dismantling Plan for Building 003 (Appendix A) which defined the scope of the dismantling effort was prepared. This plan was reviewed and approved by the Isotopes Committee of the AI Nuclear Safeguards Review Panel and subsequently approved by ERDA. A detailed working procedure for dismantling Building 003[1] was then prepared which provided step by step delineation of the tasks described in the dismantling plan. This procedure was also reviewed and approved by the Isotopes Committee.

The basic work was performed by AI Remote Technology Unit personnel trained to work in radiation areas. This Unit was supported by the Health, Safety, and Radiation Services (HSRS); Industrial Engineering; and Maintenance Departments. A contractor was hired to remove the concrete floor and structural footings. The contract was amended later to authorize the contractor to use explosives to remove the floor pans imbedded in the concrete.

A. PREPARATIONS

The existing personnel change room was reactivated and resupplied. An HSRS work station, equipped with alpha and beta-gamma counting instrumentation, survey meters, air samplers, personnel dosimeters, protective breathing apparatus, protective clothing, gloves, shoe covers, and other safety materials, was established in the high bay along the south wall.

Plastic sheet entry enclosures (Figure 6) were constructed, one each for the east and west door openings. The enclosures allowed opening the cell doors for personnel entry, and prevented the spread of contamination into the Building 003 high bay. The Hot Cave exhaust system was operated throughout the Hot Cave decontamination activities. This system also vented the entry enclosures when the cell doors were opened. The building and the cell doors (Figure 3) were kept

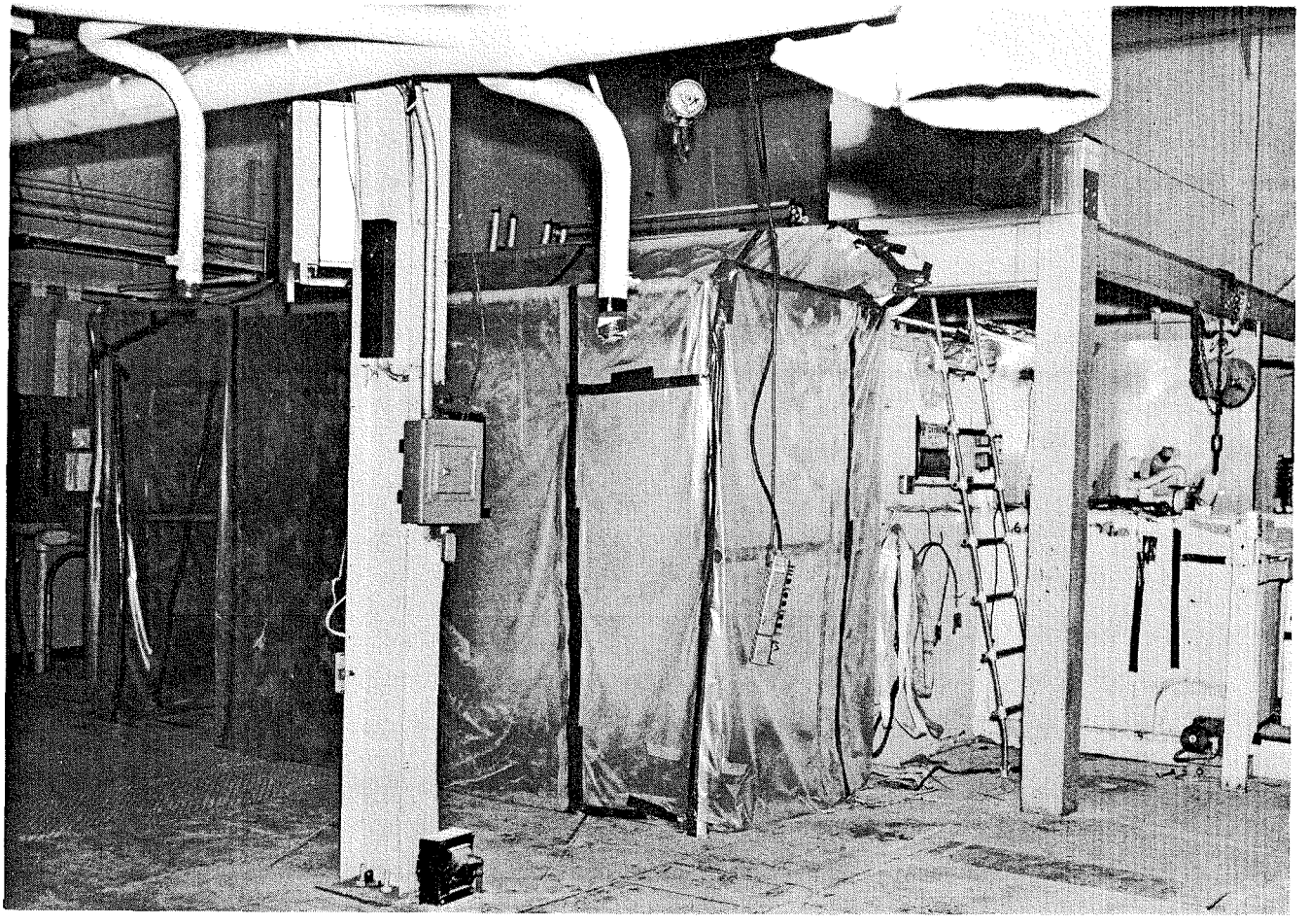

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Figure 6. Cell Door Enclosure

locked whenever the facility was unattended. Before beginning the D&D activities, all personnel associated with this work were briefed by the unit manager on the scope of the work, radiation hazards, and the necessary safety precautions. A familiarization review of the detailed procedures and the requirements for limiting personnel exposure to levels which are "as low as practicable" (described in Reference 2) was also presented by the unit manager. The dismantling was then begun.

B. DISMANTLING

To provide the required access to the Hot Cave, the Building 003 high bay was cleared of unnecessary equipment, including the remains of a sodium experiment.

1. East Cell

The east cell of the Hot Cave was entered and decontaminated first. Restricted Access Entry Permit No. 17602 was issued by the Health, Safety, and Radiation Services Department. Figure 6 shows the typical entry enclosure erected over the cell door.

The removal of the manipulator and other equipment, materials, and structures from the east cell was accomplished as planned. When removed, contaminated materials were wrapped in plastic sheeting to contain removable contamination and placed in a U.S. Department of Transportation (DOT) specification shipping container for shipment to Beatty, Nevada for burial. The radiation levels found before and after cleaning are reported in Section III, Radiological Monitoring and Surveying, Tables 3 and 4. The east cell was decontaminated using a "foamer" to loosen the contamination, and a vacuum cleaner to remove the contamination. The solvent used in the "foamer" was "Big K," which is a light caustic. Foaming action was provided by detergent. Following "foaming," the cell was cleaned further by wiping using the "Big K" solvent. The vacuum cleaner was later decontaminated at the Radioactive Material Disposal Facility (RMDF). All other residue and wiping cloths were placed in a plastic bag and shipping container, and shipped to the RMDF.

