AI-78-10

DECOMMISSIONING PLAN FOR ROCKWELL INTERNATIONAL HOT LABORATORY LICENSED UNDER SPECIAL NUCLEAR MATERIAL LICENSE SNM-21

Rockwell International
Rocketdyne Division
6633 Canoga Avenue
Canoga Park, CA 91303

September 28, 1990

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DECOMMISSIONING PLAN
FOR
ROCKWELL INTERNATIONAL HOT LABORATORY
LICENSED UNDER
SPECIAL NUCLEAR MATERIAL LICENSE
SNM-21

Prepared by the Staff
of the
Radiation Protection and Health
Physics Services and Nuclear Operations
Departments

Rockwell International
Rocketdyne Division
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REV	SUMMARY OF CHANGE	APPROVALS AND DATE
4/15/90	Entire document revised. Approvals & Date 4-6-90 S. R. Lafflam P. D. Rutherford 4-6-90 T. A. Moss D. C. Gibbs Division Director	4-6-90 Paul M. Sewell 4/6/90 R. J. Tuttle 4/6/90 W. R. McCurnin
8/29/90	1) Document revised, as described in Appendix A, to incorporate additional information requested by the NRC. 2) Section 2.5 revised to reflect organizational changes. 3) Sections 4.5.1 "Sampling Inspection by Variables" and 4.5.2 "Acceptance Criteria" deleted because they are now considered superfluous. 4) Section 5.0 revised to reflect estimate corrections and provide additional detail. 5) Section 6.0 revised to reflect new requirements for Physical Security and Material Control. 6) Minor editorial changes to accommodate these revisions.	Approvals & Date P. Horton S. R. Lafflam T. A. Moss P. D. Rutherford P. M. Sewell D. C. Gibbs Division Director

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1.0 GENERAL INFORMATION

A special nuclear materials license was issued to Rockwell International, Rocketdyne Division, by the U.S. Nuclear Regulatory Commission (NRC) for operation of the Rockwell International Hot Laboratory (RIHL) and other facilities. In support of that license, a decontamination plan, AI-78-10, was submitted to the NRC. This decommissioning plan is the second revision to that document. The first revision, dated April 15, 1990, reflected then-current planning and incorporated the format recommended by NRC Regulatory Guide 3.65 for such plans. This revision reflects current planning, responds to NRC comments dated July 3, 1990, and updates organizational responsibilities and requirements for physical security.

Special Nuclear Materials License No. SNM-21 was issued to Rockwell International, Rocketdyne Division, 6633 Canoga Avenue, Canoga Park, CA 91303. It was renewed in June 1984.

2.0 DECOMMISSIONING ACTIVITIES

2.1 DECOMMISSIONING OBJECTIVE AND SCOPE

The objective of this program is to decontaminate the RIHL facility to levels that allow release for unrestricted use. The facility consists of four rectangular hot cells, abutted by decontamination rooms. These areas are surrounded by a building structure that provides an operating gallery in front, a service gallery in the rear, and contiguous operation support, mockup, and administrative offices. The hot cells and decontamination rooms are constructed of reinforced and dense concrete. All surfaces of the hot cells and the floors of the decontamination rooms are clad with steel. The layout of the facility is shown in Figure 2-1. In-cell equipment is remotely operated from the operating gallery using manipulators, analytical equipment, and controls. Access into the cells is from the service gallery, located at the rear of the hot cells. The decontamination rooms are located between the cells and service gallery. In these rooms, equipment is decontaminated and packaged. The decontamination rooms also serve as contamination control areas between the cells and the service gallery. Connected with the service gallery is a hot manipulator repair room for servicing low-level, radioactively contaminated equipment. The facility ventilation system causes air to flow from the radioactively uncontaminated areas toward the areas of highest contamination potential, through roughing filters and high-efficiency particulate filters, and finally out a 54-in. exit-diameter, 73-ft-high stack (above grade). The ventilation ducts are installed in the basement directly below the hot cells.

The following areas of the RIHL facility will require decontamination and/or verification that radiation levels are below limits for release for unrestricted use and constitute the primary activities of the decommissioning program.

- Hot Cells and Decontamination Rooms (Rooms 1, 2, 3, and 4)
- Glove Box Laboratory (Room 139), Laboratory (Room 141), and Manipulator Maintenance (north, hot side of Room 128)
- Service Gallery and North Hall (Room 147)
- Attic (drop ceiling above Room 147 and portion of northwest corner of RIHL)
- Support area drain system (from Rooms 128, 139, 141, 147, 149) and Building 468
- Operating Gallery (Room 117), Mockup Assembly (Rooms 125 and 131), Hot Change (Room 149)
- Basement
- Exhaust system

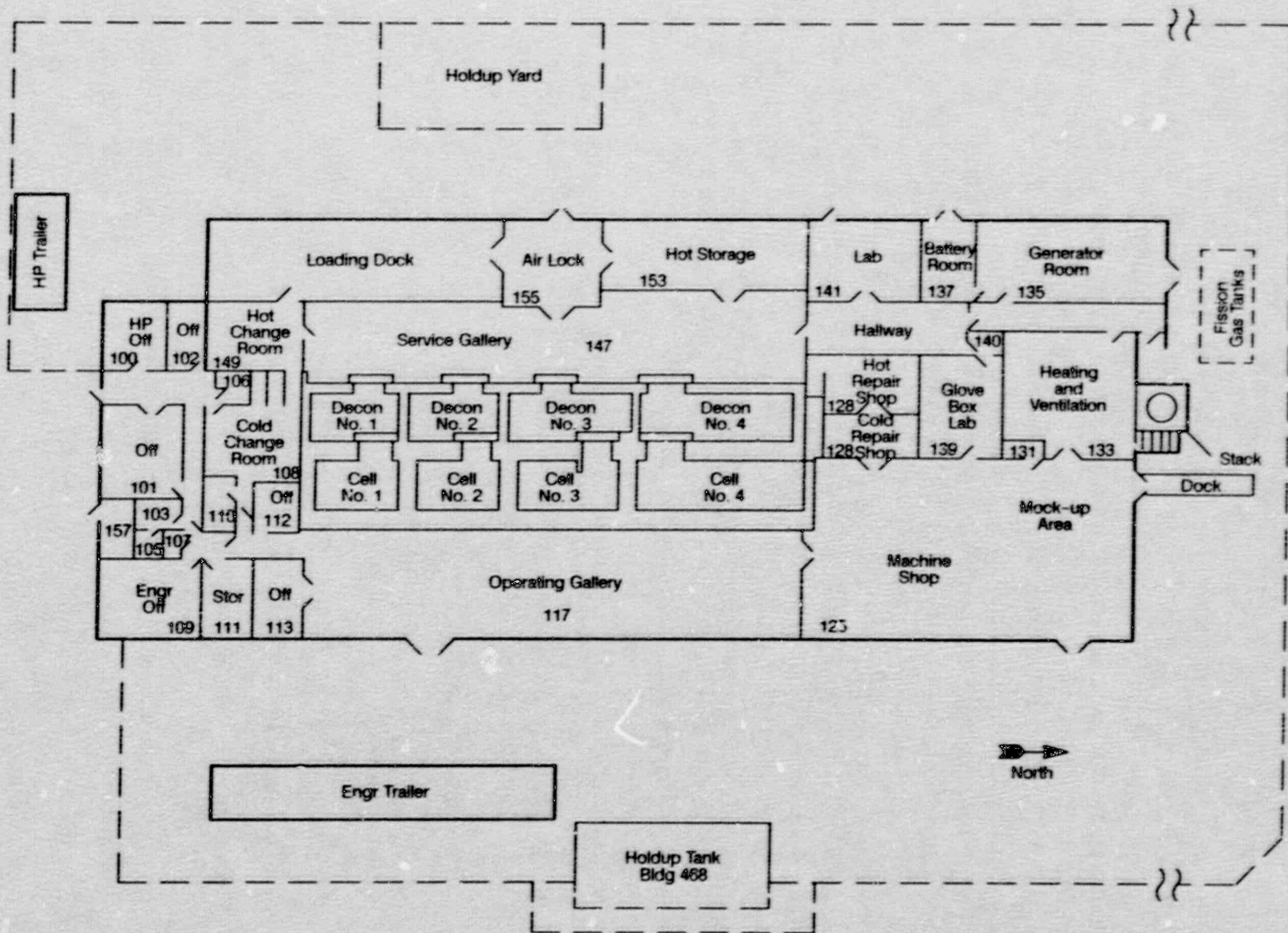


Figure 2–1. Layout of RIHL Facility

- Hot cell radioactive drain system (from Hot Cells and Decontamination Rooms 1, 2, 3, and 4)
- Roof
- Offices and Cold Change Rooms (Rooms 100, 101, 102, 103, 105, 107, 108, 109, 110, 111, 112, and 113), and Engineering and Health Physics Trailers
- Battery (Room 137), Emergency Generator (Room 135), Heating and Ventilation (Room 133), and Air Conditioning (Room 157)
- Hot Storage (Room 153) and Air Lock (Room 155)
- Yards, concrete (surrounding RIHL), asphalt, and loading dock
- Fission gas tanks.

2.2 DECOMMISSIONING DESCRIPTION

Decontamination will be the primary focus of the RIHL decommissioning. This will be initiated after all special nuclear materials in inventory have been removed from the facility. The basic approach will be to decontaminate the areas of highest radiation levels first to minimize personnel exposure and to reduce the background radiation which will allow detection of lower level radiation areas. Conventional methods will be used which have proven successful for other facilities.

The following decontamination methods will be utilized. Foam cleaning will be used in conjunction with localized brushing with detergent to remove surface contamination. Scabbling or grit blasting will be used to remove contaminated epoxy paint. The steel liners will be treated with hand grinders to remove residual surface contamination. The steel liners will be cut mechanically or with oxy–acetylene or plasma arc torch to remove sections for sampling of the underlying concrete. Any areas of concrete that have contamination will have the surface layer removed by chipping hammers, scabblers, and/or grinders as deemed best. Any deep penetration of contamination may require scarfing, core drilling, or jack hammering to reduce the contamination to allowable limits. In general, methods will be selected to minimize the quantity of waste generated and personnel radiation exposure.

Some degree of radioactive contamination exists in much of the functional areas of Building 020. The general extent of removable beta and gamma contamination is as follows:

- Cells 1, 2, 3, and 4 and connected decontamination rooms—high to moderately high ($\geq$5,000 dpm/100 cm^2 contamination known to exist).
- Most of the cell service gallery has some degree of low–level contamination (<3,000 dpm/100 cm^2). Also, the hot shop, hot laboratory, the hot storage area, air lock, and the loading dock.

- The remainder of the cell service area, the operating gallery, the slave shop, and the passageway between the operating gallery and the hot shop are probably contaminated, but at a lower level (< 1,000 dpm/100 cm^2).

The radiation levels in the cells average 50 mR/h, with drains reading 1 R/h. Most equipment in the cells has contamination of > 100,000 dpm/100 cm^2 and dose rates up to 500 mR/h (near contact). The decontamination area ranges between 0.01 and 0.10 rad/h. Service gallery, hot slave shop, and hot storage areas are in the 50 to 5,000 dpm/100 cm^2 range with up to 20 mR/h in cracks, etc. The basement area, in general, is about 1,000 dpm/100 cm^2; tank alcove, 100 mR/h, pipes, pumps, and filter banks are generally contaminated. The radioactive contamination consists primarily of old mixed fission products (Cs-137, Sr-90, Pm-147) with Co-60 and small amounts (<0.01%) of uranium and trace amounts of plutonium. About 2.2 curies of contamination is estimated within the building and surroundings.

The primary operating areas of the RIHL have been cleaned periodically to minimize contamination during the years of licensed operation. The facility was designed to control and minimize contamination. No historical occurrences are identified which might adversely affect decommissioning safety.

The Decommissioning Plan identifies 15 areas at the RIHL facility that will require decontamination and/or verification that radiation levels are below limits for release for unrestricted use. A brief description of each area and its planned decommissioning is presented in the following subsections:

2.2.1 Hot Cells and Decontamination Rooms (1, 2, 3, and 4)

The walls of the hot cells are steel-lined, 42-in.-thick, high-density (4.4 g/cm^3 magnetite concrete. The decontamination rooms are steel-lined, 24-in-thick standard concrete. All surfaces are covered with several layers of contaminated epoxy paint. The viewing windows in the cells are also 42-in. thick. The cells contain various forms of attachments and penetrations for storage, instrumentation, intercell transfers, and the like. Master-slave manipulators are stationed at each window, and each cell has a 3-ton bridge crane.

Initial decontamination of the cells may be performed remotely if radiation levels are deemed too high. The storage and transfer drawers will be emptied, decontaminated, and surveyed remotely to ensure that all high-radiation sources are removed. Contaminated equipment will be cleaned in place (if practical) and then moved from the cells to the decontamination rooms. The false floors will be cleaned and removed. Remote handling equipment will be removed from the cells. Final decontamination and disposition of the items will be performed in the decontamination room, service gallery, or Radioactive Material Disposal Facility (RMDF), as conditions permit. Master-slave manipulators, periscopes, and other items penetrating the front wall will be removed and dispositioned. The wall penetrations will be decontaminated and sealed to prevent recontamination during cell cleaning.

When all materials and equipment have been removed, the paint will be completely stripped from the cells and decontamination rooms. Radiation surveys will be performed to determine if any contamination remains. Selected areas of the steel liners in the cell and decontamination rooms will be removed to permit radiation surveys of the underlying concrete to assure no contamination exists. Further work in these areas will be based on the results of these surveys.

There are approximately 270 through-tubes and 26 manipulator ports located in the hot cells and decontamination rooms. The plugs will be removed from the through tubes and manipulators will be removed to allow cleaning of the internal, metal lined penetration surfaces. Chemical detergents and grit blasting methods of decontamination will be used to remove contaminated material. *In situ* decontamination will be used where possible before resorting to removal of the tubes to reduce waste volume. If *in situ* operations are unsuccessful, then the steel through-tube liners may be removed with concrete core saw or jack hammer if fixed contamination or concrete contamination is found.

2.2.2 Glove Box Laboratory (Room 139), Laboratory (Room 141), and Manipulator Maintenance (Room 128)

These rooms were used for handling materials with low levels of radioactivity and are known to be slightly contaminated.

Two alpha-containing glove boxes were installed in Room 139 after it had seen service as a hot shop and Pr-147 loading facility. One was never contaminated and has been determined to be clean, removed, and disposed of. The second glove box will be decontaminated to the extent required for packaging and shipment as LSA waste. Then the room will be decontaminated by the conventional sequence of vacuum-wash, removal of material from the walls and ceiling, removal of floor tiles, and "chasing" of contamination in cracks in the concrete and building seams, as required. The glove box HEPA-filtered exhaust system will be size-reduced and disposed of as TRU or LSA waste, as appropriate. The Laboratory, Room 141, contains a stainless steel hood used for radioactive chemicals. This hood will be decontaminated by scrubbing, size-reduced, and shipped as LSA waste. The room will also be decontaminated by conventional techniques.

The Manipulator Maintenance Room, Room 128, is divided into a "cold" side and a "hot" side, paralleling the use of the manipulators which extend from the operating gallery into the cells. The "cold" side is known to be relatively clean while the "hot" side is known to be contaminated. Substantial removal of material from hot side walls, ceiling, and floor is expected to be required. This will be accomplished by scabbling. The floor of Room 128 still has the original RIHL asphalt/asbestos (nonfriable) tiles which will require special treatment for removal and disposal.

2.2.3 Service Gallery and North Hall (Room 147) and Hot Change (Room 149)

The service gallery and north hall have been used for the passage, temporary storage, and packaging of radioactive equipment and materials. Surface contamination of the existing painted surface is quite low, but the concrete, especially where cracked, is suspected to be contaminated. The hot change room may also have local "hot spots" in cracks or under tiles.