2. West Cell

The west cell was opened and a radioactivity survey conducted (Table 3, Section III). The west cell contained considerably higher levels of radioactivity than the east cell. The west cell contained test analysis equipment and experimental residue. Upon initial entry, miscellaneous waste was removed, including three trays (7 rad/hr) and two 1-gal. paint cans (~25 rad/hr). This waste was bagged and placed in a conduit with 6 in. of concrete shielding and sent to the RMDF for disposal. The cell interior was wiped using the cell manipulators. After the wiping materials were bagged and removed, the cell was vacuum cleaned. Five prefilters (250 mrad/hr) from the lower section of the cell and a 30-gal. bag of solid waste (2 rad/hr) were then removed, and the cell was vacuum cleaned again so that most of the loose contamination was removed. As the roof shield blocks associated with the manipulators, and the manipulators, were removed, the openings in the roof were covered with

TABLE 1

FILM-BADGE AND FINGER-RING ANALYSES FOR INCIDENT INVOLVING DISCOVERY OF HIGH LEVEL RADIATION SOURCE

Technician	Film Badge Number	Dose (mrem)	
		β	γ
Whole Body Dose*			
A	219	120	240
A	220	120	210
B	221	135	0
B	222	165	0
C	223	70	15
C	224	70	30
D	225	110	0
D	226	110	0
Hand Dose†		$\beta + \gamma$	
A	—	610§	
B	—	50§	
C	—	300§	

*Body badges worn two days
†Finger rings worn two days
§Average both hands

plastic sheet to contain the loose contamination on the adjacent blocks. The remaining items in the cell, including a lucite enclosure, shelf, cell table, and 90 gal. of solid radioactive waste were removed. At this time, an area of the cell floor, covered with what appeared to be dried uranyl salt solution, was discovered to be contaminated (25 rad/hr at 10 cm). Further investigation was initiated when removal of this contamination failed to reduce the radiation levels in the cell to the levels anticipated.

The investigation revealed that a container of SNAP burnup samples lay in the transfer tunnel between the two cells. The container was picked up with tongs to obtain a radiation level measurement using a Juno portable ionization chamber-type detector (0 to 25 R/hr). When radiation levels in excess of the upper limit of this instrument were observed, the container was immediately placed farther into the transfer tunnel, and the transfer tunnel west door was closed. All personnel then exited the cell, and film badges and finger rings were collected and developed. Operations on the Hot Cave were halted pending the assessment of radiation exposure to personnel, and establishment of steps to remove the high level radioactive material. The personnel radiation exposure for this particular activity was evaluated immediately. These exposures appear in Table 1.

Upon determination that the radiation exposures to the personnel involved were well within occupational exposure limits, the cell was entered again, and the container of radioactive material was transferred with tongs to a 5-gal. can which was placed into a lead cask. After placing the container in the cask, maximum radiation levels of 2.3 R/hr, and 165 mR/hr were observed at the surface, and at 1 meter from the surface of the cask, respectively. The cask was transferred to the Radioactive Waste Storage Facility, Building T075.

In removing the west cell manipulator, access to the west portion of the roof was necessary. The west roof, unlike the exterior walls of the Hot Cave, was contaminated and required protective clothing for access.

3. Transfer Tunnel

Table 6 in Section III shows the contamination levels in the transfer tunnel. All contaminated materials (cask dolly, rails, push-pull rods) were removed from the tunnel and packaged for shipment to Nuclear Engineering Company for

burial at Beatty, Nevada. After the area was decontaminated, the shield blocks surrounding the tunnel were removed. Each block was examined for contamination. A plastic sheet cover was taped over the tunnel to prevent contamination spread (Figure 7).

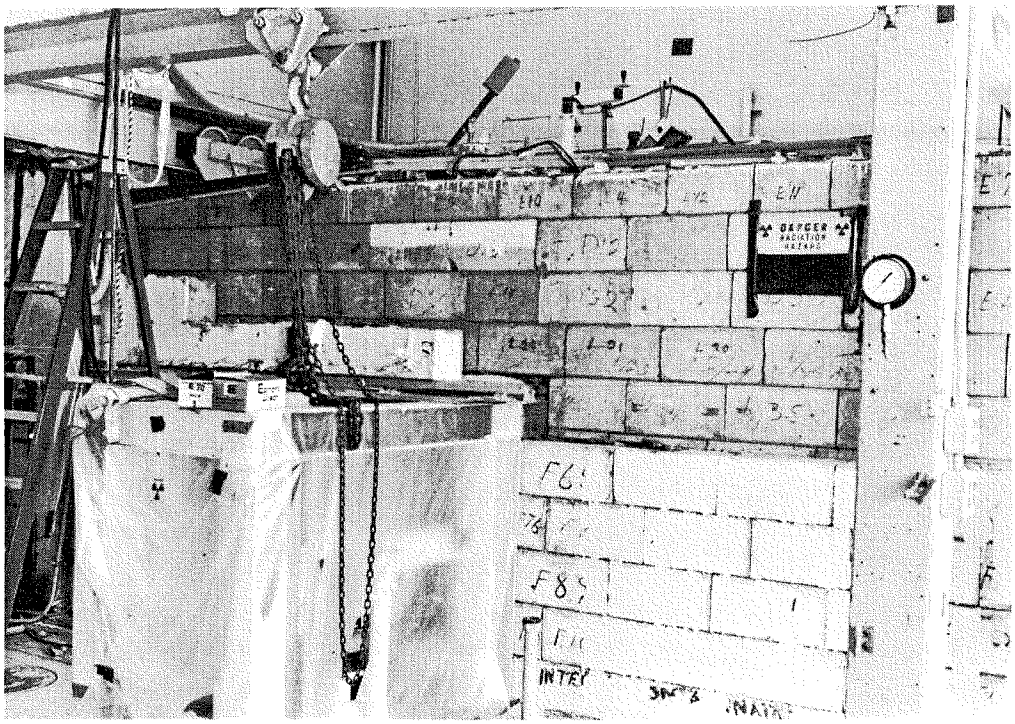

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Figure 7. Transfer Tunnel Entry Cover

4. Cell Roof and Wall Blocks

The cell roof and wall shield blocks were removed. The contaminated roof blocks were wrapped with plastic sheets. The wall blocks were in layers three deep. Two of the blocks located over the west cell in the second layer were found to be contaminated. These were decontaminated to less than the limits specified in Table 1 of the Plan. The floor area exposed upon block removal was surveyed and found to be free of contamination. The blocks making up the interior layer were found to be contaminated and were disposed of as radioactive waste. Figure 8 shows the block wall disassembled.