These areas will be decontaminated by removing tiles, scabbling the surface, followed by jack-hammering around contaminated cracks in the concrete until no evidence of contamination is found.

2.2.4 Attic

The attic of the RIHL consists of the enclosed space above the drop ceiling over the office area and above the plastered ceilings over the laboratories and service area. Much of the RIHL has no ceiling. The attic is not a working or storage area; any radioactivity present is the result of airborne contamination. The attic is expected to be relatively clean.

The attic contains a considerable amount of utility plumbing and piping which have accumulated dirt and dust, which must be removed for a valid radiation survey, as dirt and dust can mask the alpha emissions. The main thrust of the task will be thorough cleaning, using vacuums and wet wipes, followed by a radiation survey of the complex area.

2.2.5 Support Area Drain System (From Rooms 149, 147, 141, 139, and 128) and Building 468

The RIHL radioactive drain system consists of the accessible support area drain system and the inaccessible hot cell drain system (see paragraph 2.2.9), which join in the basement and flow through a double-walled pipe to the holdup tank in Building 468.

The support area drain system is suspected to be contaminated. If this is borne out by survey, decontamination may be accomplished *in situ* by mechanical or other techniques. Alternatively, if the current *in situ* cleaning is not successful, or if there is any doubt about the cleanliness of the piping or about leaks into the soil around the pipe, the piping will be exhumed and shipped, along with the contaminated soil, as radioactive waste.

The inner (radioactive) line from the double-walled drain from the RIHL basement to the holdup tank in Building 468 will be removed, cleaned, packaged, and shipped as radioactive waste, as will the holdup tank in the building. The outer pipe will be surveyed and, if required, decontaminated or exhumed for shipment as radioactive waste.

The ceiling, walls and floor of Building 468 will be surveyed and decontaminated, using liquids, foam, grit, scabblers, and jack-hammers as required.

2.2.6 Operating Gallery (Room 117), Mockup Assembly (Rooms 125 and 131)

The operating gallery and mockup assembly area have some areas of known (fixed) and suspected contamination. The cell faces and utility trenches are known to be contaminated. There is suspected contamination under the floor tiles.

Decontamination of these large rooms will begin with stripping and sandblasting the cell faces and penetrations into the hot cells. Then the ceiling and walls will be decontaminated using foam, water, and scabblers, if required. Floor tiles and mastic will be removed and contamination in cracks will be chased and excised.

2.2.7 Basement

The basement of the RIHL is known to be contaminated as a result of at least one incident when the hold-up weir overflowed. This weir was subsequently removed and replaced by the tank in Building 468.

The RIHL basement contains a "minidrain" system which drains into two sumps, one at each end of the basement. These sumps are pumped into the holdup tank in Building 468. The system is contaminated.

Decontamination of the basement is scheduled to be performed soon after the hot cells and decontamination rooms are completed. The need for removal of a substantial amount of contaminated concrete is expected. Furthermore, it is likely that both sumps and the drain system will have to be removed and the underlying soil will have to be surveyed in order to prove that release limits have been met. Scabbling, jack-hammering, and soil excavation are planned.

2.2.8 Radioactive Exhaust System

The RIHL radioactive exhaust system will continue to be a primary element in the control of radioactive contamination until near the end of D&D.

When all of the hot cells and decontamination rooms have been cleaned and all of the dust-generating work in other rooms is completed, the RIHL radioactive exhaust system will be decommissioned.

> Note: The main building radioactive exhaust system will be a backup to individually vented and filtered special-purpose containment tents, which will be used extensively throughout the D&D of the RIHL.

The decontamination and deactivation of the radioactive exhaust system will begin from the inlet ducts to the filter plenums, the blowers, and the exhaust stack.

The exhaust ducting will be surveyed and, if contaminated, removed and size-reduced, packaged, and shipped as radioactive waste. Care will be taken to avoid the spread of contamination. The ducts, filter housings, control elements, etc., will be removed, decontaminated (if appropriate), and dispositioned. Where ducting is embedded in heavy concrete, the ducting will be decontaminated in place and/or the ducting will be pulled from the concrete.

If the stack is found to be contaminated, the ends will be sealed with plastic and the inside will be decontaminated. If decontamination is unsuccessful, the stack will be size-reduced, packaged, and processed as radioactive waste.

2.2.9 Hot Cell Radioactive Drain System (From Hot Cells and Decontamination Rooms)

The radioactive drain system from the hot cells and decontamination rooms is an all-butt-welded stainless steel piping system that runs from each cell and adjoining decontamination room to the manifold in the basement, where it joins the support system radioactive drain system (see paragraph 2.2.5) to drain to the holdup tank in Building 468.

This drain system is embedded in 5-ft-thick, rebar-laced concrete between the main floor of the RIHL and its basement. This drain system does not come close to the soil (environment) under or around the RIHL.

Decontamination of the hot cell drain system will be either to decontaminate the system *in situ* to meet NRC criteria for release for unrestricted use or to remove the drains and survey the surrounding area.

2.2.10 Roof

The roof has suspected contamination, particularly at the north end, resulting from stack fallout. The entire roof will have to be gridded and surveyed. The RIHL has been reroofed several times, and it consists of several layers of asphalt and gravel, which will be surveyed for subsurface contamination. Core samples will be taken from grid locations and volumetrically checked for radioactivity, using a Canberra HPGe radiation detector. If release limits are exceeded, the roof will be removed and disposed of as radioactive waste.

2.2.11 Offices and Cold Change Room (Rooms 100, 101, 102, 103, 105, 107, 108, 109, 110, 111, 112, and 113), and Engineering and Health Physics Trailers

The block of rooms at the south end of the RIHL and two small trailer outbuildings are expected to be contamination-free.

Standard decontamination procedures for "clean" areas will be followed, namely, detailed survey, scrubbing and contamination removal, and resurvey until release limits are met. Removal of all carpeting, coving, and tile flooring is planned.

2.2.12 Battery (Room 137), Emergency Generator (Room 135), Heating and Ventilation (Room 133), and Air Conditioning (Room 157)

These rooms are expected to be relatively contamination-free. Slight contamination of the south floor of the Battery Room (Room 137) from a known spill in the hood in the north end of the Laboratory (Room 141) is suspected. These rooms cannot be surveyed with any reliability until adjacent rooms are decontaminated.

Standard decontamination procedures for "clean" areas will be followed, as described in paragraph 2.2.11.

2.2.13 Hot Storage (Room 153) and Air Lock (Room 155)

These rooms have painted concrete floors that are known to be contaminated, particularly in cracks where contaminated water from previous cleanup operations has penetrated.

The floors will be decontaminated by scabbling. Contaminated cracks and building concrete floor seams will be detected by survey instruments; the contamination will be "chased" using jack-hammers until the areas meet release limits.

2.2.14 Asphalt and Concrete (Surrounding Facility) and Loading Dock

Several areas of modest radiation contamination outside the RIHL are known to exist. These include (1) the Holdup Yard to the west of the RIHL, the paved surface of which became contaminated from contact with contaminated radioactive containers; (2) the concrete loading dock on the north end, which was also contaminated by contact with radioactive containers; and (3) a concrete pad at the north end of the building, which was contaminated by a liquid spill many years ago.

The entire area between the RIHL and its fence will be gridded and surveyed. Contaminated concrete, asphalt, and soil will be removed, packaged, and disposed of as radioactive waste until the area meets release limits.

The area surrounding the RIHL fence will also be surveyed to ensure the absence of radioactive contamination.

2.2.15 Fission Gas Tanks

Three fission gas tanks were installed underground at the north end of the RIHL facility (see Figure 2-1). These tanks were never used. The tanks and plumbing leading to them were excavated, surveyed to verify that no contamination existed, and then disposed of as industrial scrap.