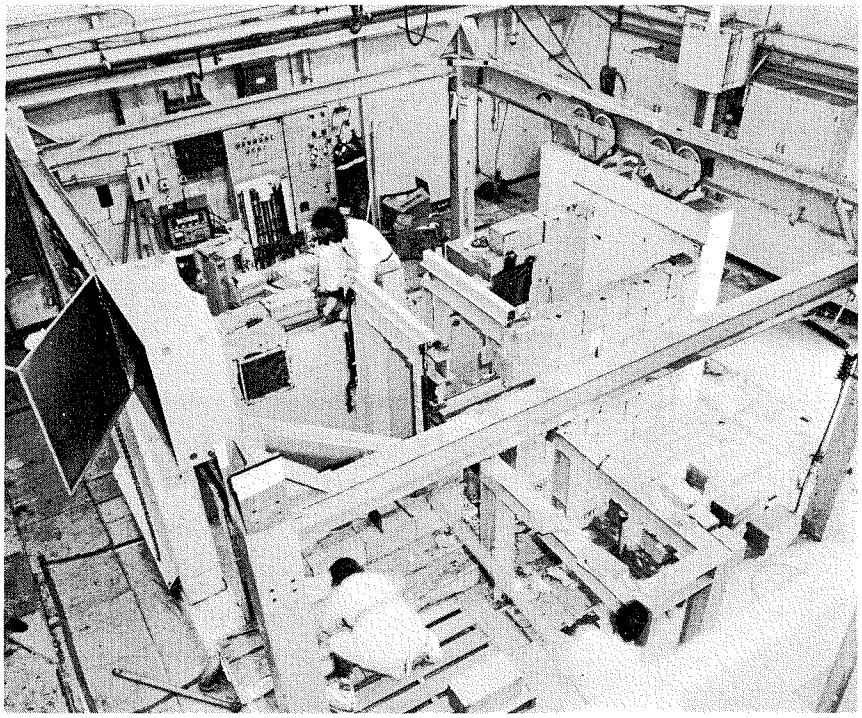

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Figure 8. Disassembly of Block Walls

5. Hot Cave Floor

Each cell contained a stainless-steel pan about 3 ft by 3 ft and 8 in. deep. These pans provided a junction and distribution system for the exhaust air, electrical power, instrumentation, and radioactive waste. Figure 9 shows the pans just inside the door structure. The pans were partially decontaminated and the remaining contamination was fixed with a spray paint. Removal of these pans was difficult because of the massive 18-in. thick reinforced concrete that had been poured around the pans and the connecting ducts and conduits when constructed.

Several techniques for removal were employed. Oxy-acetylene flame cutting and carbon arc fusing were tried but progress was extremely slow. The concrete grout behind the pan metal absorbed most of the applied heat, preventing rapid melting of the metal. Air breathing equipment was used by the operator in addition to the usual protective clothing. A special exhaust duct for removal of the generated fumes was connected to the building radioactive exhaust system.

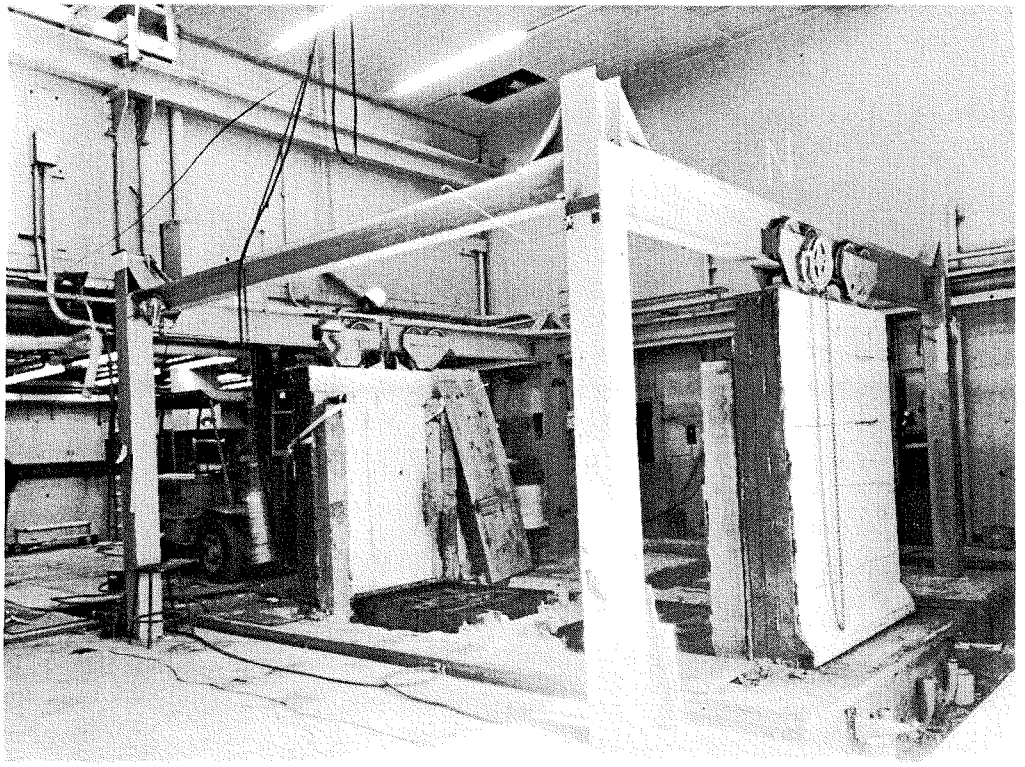

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Figure 9. Floor Pans at Base of Doors

An attempt was made to break up the concrete surrounding the pans using jack hammers with little success. Airborne concrete dust was not a radiological problem since the concrete was not contaminated. Air samplers in the room verified the absence of radioactivity in the concrete.

The pans were finally removed using explosives. The demolition subcontractor drilled several holes beneath the pans and set off charges. The force of the explosive charges was contained by sand bags over the pans and the concrete. Figure 10 shows preparations for blasting. After repeating the drilling and explosive detonations several times, the pans were loosened. The air sampler recorded no detectable airborne contamination during the drilling and blasting.

The two 12-ton shield doors and supporting steel structure (Figure 9) were sold to a salvage contractor for $735 who dismantled and removed it all without charge. Prior to release of this structure to the salvage contractor, the doors were

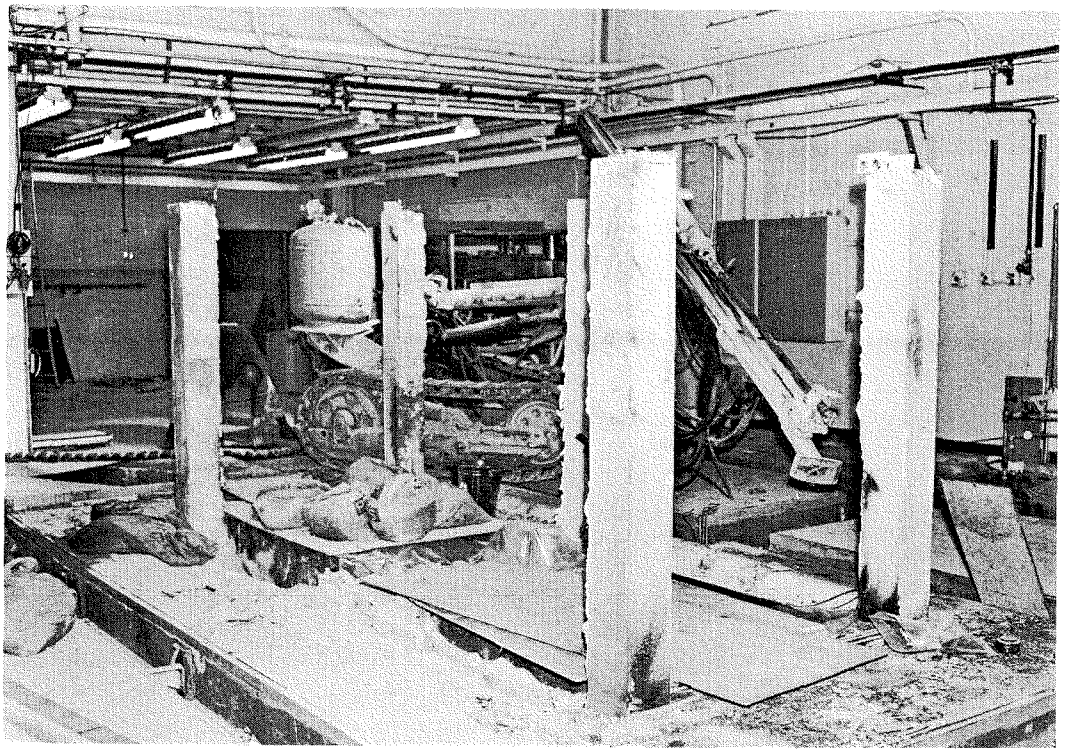

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Figure 10. Drill Rig and Preparation for Blasting

decontaminated by wiping them several times with "Big K" solvent to levels which were as low as practicable (ALAP), but in all cases less than the limits specified in Table 1 (Appendix A). The contractor cut the doors into manageable pieces in place, then moved the pieces outside the building where they were cut into smaller segments.

6. Support Facilities D&D

The Hot Cave radioactive exhaust filters were removed, wrapped in plastic, and shipped to Beatty, Nevada for burial. Exhaust ducts and liquid waste lines were removed and also wrapped and shipped to the burial site. The two liquid waste tanks associated with the Hot Cave were partially decontaminated. These holdup tanks were later removed by the contractor using a back hoe, and packaged for shipment to the burial site. The remaining noncontaminated concrete, rubble, and soil at the Hot Cave site were removed by the contractor. Figure 11 shows the completed excavation. This area was subsequently

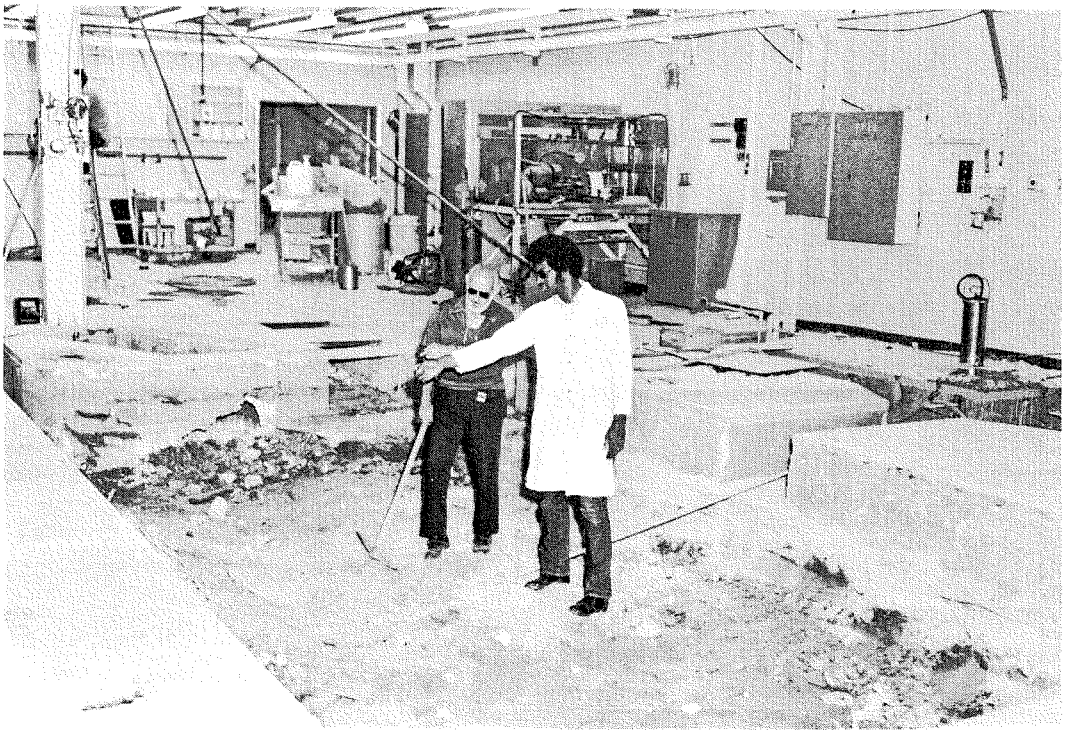

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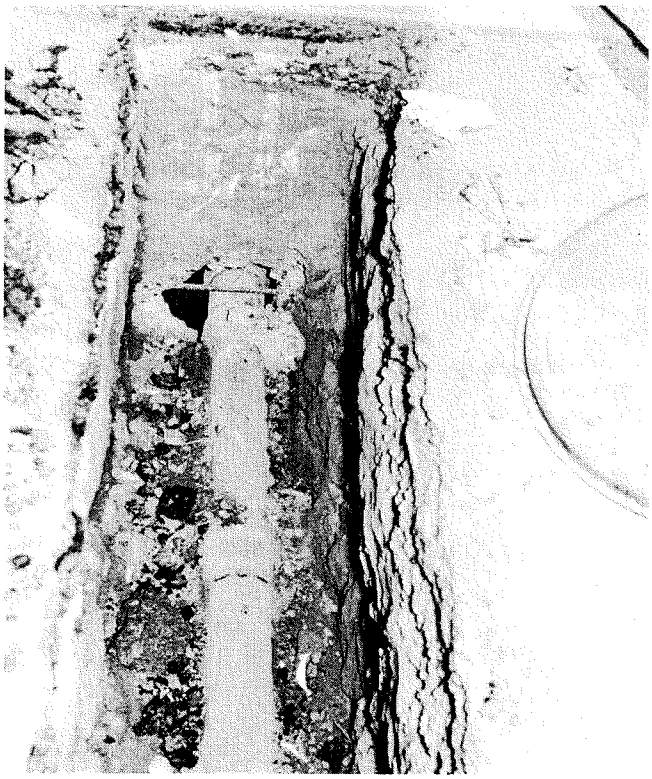
Figure 11. Excavation of Hot Cave Floor

excavated further to construct a mockup of the SRE reactor vessels as part of the tooling development for the planned dismantling of the SRE.

During the Hot Cave dismantling, nine fume hoods were removed from Building 003 laboratories. Two were contaminated and were, therefore, sent to the Radioactive Materials Disposal Facility (RMDF) where they were decontaminated and later sent to salvage as suitable for unrestricted use. The exhaust ducting associated with these fume hoods was also removed. Most of the ducting was found to be free of contamination. About 30 ft of the ducting in the high bay was contaminated and was dismantled and sent to the RMDF for packaging and subsequent offsite burial.