2.3 PROCEDURES

All decommissioning activities will be conducted in accordance with approved, written procedures. The approvals necessary for release of procedures will be tabulated and issued in a release plan of action (RPA). Release of the RPA will require the approval of the directors of all departments participating in the decommissioning program. Engineering Document Control will verify that required approvals are obtained before releasing each procedure for use. Changes to procedures will require the same approvals as the original issue. Detailed working procedures (DWPs) will be prepared for each method and operation used in decontamination activities. A DWP will also be generated for each area of the RIHL to be decontaminated. These procedures will use the following format as a guideline.

2.3.1 Scope

The physical activities and physical areas, to which the DWP applies, will be described.

2.3.2 Applicable Documents and References

Other key DWPs that have direct applicability to the scope will be listed along with any other documents that directly apply to the activity.

2.3.3 Equipment and Materials

Specific items of equipment, tooling, and materials to be used will be listed in this section, including those routinely used, and any special items.

2.3.4 Special Safety Precautions

Any special safety considerations will be listed in this section. This is to emphasize safety considerations associated with individual procedures.

2.3.5 Work Instructions

This section will define the step-by-step instructions for performance of the activity. Cautionary notes on critical tasks will be included where safety or success of subsequent tasks may be affected.

2.3.6 Waste Volume Estimates

A description of the radioactive contaminated material that is expected to be found will be tabulated, i.e., volume, classification, type, and burial volume of packaging, and number of containers.

2.3.7 Manhour Estimates

Estimates of the types of manpower, the number of manhours of each type, and total hours to complete the activity will be included.

2.3.8 Personnel Dose Estimates

Estimates of the expected personnel doses will be made based on the manhour estimates and available radiation survey data. These dose estimates are required to allow work crew assignment, considering individual dose and allowable limits, and to implement the "as low as reasonably achievable" (ALARA) program.

2.4 READINESS REVIEWS

Readiness reviews, as described in Engineering & Management Procedure (EMP) 4-7, will be performed for D&D activities that are new or significantly different from the existing experience base.

Readiness reviews are performed by an *ad hoc* team of technically competent personnel who are not directly involved with the work and who represent such disciplines as Design Engineering; Process Engineering; Facilities Engineering; Instrumentation and Control; Health, Safety and Environment; Radiation Protection and Health Physics Services; and Quality Assurance.

The readiness reviews normally have the following agenda:

- Objective of the new activity
- Adequacy of the facility and equipment to perform the proposed activity
- Generation and disposition of wastes and effluents
- Operational requirements
- Detailed description of the activity procedure
- Operating envelopes and constraints
- Shutdown or termination requirements and criteria
- Data or documentation requirements
- Risk factors
- Personnel and environmental hazards
- Disposition of equipment at completion of the activity.

The readiness review is chaired by the manager of the facility and/or of the crew performing the D&D. The lead engineer or person most knowledgeable in the planned activity will normally make the presentation to the Review Team.

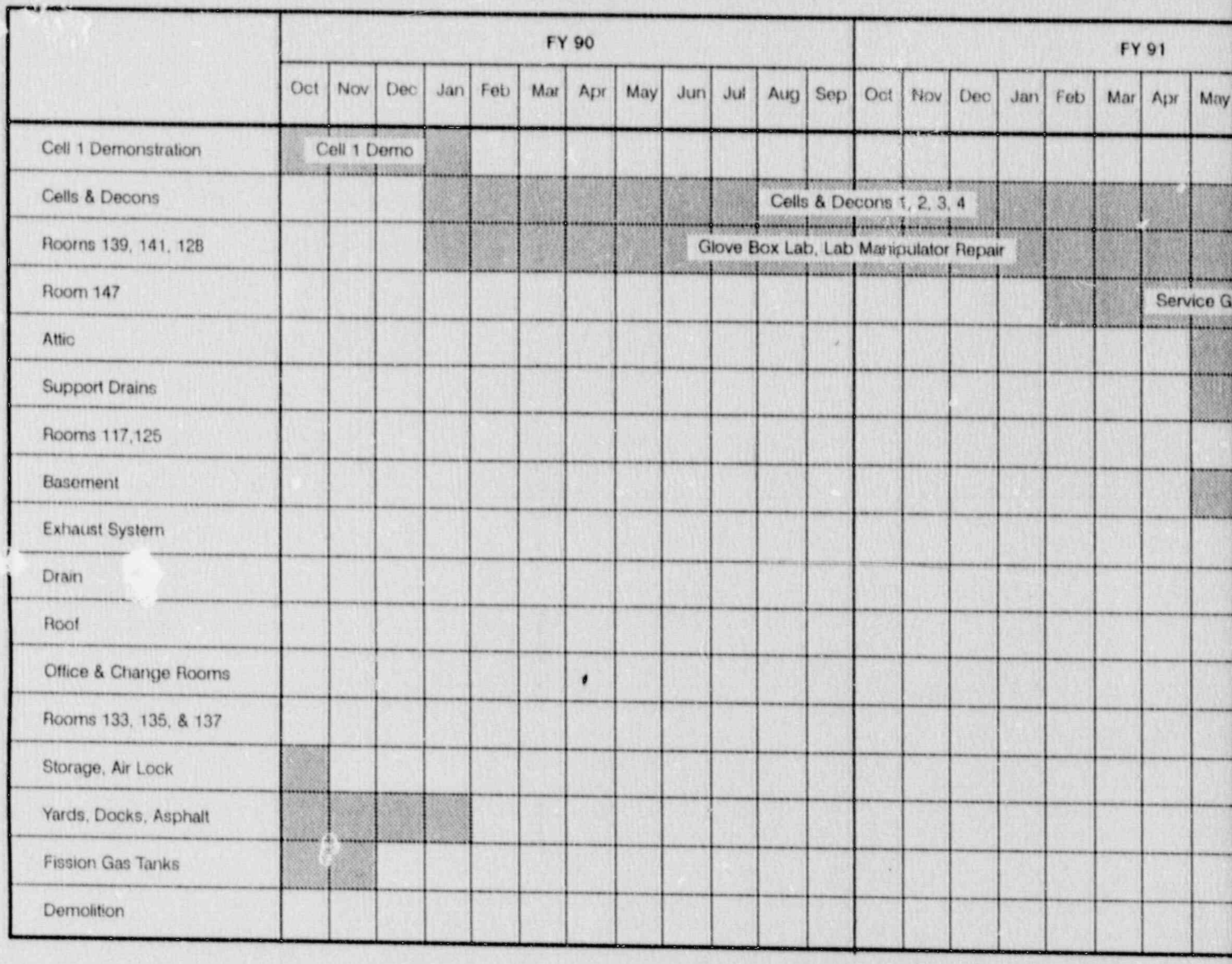
The chairperson is responsible to record, resolve, and document the Team's comments and actions taken thereto. Operations are not allowed to proceed until all comments and action items are resolved.

2.5 SCHEDULE

The schedule for decontamination activities on the RIHL is shown in Figure 2-2. This schedule may be changed to use personnel effectively and to adjust for unforeseen problems or programmatic perturbations. Such changes will require management concurrence and approval. The general schedule reflects the philosophy of decontaminating the areas of highest radiation levels first and proceeding to those where little, if any, contamination is expected to be found. Two exceptions to this schedule are the radioactive exhaust and radioactive liquid waste systems. These systems are necessary to efficiently conduct the decontamination of the facility in a safe manner. The schedule shows the initial demonstration of decontamination methods and techniques on Hot Cell No. 1. This has been successful and decontamination of Hot Cell No. 1 and Decontamination Room No. 1 is in progress. Decontamination of the Glove Box Laboratory (Room 139), the Laboratory (Room 141), and the Hot Manipulator Repair (Room 128) is proceeding in parallel to allow efficient use of available personnel. The Service Gallery (Room 147) and adjacent north hallway, the basement, and attic are to be initiated near the completion of Hot Cell and Decontamination Room decontamination to maintain efficient use of personnel. The support drains for Rooms 149, 147, 133, 141, 139, 128, and 125 are scheduled for removal concurrent with the decontamination of these rooms. These drain lines are located below nominally 6 inches of concrete and may be decontaminated in situ or removed by conventional methods.

The radioactive drain system, through tubes and storage tubes from the hot cells and decontamination rooms, is scheduled late in the program. These items are embedded deep below the cell floor and in the walls in heavily reinforced, dense concrete. If *in situ* decontamination is unsuccessful, removal will require an excavation effort.

The Hot Storage (Room 133), Air Lock (Room 155), and the radioactive exhaust system are scheduled to phase into the effort when decontamination of Rooms 117 and 125 is complete. Again, this is to maintain efficient use of personnel. The exhaust system decontamination and removal is staged to maintain service until work is completed in all radiologically controlled areas. Decontamination of peripheral areas, where little, if any, contamination is expected, is scheduled as the final work phase. These areas include administrative offices, cold change room, roof, yard, and surrounding asphalt-covered and bare grounds.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Oct
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Cell 1 Demonstration
Cells & Decons
Rooms 139, 141, 128
Room 147
Attic
Support Drains
Rooms 117,125
Basement
Exhaust System
Drain
Roof
Office & Change Rooms
Rooms 133, 135, & 137
Storage, Air Lock
Yards, Docks, Asphalt
Fission Gas Tanks
Demolition
Cell 1 Demo
Cells & Decons 1, 2, 3, 4
Glove Box Lab, Lab Manipulator Repair

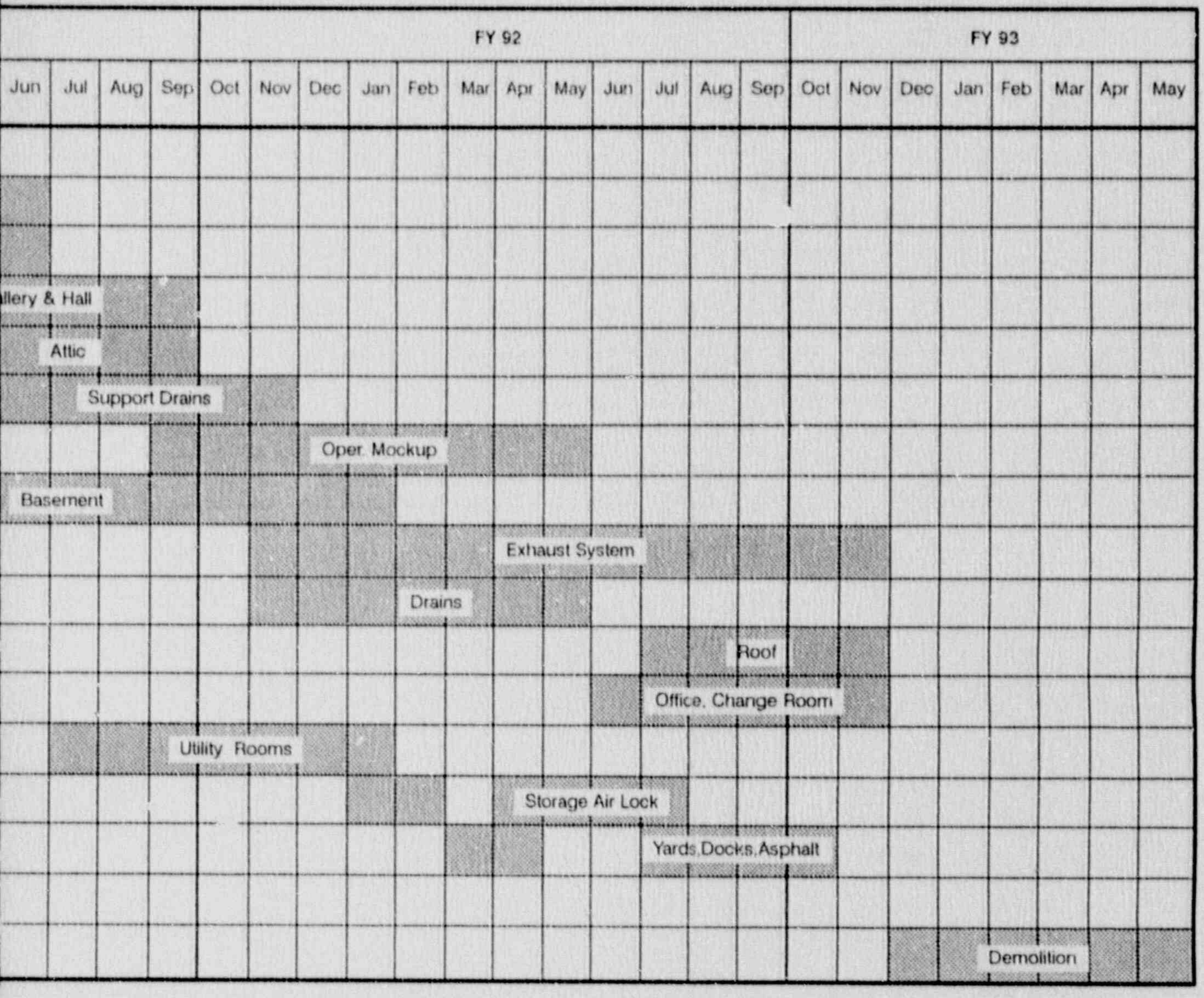

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Figure 2-2. RIHL Decommissioning Schedule

The demolition of the RIHL is planned to be performed after its release for unrestricted use by the NRC. RIHL demolition is described in Section 2.10, "Demolition."

2.6 ORGANIZATIONAL RESPONSIBILITIES AND AUTHORITY

The operations of Rocketdyne Division of Rockwell International Corporation are under the direct management of the division president. The president delegates to support organizations the responsibility for ensuring that all operations are conducted in a safe manner and in accordance with the provisions of applicable licenses and regulations. The organizational structure is shown in Figure 2-3. Although the titles and structure are subject to change, the principal lines of authority will remain unchanged.

The responsibility for radiation safety of workers at the Santa Susana Field Laboratory has been assigned to the Energy Technology Engineering Center (ETEC), General Programs Operations Department, Radiation Protection and Health Physics Services (RP&HPS).

The Health, Safety and Environment (HSE) Department has the delegated responsibility for industrial hygiene and industrial safety. In this capacity, the department is responsible for development of an overall safety program and serves as advisor to functional organizations to ensure that programs are implemented satisfactorily.

While the responsibility for safety is delegated to all operational management, members of RP&HPS and HSE have the authority to halt any unsafe operation. Approval to restart a halted operation requires the concurrence of RP&HPS and HSE.

2.6.1 Key Positions

The key radiation safety positions are the following:

President, Rocketdyne Division
Vice President and General Manager, Energy Technology Engineering Center
Manager, General Programs Operations
Manager, Radiation Protection and Health Physics Services

The key conventional safety positions by title are the following:

President, Rocketdyne Division
Vice President, Human Resources and Communications
Director, Health, Safety and Environment

The key operational positions with safety responsibilities are the following:

President, Rocketdyne Division
Division Director, Atomics International
Manager, Atomics International
Manager, Nuclear Operations