The radioactive waste sinks, which had been decontaminated after their last usage, one in the high bay and one in the upstairs laboratory, were removed and packaged for shipment to Beatty, Nevada for burial. To remove the drain lines required breaking through the concrete floor for a distance of about 60 ft and excavating. Figure 12 shows a section of the excavation. The soil in the vicinity of the drain lines was sampled and analyzed for radioactivity. The lines were removed by breaking them at the joints. There was no residual



7704-6629

Figure 12. Excavation of Radioactive Waste Drain Line

liquid in the lines, but in the removal process the soil became contaminated when pieces of pipe came into contact with the soil. In the areas where radioactivity was found, the soil was removed, packaged in 55-gallon drums and shipped to Beatty, Nevada for burial. A final check of the trenches with direct reading instruments and by soil sampling showed the area to be free of contamination. The holdup tank at the end of the drain line was removed and sent to Beatty, Nevada for burial. The trenches were then backfilled and paved with concrete.

III. RADIOLOGICAL MONITORING AND SURVEYING

A major activity in the Building 003 decontamination and disposition was the radiological monitoring and surveying of the operations. Smear surveys, portable instruments measurements, air sampler measurements, and water and soil analyses were made. A considerable quantity of data was taken and recorded by Radiation and Nuclear Safety personnel. The more significant data are presented in Tables 2 through 8. The whole body and extremity doses for the technicians working on the decontamination and dismantling of Building 003 Hot Core for the period January 1975 through April 30, 1975 appear in Table 2. These doses represent the total man-rem received for this D&D operation.

TABLE 2

PERSONNEL RADIATION EXPOSURE SUMMARY
FOR D&D OF BUILDING 003 HOT CAVE
(January 1975 through April 1975)

Technician	Total Dose* (mrem)
Whole Body Dose	
A	490
B	255
C	~~90~~ 70
D	525
Health Physicist	275
Extremities (Hand) Dose	
A	785
B	300
C	190
D	250

*Per [illegible]

TABLE 3

REMOVABLE CONTAMINATION LEVELS MEASURED DURING HOT CAVE INITIAL ENTRY (EAST CELL)

Location	Results (min-max)	
	$\left(\frac{\text{dpm } \alpha}{100 \text{ cm}^2}\right)$	$\left(\frac{\text{dpm } \beta\text{-}\gamma}{100 \text{ cm}^2}\right)$
West Manipulator Roof Shield Block Area	<20	<100
Lead Manipulator Part Shield Block Area	<20	100-524
West Manipulator Lower Area	<20	3,180-5,250
Open Manipulator Port	<20	<100
South Wall (Interior of Cell)	<20	126-14,451
South Wall Exhaust Outlets	42-96	36,309-52,926
West Wall	<20	1,056-86,178
North Wall	20-39	1,230-19,038
Ceiling	<20	480-9,504
Floor Area	20-54	4,862-33,828
Floor Area Under Door		522

TABLE 4

REMOVABLE CONTAMINATION LEVELS ON INNER SURFACES OF EAST CELL FOLLOWING INITIAL DECONTAMINATION

Location	Results
	$\left(\frac{\text{dpm } \beta\text{-}\gamma}{100 \text{ cm}^2}\right)$
South Wall	100-3,855
South Wall Exhaust Ducts	2,838-10,800
West Wall	100-1,818
North Wall	100-2,349
Ceiling	186-5,145
Floor	1,418-30,504

TABLE 5

REMOVABLE CONTAMINATION LEVELS ON OUTSIDE SURFACES OF WEST CELL

Location	Results $\left(\frac{\text{dpm } \alpha}{100 \text{ cm}^2}\right)$	Results $\left(\frac{\text{dpm } \beta\text{-}\gamma}{100 \text{ cm}^2}\right)$
Door Top	<20	<100
Door External Surface	<20	100-867
Area Outside Door	<20	<100

TABLE 6

REMOVABLE CONTAMINATION LEVELS ON INNER SURFACES OF WEST CELL FOLLOWING INITIAL DECONTAMINATION

Location	Results $\left(\frac{\text{dpm}\beta}{100 \text{ cm}^2}\right)$
Lucite Door Panel	500,000
South Wall After Wiping	6,424
North Wall	249,000
Roof Area	8,359
Roof Blocks Near East Wall	108
Roof Blocks Near West Wall (after Decontamination)	2,800
Roof Blocks Near South Wall	11,792

TABLE 7

REMOVABLE CONTAMINATION LEVELS ON INNER SURFACES OF TRANSFER TUNNEL FOLLOWING INITIAL DECONTAMINATION

Location	Results $\left(\frac{\text{dpm}\,\beta}{100\ \text{cm}^2}\right)$
Rails (Cask Dolly)	5,492
East Wall	1,096
West Wall	784
Floor of Tunnel (Oily Substance)	14,000
Upper Storage Area	32,023

TABLE 8

SURFACE RADIATION MEASUREMENTS ON ITEMS REMOVED FROM HOT CAVE

Item	Results (mrad/hr)
East Cell Manipulator	5
3 each, Stainless-Steel Tray (West Cell)	7,000
2 each, 1-gal. Paint Cans (West Cell)	25,000
5 Prefilters (West Cell)	250
30-gal. Bag of Radioactive Waste (West Cell)	2,250
Container of Burnup Samples	>25,000
Transfer Cell Dollies and Electromagnet	750
Roof Plate West Cell	2,000
Lead Curtains - Transfer Tunnel to Cell Doors	2 to 60

The objective of the Dismantling Plan[1] was to complete the dismantling of Building 003 facilities so that all remaining surfaces are decontaminated to levels which are as low as practicable but in all cases to levels no greater than those of Table 1 of the Dismantling Plan. A description of the approach utilized for implementing ALAP principles appears in Reference 5.

The Hot Cave contents and structure were completely dismantled and removed. In addition, the floor beneath the Hot Cave was subsequently excavated to a depth of 35 ft as part of the SRE mockup construction. Soil samples from this excavation contained radioactivity concentrations of 0.75 pCi/gmα and 24.8 pCi/gmβ. These concentrations closely correlate to the Santa Susana site background radioactivity concentrations in soil of 0.60 pCi/gmα and 25.0 pCi/gmβ. During the excavation, ground water seeped into the hole. Analysis of a sample of this water indicated radioactivity concentrations of 7.9×10^{-10} μCi/ccα and 1.2×10^{-8} μCi/ccβ, which are lower than the site background radioactivity concentration in ground water.

Removal of the drain lines from the radioactive sinks involved excavating about 60 ft of concrete floor and soil cover. Fifteen samples of the soil in the trench were taken. Radioactivity concentrations in these samples ranged from 20.3 pCi/gmβ to 408.2 pCi/gmβ and 0.38 pCi/gmα to 56.3 pCi/gmα. Four of the soil samples deviated significantly from average background levels. The soil from these sample points was removed by additional excavation until portable instrumentation indicated clean soil. The soil was then sampled and analyzed again. Radioactivity concentrations in these samples ranged from 22.3 pCi/gmβ to 24.1 pCi/gmβ and 0.662 pCi/gmα to 0.973 pCi/gmα.