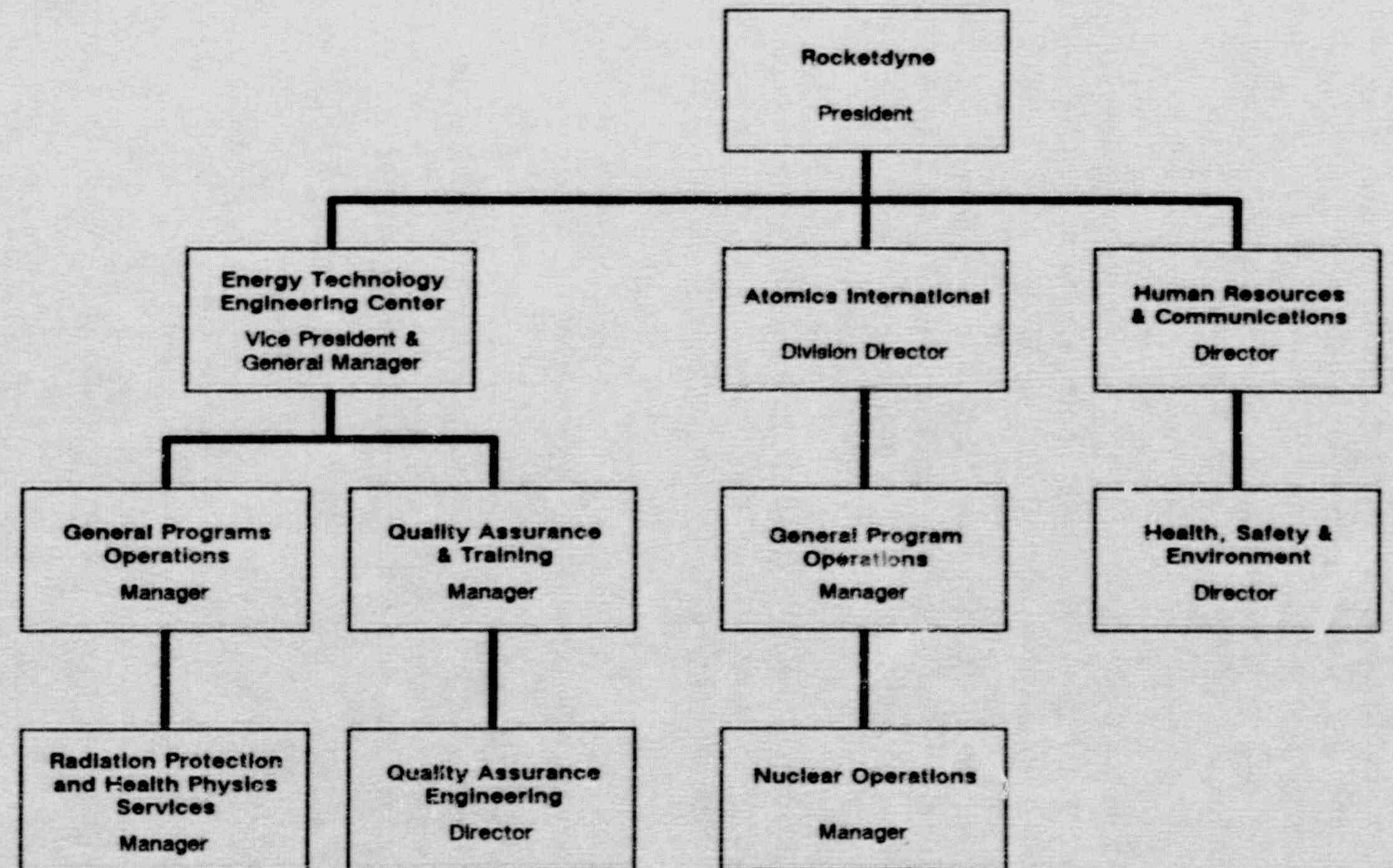

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Figure 2-3. Organization Chart

2.6.2 Educational and Experience Requirements

The minimum qualification requirements for operational and safety personnel with safety-related management and staff positions are as follows:

2.6.2.1 Operational Personnel

- Department Director and Higher Management Positions – Bachelor's degree or equivalent in one of the physical sciences or engineering disciplines. Eight years of experience in a technical discipline related to the technology associated with department operations, including 1 to 3 years of management experience. Demonstration of the management and technical capabilities to organize and direct technical groups responsible for conducting the operations for which the department is responsible.

- Manager – Bachelor's degree or equivalent in one of the physical sciences or engineering disciplines. Five years of experience in a technical discipline related to the technology associated with operations, including 1 to 3 years of technical management experience. Demonstration of the management and technical capabilities to organize and direct the operations.

2.6.2.2 Safety Personnel

- Manager – Radiation Protection and Health Physics Services – Bachelor's degree in one of the physical sciences. Two years of experience in radiation protection operations. Demonstration of sufficient judgment and analytical capability to establish and maintain a technically sound and effective program for the function to be supervised.

- Department Director – Health, Safety and Environment – Bachelor's degree in one of the physical sciences or in engineering. Eight years of experience in a technical discipline, plus 1 to 3 years of management experience. Demonstration of the managerial and technical capabilities required to organize and conduct the company safety program.

The bachelor degree requirement for the above positions may be waived with explicit review of the applicant's background by supervision one level above the position under consideration and with concurrence of the next higher level of management.

2.7 TRAINING

Appropriate training is provided to all employees who are assigned to work in areas where their personal safety or the safety of operation require it. New employees and other personnel whose regular work assignments include exposure to radiation or radioactive materials must complete a formal training course covering the general aspects of working with these hazards. Periodic refresher training is a part of this program. This training includes all aspects of radiation safety that are appropriate to the assignments. Management establishes the necessary training requirements for assigned personnel. The Training Department ensures that the training occurs and retains the training records. Implementation of the program is conducted by the manager, Nuclear Operations.

2.8 CONTRACTOR ASSISTANCE

Minimal, if any, contractor assistance is anticipated. However, any contracted activity involving contaminated areas or materials must be covered by detailed work procedures and sufficient training to ensure compliance with safety requirements by al! personnel involved.

2.9 FIRE PROTECTION

2.9.1 Fixed Fire Protection

A fixed preaction sprinkler system using heat actuation devices provides fire protection to the RIHL galleries, basement, support areas, and offices. Actuation of this system sounds a local alarm and also an alarm at the Rockwell Santa Susana Control Center which has a full-time fire protection force. The hot cells, decontamination rooms, and radioactive exhaust system are covered by heat-actuated devices, which also alarm locally and at the Control Center; the nitrogen system which was originally actuated by these devices will be disabled during D&D.

It is planned to keep the preaction sprinkler system enabled throughout the D&D of the RIHL, with temporary local exceptions when the D&D work itself could actuate the fire extinguisher system.

The heat-actuated devices over the hot cells, decontamination rooms, and radioactive exhaust system will be disabled as the individual areas are decontaminated. These systems are replaced by portable fire extinguishers when the heat detection systems are removed.

2.9.2 Portable Fire Protection

The RIHL is equipped with portable fire extinguishers throughout the facility, in accordance with NFPA 10-1988. These are inspected monthly by Fire Protection personnel. These fire extinguishers are also serviced annually by Fire Protection personnel. Additional portable fire extinguishers are placed at work areas at the request of the cognizant manager; person-in-charge; Fire Protection personnel; or as a result of the readiness review, described in Section 2.4.

2.9.3 Fire Protection Practices

The following practices will be enforced for the D&D of the RIHL:

- Welding, torch-cutting, and other hot working operations are performed in accordance with Rocketdyne's Protective Services General Order Manual, Section 4, Order 6 and with Rocketdyne Operating Policy H-508, "Authorization and Control of Welding, Cutting, Heating, Soldering, or Open Flame Operations." These policies require the issuance of hot work permits by Fire Protection officers and ensure that proper extinguishers are on hand; combustibles are removed from the area; noncombustible curtains are provided; and a fire-watch person is on hand. These procedures meet the requirements of NFPA 51B-1989.

- Sand and grit blasting operations are performed in enclosed spaces. These enclosures and the placement of portable fire extinguishers in the proximity of the work meet the requirements of NFPA 10-1988.

- Use of flammable liquids for decontamination is to be avoided wherever practicable. Flammable liquids that are used in decommissioning are properly labeled and are stored outside and away from the RIHL in properly grounded U.L. listed flammable liquid cabinets. Decontamination operations using flammable liquids are conducted using the facility HEPA filtration exhaust system or a portable HEPA filtration exhaust system. All ignition sources are prohibited from areas that are conducting cleaning operations using flammable liquids.

- Reactive chemicals, such as nitric acid, are stored outside and away from the RIHL in approved cabinets. Decommissioning activities that require the use of reactive chemicals will be diked to prevent spills from spreading. Acid-soaked rags will be handled in fire-resistant containers and disposed of separately from other combustible materials.