The floor area in the high bay was routinely surveyed throughout the dismantling activity. When contamination was detected, it was immediately removed and the area resurveyed to verify the removal. Removable contamination levels on the general Building 003 floor area were below 50 dpm/100 cm^2 β-γ and 20 dpm/100 cm^2 α. The floor area and the excavated soil meet the requirements of the Dismantling Plan and Reference 3 for unrestricted access to Building 003. The contamination levels, which were in all cases well below the limits described in Table 1 of the Dismantling Plan, were determined to be ALAP at the completion of the decontamination effort. Final radiological survey data were reviewed by the QA Program Administrator to enable verification of completion.

IV. DISPOSAL OF RADIOACTIVE WASTE

Contaminated materials and equipment accumulated from the Building 003 dismantling operation were sent to the Radioactive Materials Disposal Facility at AI. The materials and equipment were transferred to the RMDF either in specially constructed boxes or wrapped in plastic sheets and on pallets.

After receipt at the RMDF, the levels of radioactivity and the estimated cost in time and labor determined whether the items were to be decontaminated or to be shipped for burial. If equipment could easily be decontaminated by dismantling portions or by simple wiping, the decontamination was performed. The equipment was then sent to the salvage yard. In most cases, it was more economical to package and ship contaminated material and equipment for burial than to decontaminate it.

A total of 4,235 ft^3 of radioactive waste was shipped to Nuclear Engineering Company for burial at Beatty, Nevada. All waste was packaged and shipped according to U. S. Department of Transportation requirements.

V. BUILDING 003 D&D COSTS

The total costs are presented in Table 9. As was planned, the major expenditure was for AI and Rocketdyne labor. The Rocketdyne Division of Rockwell International provides maintenance support for AI facilities at the Field Laboratories. Rocketdyne Maintenance Department personnel disconnected the utility services.

Nuclear Engineering Company was the contractor for burial of the radioactive waste material. Richard Lane Company provided explosive demolition, excavation, and repair services. The repair consisted of backfilling the trenches with dirt and paving with concrete.

The material costs shown in Table 9 were for purchase of plastic sheeting, wood for boxes, tool bits, and filters.

The two Hot Cave doors were sold to a salvage contractor.

TABLE 9

BUILDING 003 D&D COSTS

Total Labor Costs	
AI	$101,094
Rocketdyne	11,990
Subcontracted Costs	
Nuclear Engineering Corporation	10,463
Richard Lane Company	4,946
Other Costs	
Materials	4,571
Sale of Salvage	(735)
Miscellaneous	70
a. G&A	7,411
b. Fee	8,720
Total D&D Costs	$148,530

REFERENCES

1. W. K. Majors, "Procedure for Decontamination of Building T003 (Hot Cave)," DWP-704-990-001, AI Internal Document, January 20, 1975

2. J. D. Moore, "Operational Safety Plan for the AI Decontamination and Disposition of Facilities Program," SRR-704-990-001, December 9, 1975

3. W. F. Heine to R. L. Westby, "Application of as Low as Practicable Principles in the AI D&D Program," AI Letter 75AT-4986, August 13, 1975

APPENDIX A

FACILITIES DISMANTLING PLAN FOR BUILDING 003 HOT CAVE

Atomics International Division

SUPPORTING DOCUMENT

NUMBER: FDP-704-990-001	REV LTR/CHG NO: SEE SUMMARY OF CHG
DOCUMENT TYPE: Facilities Dismantling Plan	
KEY NOUNS: Dismantling Plan	
ORIGINAL ISSUE DATE:	

PROGRAM TITLE: Decontamination and Disposition of Facilities Program

DOCUMENT TITLE: Facilities Dismantling Plan for Building (D+D) T003 Hot Cave

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IR&D PROGRAM? YES ☐ NO ☒ IF YES, ENTER TPA NO. _____

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B.F. Ureda 9-3-74
M. Remley 7 Sept 74

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ABSTRACT

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FORM 734-C REV. 2-74

DISMANTLING PLAN

BUILDING 003 - HOT CAVE

I. OBJECTIVE

The hot cave in Building 003 has been inactive since the close-out of the SNAP Program in GFY 1973. Prior to that time the facility had been used for the analysis of SNAP fuel burnup samples and evaluation of irradiation experiments. The inner surfaces of the cave are grossly contaminated with mixed fission products. Containment of this high level contamination requires continuing radiological surveillance and continuing operation of the radioactive exhaust system and associated filtering and sampling systems.

The hot cave internals and structure, the floor beneath the hot cave and all radioactively contaminated facility systems will be removed so that radiological hazards are eliminated. Radioactive contamination is limited to the internal surfaces of the hot cells, liquid waste lines, liquid holdup tanks, radioactive exhaust system ducting and filter plenums. No soil contamination is anticipated. All surfaces which remain following completion of the dismantling and all material released for unrestricted use will be decontaminated to levels which are as low as practical, but in all cases to levels below those in Table 1.

TABLE 1

Contamination Limits For Decontamination and Disposition of Building 003 - Hot Cave

	Total	Removable
Beta Gamma Emitters	0.1 mrad/hr at 1 cm with 7 mg/cm^2 absorber	100 dpm/100 cm^2
Alpha Emitters	100 dpm/100 cm^2	20 dpm/100 cm^2

After the radiological hazards are eliminated, Building 003 can be razed by conventional means or put to other uses.

The hot cave consists of two cells and a transfer tunnel for introducing and removing material from either cell (see Figure 1). The following will be dismantled or removed:

1. Equipment, materials, containers remaining from hot cave operations.
2. Manipulators and other cave operating systems.

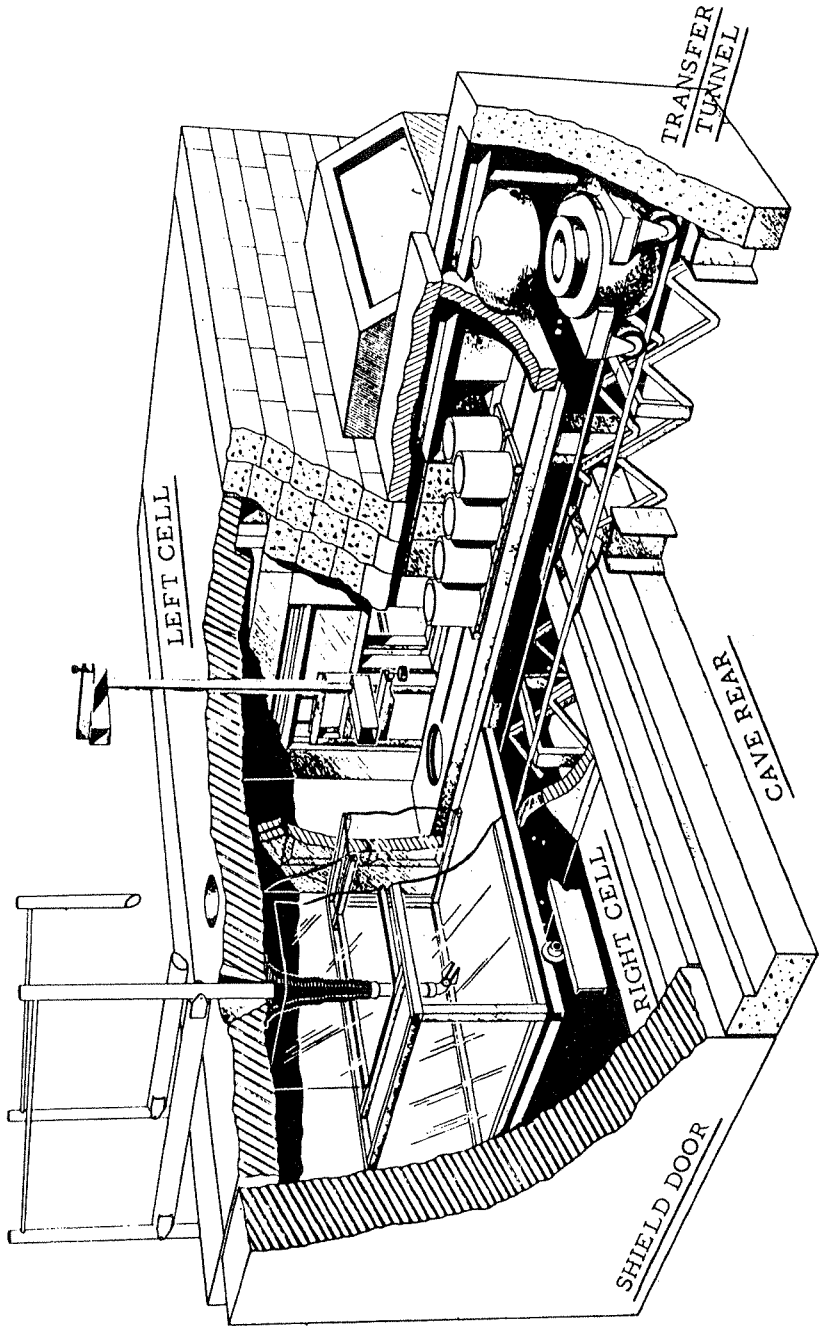


Figure 1. Hot Cave Layout

3. Cave structure, including floor and soil beneath as necessary.
4. Building 003 facility and the hot cave radioactive exhaust systems, related ducting and plenum chambers.
5. Two small radioactive liquid hold-up tanks located below the hot cave.
6. Building 003 liquid waste sinks, lines, and hold-up tank.

The radioactive and contaminated material resulting from the dismantling, removal and decontamination will be packaged and shipped for burial. The excavation resulting from the floor removal will be backfilled and repaired.

II. SCOPE OF PLAN

The Dismantling Plan delineates the activities necessary to realize the objectives stated above. These activities have been categorized as follows:

1. Planning, monitoring and control.
2. Radiological survey.
3. Tooling and support equipment procurement.
4. Dismantling and disposal.
5. Documentation.

III. PLANNING MONITORING AND CONTROL

A schedule listing the detailed tasks and the sequence of performance has been prepared. (See Attachment 1.) Monthly totals of the manpower requirements are shown in Attachment 1. Support for the activity, in addition to the Program Office will come from Quality Assurance, Health and Safety, Industrial Engineering and Purchasing.

Specific tasks will be initiated and monitored by the Program Office. The work authorizations, work releases, and progress reports issuance will generally follow the format and guide lines set out in the Decontamination and Disposition of Facilities Program Plan. Quality Assurance and Health and Safety actions will be governed by the Quality Assurance Plan and the Operational Safety Plan respectively. The schedule, the manpower loading charts, and cost records will serve as the overall criteria to measure progress and accumulated costs.

IV. RADIOLOGICAL SURVEY

An initial radiological survey will be performed in the Building 003 high bay area surrounding the hot cave. No significant radioactive contamination is expected; however, this survey is deemed necessary to assure that equipment, materials and structure not related to the cave operations are not

contaminated before they are removed. The removal is necessary to preclude contamination of these items by hot cave dismantling operations, and to facilitate these operations by providing unimpeded access to the hot cave area. The interior of the hot cave will be surveyed to determine the level of contamination.

Continuing radiological surveillance by Health and Safety as prescribed in the Operational Safety Plan will be conducted throughout the dismantling and disposal effort to assure personnel safety. Radioactivity level readings obtained in the survey will assist in determining the packaging, shipping and burial classifications. The extent of the hot cave floor and soil removal will also be based on survey results.

A final survey of Building 003 will be made upon completion of the decontamination and disposal effort to verify that the radioactive contamination is within the acceptable limits as specified in Table I, and will be documented in the Final Report.

V. TOOLING AND SUPPORT EQUIPMENT

The primary requirement for special tooling will be accommodated by the existing hot cave manipulators. A remote grapple for removing the radioactive material from the interior of the hot cave and a grapple for lifting the concrete blocks that form the cave walls will be specified and procured. The special packaging for contaminated debris, materials and equipment will be fabricated or purchased. Final processing and packaging of this radioactive waste will be handled in the Radioactive Materials Disposal Facility from where it will be shipped for land burial in containers approved by the Department of Transportation and the Burial Site Management.

VI. DISMANTLING AND DISPOSAL

Detailed procedures will be written to guide the dismantling and disposal crews. A brief description of the principal tasks are as follows:

1. Preparation of Building 003 Prior to Dismantling the Hot Cave

The health and safety facilities will be renovated, including the personnel protective clothing change room and the radiological survey station. A radiological survey of the hot cave environs in the high bay area will be made. Extraneous equipment, materials and structure not required to support the hot cave D&D work will be removed. The building utility systems and hot cave support systems will be reactivated. These include: electrical, water, ventilation, hot cell windows, lighting and manipulator systems. The hot cave exhaust system will be upgraded by operating two blowers simultaneously to increase the exhaust flow rate. The

high efficiency particulate filters contained in the hot cave exhaust system will be leak tested utilizing the DOP smoke technique. Health and Safety services, equipment and instrumentation will be made available. The hot cells will be surveyed and decontaminated to the extent possible using the cell manipulators.

2. Hot Cave Left Cell Decontamination

An earlier survey performed on the hot cave has shown that the left cell has a lower contamination level than the right cell. The left cell decontamination will begin with the erection of an air lock and transfer station (tent) over the shielded door. This tent will maintain the cell exhaust pressure differential (high bay pressure is slightly greater than the cave pressure). The side door will be opened by properly protected personnel (i.e., protective clothing and respirators) while the radiation level is continuously monitored. The existing lucite panel, which presently covers the cell wall inside the door, will be removed. Contaminated material will be removed through the tent using the manipulators and hand held grapples as required. Surfaces inside the cell will be decontaminated remotely to levels permitting personnel entry. The passageway between the cell and the transfer tunnel will be sealed with plastic sheeting. The manipulator and other remaining equipment will be removed from the cell, placed in a container and transferred through the tent to the high bay. After decontamination of the left cell to practical limits, the side door will be closed.

3. Hot Cave Right Cell Decontamination

The left cell decontamination steps will be repeated. In addition, the glove ports present in the left cell lucite shield will be used to aid the remote decontamination. The small door will be used to introduce packaging material and to remove packaged waste.