- Combustible contaminated liquids, such as pump, gear, and hydraulic oils, will be drained into proper storage containers and then transferred to the DOE Radioactive Materials Disposal Facility (RMDF) for stabilization, temporary storage, packaging, and shipment for final disposition.

- Good housekeeping practices will be followed. Ordinary combustibles, such as pallets, cardboard boxes, and plastic sheeting will not be allowed to accumulate. Contaminated combustibles will be placed into metal, strong, tight containers immediately; these will be transferred to the RMDF. Noncontaminated combustibles, with the exception of wooden pallets, will be removed from the facility and placed in proper waste containers for disposal. Wooden pallets will be removed and stored away from the facility before being returned to the warehouse area.

2.10 DEMOLITION

Before the start of demolition, Building 020 will be vacated, and all reusable equipment and materials will be removed. All decontamination work and contamination-surveying evaluations will have been completed, and the entire facility will have been released for unrestricted use by NRC. Building 020 utilities will be shut off and disconnected at locations outside of the facility perimeter fence by others.

All equipment located within Building 020 and above ground outside of the hot laboratory will have been removed before start of demolition work. All of the underground tanks, pits, and associated valves, piping, etc., shall be removed. These underground installations include three air-storage tanks, one diesel oil storage tank, one fuel-oil storage tank, one septic tank, and two leaching pits.

The majority of the process and utility piping located within the hot laboratory will have been removed before start of demolition work. During demolition, all of the remaining process and utility piping from within Building 020 and outside Building 020, both above ground and underground, will be removed. The piping will have been disconnected from the source at, or outside, the Building 020 perimeter fence before demolition.

A network of stainless steel process drains is embedded within the reinforced concrete floor of the hot cells. These drains shall have been decontaminated *in situ* and/or removed during step 1 of the program. The remaining, uncontaminated drains will be removed and disposed of as part of the hot cell concrete demolition and removal work. These drains will be closely monitored during demolition to ensure that they are free of radioactive contamination.

The majority of the electrical wiring and the conduit located within Building 020 will have been removed before start of demolition work. The electrical wiring and the conduit will have been disconnected from the source at, or outside, the perimeter fence before demolition.

The Building 020 roof and outer walls are fabricated of structural steel columns, trusses, and beams with sheet metal attached. The building interior walls, except for the hot cells and decontamination rooms, are fabricated of metal studs, lath, and gypsum board. During demolition, all the roof and wall members will be removed, size reduced, and shipped to disposal. Any piping, wiring, conduit, etc., located inside the wall panels, will be removed as part of the roof or wall sections.

There are four rectangular hot cells in Building 020. These cells are constructed of heavy steel-reinforced dense concrete. The concrete roof of the hot cells varies in thickness from 2-ft 5-in. to 3-ft 5-in. The walls are 3-ft 6-in. thick, and the floor is 5-ft thick. The ceiling of the hot cells is lined with steel tubes, angles, and plates. The walls have steel plate liners both inside and outside, connected with numerous steel tubes, angles, and plates. The bottom of the hot cells is lined with a webbed steel plate structure filled with dense concrete. Each cell contains steel-lined, lead-shielded window openings and pass-through transfer passages to the adjacent cells and decontamination room. The north end wall of Hot Cell No. 4 contains an opening that is covered and sealed with a 21-in.-thick meehanite steel sliding door, similar to the sliding doors between the hot cells and adjacent decontamination rooms.

The four concrete-constructed hot cells, including the sliding doors and all structural steel liners, through tubes, supports, and hardware, will be demolished, broken up, removed, and shipped to disposal. All uncontaminated lead shall be collected and disposed of.

There are four decontamination rooms located adjacent to the four hot cells in Building 020. These rooms are constructed of heavy steel-reinforced concrete. The concrete roof of the rooms is 1-ft thick; the outside, end, and dividing walls are 2-ft thick; and the floor is 2-ft thick. A portion of the floor steps to a thickness of 5 ft at the hot cell side of the rooms. The east wall of the decontamination rooms is common with the adjacent hot cell and is ~5-ft thick. This wall is constructed of heavy steel-reinforced dense concrete. The floor area is covered with a steel liner with webs filled with concrete.

The west wall of each decontamination room has an opening which is covered and sealed by a large sliding door. The sliding door is 16-in. thick and is constructed of steel liners and reinforcements filled with dense concrete. The east wall of each decontamination room contains an opening which enters a hot cell. This opening is covered and sealed by a solid meehanite steel sliding door. This door is 21-in. thick and weighs approximately 45 tons. The four concrete-constructed decontamination rooms, including the sliding doors and all structural steel liners, support, and hardware, will be broken up, removed, and shipped to disposal.

The concrete floor of the hot cells and decontamination rooms contain 3-in. diameter Schedule 40 stainless steel pipe drains. These drains shall be removed as part of the concrete floor removal.

A concrete basement encompasses the area directly beneath the hot cells and decontamination rooms. There are two concrete tunnels emanating from the basement area. One tunnel extends to the north to the exhaust stack and a concrete stairway to ground level. The second tunnel extends to the east of the basement under Hot Cell No. 1 to a concrete stairway to ground level.

The exterior walls of the basement are 2-ft thick and are constructed of heavy steel-reinforced concrete. The basement floor is nominally 2-ft thick except it is 3-ft thick under the large concrete support columns and 3-ft 6-in. thick in the sump pump pit areas. The basement floor is also constructed of heavy steel-reinforced concrete.

There are five large concrete support columns in the basement which extend from the basement floor to the basement ceiling (which is also the floor of the hot cells above). Columns 1, 2, 3, and 5 have cross-sections 6-ft 6-in. square and are constructed of heavy steel-reinforced dense concrete. Column 4 has a 5-ft 6-in. by 5-ft by 7 1/2-in. cross-section and forms a part of an internal concrete wall. This column and wall are constructed of heavy steel-reinforced concrete. Located in the center of each of columns 1, 2, 3, and 5 is a carbon steel pipe storage tube which extends vertically from the cell floor, down approximately 12 ft into the concrete column. The fuel storage tubes will have been cleaned *in situ* and/or removed before demolition.

The concrete basement, tunnels, columns, storage cells, internal walls, foundations, equipment supports, and all structural steel supports, and brackets, drains, and ducts will be demolished, broken up, removed, and shipped to disposal.

After satisfactory completion of Building 020 demolition, removal, and disposal work, the site will be surveyed for radioactive contamination, and, if it is within acceptance criteria, it will be backfilled with clean fill dirt and sand, compacted, and graded to the site-level elevation; and it will be allowed to return to natural vegetation.

3.0 RADIATION PROTECTION

3.1 HISTORICAL INFORMATION

The RIHL was designed and constructed to provide hot cells and auxiliary support for the examination of irradiated nuclear fuels and reactor components. Examinations have been conducted with sodium reactor equipment (SRE) fuel assemblies and moderator cans; fuel elements from the organic moderated reactor experiment (OMRE) and Piqua reactors; and fuel test capsules irradiated at the materials testing reactor (MTR), engineering test reactor (ETR), General Electric testing reactor (GETR), Whiteshell Reactor No. 1 (WR-1), and Hanford reactors. Three intact compact reactor cores (under license-exempt operations), for the System for Nuclear Auxiliary Power (SNAP) 8 Experimental Reactor, SNAP 10FS-3, and the SNAP 8 Demonstration Reactors, have been disassembled and examined. Irradiated fuel rods from the SRE, Hallam, EBR-I, SEFOR, EBR-II, and Fermi were declad at the RIHL from 1974 through 1988.

The cells and decontamination rooms used in performing these examinations were decontaminated periodically or after completion of a program to maintain the radiological activity at "as low as reasonably achievable" (ALARA) levels. No modifications have been made to the structural design of the facility during the operational lifetime. The estimated contamination in the functional areas of the RIHL is provided in Section 2.2.

3.2 ALARA POLICY

Along with its other responsibilities in maintaining an effective program of industrial and environmental safety, Rockwell is concerned with minimizing any adverse effects to the health and safety of workers, the public, and the environment caused by operations with radioactive materials. This concern is consistent with NRC requirements for maintaining radiation exposures ALARA.