4. Transfer Tunnel Decontamination

An access air lock and transfer station will be erected at the transfer tunnel door at the rear of the hot cave. The plastic sheeting installed during the cell decontamination will be removed allowing air exhaust to the cells. The roof of the transfer tunnel will be removed. (This portion of the roof is included inside the tent.) A survey of the tunnel area will be made. All material will be removed from the interior of the transfer tunnel and storage area. The tunnel interior will then be decontaminated.

6. Dismantling of Hot Cave Structure

The right and left cells will be surveyed again. If contaminated by the tunnel operations, the cells will be decontaminated. The entire hot cave will then be dismantled by removing the roof and wall blocks. Each block will be surveyed, and contaminated blocks decontaminated or packaged for burial.

After the hot cave is dismantled, the floor will be excavated to the extent necessary to reduce radioactivity to acceptable levels. The excavation will then be backfilled and the floor replaced.

The hot cave area may be used for a mockup pit for the SRE, D&D activities. Should this happen, the excavation would be enlarged and the eventual replacement of the floor would be delayed until SRE D&D completion.

6. Dismantling of Liquid Waste Holdup System

The two small radioactive liquid holdup tanks located below the hot cave will be removed. The Building 003 liquid waste sinks, lines, and holding tank will be removed. A survey of the area will be made.

7. Dismantling of Exhaust Systems

The hot cave and building exhaust systems will be dismantled, decontaminated and scrapped or packaged for burial. A survey of the area will be made.

8. Final Radiological Survey

A final radiological survey of the entire high bay area will be made to verify that the decontamination was accomplished to the levels specified and documented in the Final Report.

VII. Documentation

1. Procedures

Detailed procedures will be written to guide the decontamination and dismantling crews. Specific radiological and industrial safety hazards and the means for working with and eliminating these hazards will be identified. The procedures will show that

the means will conform to the requirements of the Operational Safety Plan and compliance with these requirements will be monitored by Quality Assurance and Health and Safety. Detailed procedures will be released and controlled by the AI Engineering Data Release System.

2. Reporting

Progress on the hot cave D&D activities will be reported to AEC San Francisco in the Decontamination and Disposition of Facilities Program monthly report.

3. Record Information

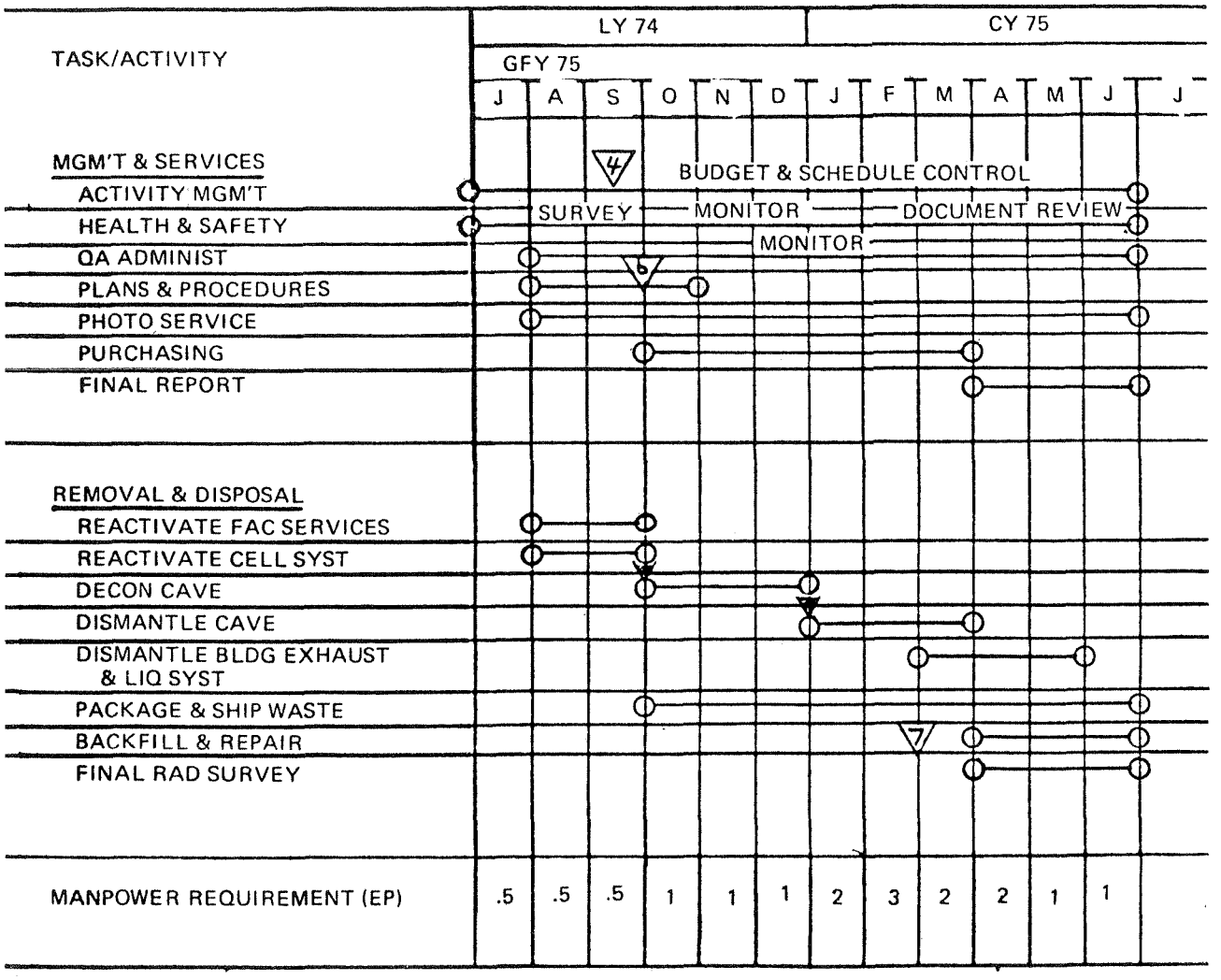
The results of radiological surveys of the areas, materials and equipment will be recorded and certified. A complete accounting of all radioactivity disposed of by RMDF will be maintained. Photographic coverage of the more significant phases of dismantling will be obtained both in still photos and in motion pictures.

4. Final Report

The final report will describe the dismantling and decontamination activities. Problem areas and the subsequent solutions will be highlighted. Shipping records showing quantities of material and the level of radioactivity will be included. The report will contain the QA and H&S safety records certifying the reported status of Building 003 high bay area upon completion.

DECONTAMINATION AND DISPOSITION OF HOT CELL BUILDING 003

ACTIVITY NETWORK



MILESTONES:

- ACTIVITY SCHEDULE SUBMITTED
- DISMANTLING PLAN SUBMITTED
- SUBCONTRACT AWARD
- RESTRAINTS

*OTHER EXPENDITURES THAN FOR THE MANPOWER SHOWN WILL BE FOR: MATERIALS, SHIPPING AND BURIAL AND EXCAVATION AND REPAIRS SUBCONTRACTS.

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