The direct goal of radiological safety procedures, including design, review, operations, training, and monitoring, is to minimize personnel exposures to ionizing radiation. This goal is achieved by effective implementation of Health, Safety and Environment Procedure G-01, "Radioactive Materials and Ionizing Radiation."

The general objective is to minimize radiation doses received, both by individuals and groups, by eliminating unnecessary exposure and limiting exposure to that necessary to the proper performance of work. The primary responsibility for identifying the need and the method for achieving this objective is assigned to the RP & HPS group.

Individual doses are monitored in terms of millirems per week, month, quarter, and year. Group doses are monitored in terms of person-rems in similar time intervals. Individual doses per quarter and year are directly compared with appropriate dose standards as established in 10 CFR 20 and with prorated standards for weekly and monthly doses. Engineering designs and operating procedures are structured to assure effective operations and control of radiological hazards. As a result, the exposure of the general public is so low as to be undeterminable.

Additional guidelines for ALARA implementation are taken from U.S. NRC Regulatory Guides 8.8 and 8.10 and DOE Order 5480.11.

While the maximum personnel dose limits are those stated in the regulations (10 CFR 20), a planning limit of 1.0 rem per calendar quarter whole-body dose is applied in practice. Pocket dosimeters and special monitors that are processed following the work provide special control during operation in planned high-exposure situations.

Radiation and contamination surveys and determination of airborne radioactivity concentrations are made by trained and experienced Radiation Protection (RP) technicians and engineers. Allowable working times and the need for special precautions, such as protective clothing and respiratory protective devices, are determined by RP personnel. RP&HPS are independent of the Operations groups and have the responsibility and authority to halt unsafe operations.

Entry into posted areas is controlled where there is likely to be external radiation or airborne radioactivity in excess of acceptable levels for continuous work. Varying degrees of control, consistent with the hazard involved, are exercised over posted areas by RP&HPS. The Controlled Work Permit (Form 719-L Rev. 7-87) is a means of restricting access to posted areas on the basis of types of personnel and potential hazards. The highest degree of hazard is associated with an area in which the active contamination and radiation levels are of such significance that special rigid entry controls and safety precautions are necessary. The permit requires approval of the managers controlling areas where work is to be performed, the personnel who are responsible for performing the work, and the RP&HPS representative. The work permit defines the work location, description of the activity, applicable detailed work procedures, and validity period. In addition, it details the specific safety equipment required, the surveyed radiation levels, and any special safety instructions. The individuals performing the work are required to read and understand the requirements.

3.3 HEALTH PHYSICS PROGRAM

3.3.1 Radiation Protection Equipment

3.3.1.1 Instruments (Survey, Sampling, and Counting)

The kinds of equipment used in radiation detection by the RP&HPS group for portable survey, air sampling, and sample counting include the following:

dc Powered (portable instrumentation)

Category 1	β–γ ionization–type survey meter; sensitivity – 0.1 to <5,000 mR/h
Category 2	Thin–window pancake Geiger–type survey meter; sensitivity – background to 5 x 10^5 counts/min
Category 3	α scintillation–type survey meter; sensitivity – background to 10^5 counts/min
Category 4	β–γ Geiger–type survey meter; sensitivity – 0.1 to 200 mR/h

ac Powered

Category 6	Counting scalers and sample changing system; α, β sensitivity to α and β radiation – 0.1 to 10^6 counts/min
Category 7	Count rate meter for α and β radiation
Category 8	Air monitor β–γ
Category 9	Air monitor α
Category 10	Multichannel analyzer NaI (T1) or Ge detectors.

Calibration and maintenance of this equipment are controlled by Radiation Instrument Services Calibration Laboratory and performed to manufacturer and/or user recommendations. Instruments are calibrated after repair and on a regular schedule. Battery–powered instruments are calibrated every 13 weeks; ac–powered instruments are calibrated every 6 months. If the manufacturer recommends more frequent servicing, that interval is used for routine calibration. Calibration sources are traceable to the National Institute of Standards and Technology.

3.3.1.2 Respiratory Protection

Respiratory protective devices are used for decontamination operations (e.g., cutting an exhaust duct containing residual radioactive material) or for emergencies that might produce airborne radioactive material in excess of the limits specified in Appendix B, Table 1, Column 1, 10 CFR 20, and subject to the conditions specified in 10 CFR 20.103c. The issuance and use of respirators are under the direct control of the RP&HPS group. A minimum of a successfully completed medical review plus 2 hours of general training in the use of the respirator is required for any person required to use respiratory protective devices. Additional training is required for special devices such as airline respirators or SCBA. The equipment itself may be issued only by RP&HPS personnel. The proposed use is reviewed by an RP&HPS representative who determines the appropriate device to be used. Each time a respirator is returned, it is serviced, cleaned, and sanitized before being reissued. Respirators are returned daily.

3.3.1.3 Protective Clothing

Protective clothing requirements are established by RP&HPS to prevent contamination of personnel. Required protective clothing generally consists of laboratory coats and shoe covers worn over personal clothing. However, additional specialized clothing is used when warranted by the nature of the operation, quantity and quality of material involved, and/or chemical and physical form of the material involved.

3.3.2 Radioactive Exhaust Systems

The RIHL exhaust systems direct the flow of air from the outside of the building into the controlled areas. The air flow is from an area of lower contamination to an area of potentially higher contamination within the building. The systems are designed specifically to control airborne contamination. As such, these systems will be maintained and utilized in the decontamination activities. Portable pump/filter units may be used for small local situations, but primary reliance will be on the RIHL systems.

3.3.2.1 High-Volume Cell Ventilation

Ventilation of the four hot cells and associated decontamination rooms is provided by a 12,540-cfm constant-volume blower system. A second identical blower is located in parallel and is automatically actuated in the event of a failure of the primary blower. The cell exhaust passes through in-cell prefilters and then through high-efficiency particulate air (HEPA) filters in the basement. When necessary to provide additional filtration, HEPA filters will be installed in-cell, downstream of the prefilters. Cell ventilation is controlled by pressure instruments located in the operating gallery. Sufficient ventilation system capacity is provided to create large flow rates into the cells when any cell door or other opening is made. When a cell door is opened, about 4,000 cfm are exhausted from the cell. This corresponds to a velocity of >100 linear ft/min through the opening into the cell. This flowrate is adequate to prevent the release of contamination from the cell into the adjacent decontamination room.

To allow more cell doors to be opened at one time, the exhaust system will be shut down for cells as decontamination is completed. As the hot cells and decontamination rooms are decontaminated to sufficiently low levels, it will no longer be necessary to maintain the engineered safeguards needed during the operational period. The requirements for these safeguards are specified in ESG-82-33, Sections 3.2.2.1 and 3.2.2.2 and relate to the use of hot cells and of other enclosures. The engineered safeguards provide for minimum airflow velocities and differential pressures as required to prevent exceeding airborne radioactivity concentrations that are greater than the occupational maximum permissible concentration, and for shielding in operations that could not be performed without exceeding regulatory radiation protection standards. The conditions requiring safeguards will no longer exist in several of the hot cells and decontamination rooms as decontamination is completed. Ventilation may be reduced in these areas as needed to support decontamination efforts in other areas.

3.3.2.2 Posted Area Ventilation

The general exhaust blower provides local exhaust through HEPA filters for the Hot Change Room, hot side of the Manipulator Repair Room, Hot Laboratory, Glove Box Laboratory, Airlock, Hot Equipment Storage, Service Gallery, Room 112, and Operating Gallery. Two identical 22,890-ft^3/ min constant-volume blowers are located in parallel to provide this exhaust, and discharge to the stack. One blower is normally in operation and the second, or standby blower, is automatically actuated if the first blower fails. Prefilters are used on all ventilation systems and are changed frequently to extend the life of the high-efficiency filters.

3.3.3 Air Sampling

Low-volume particulate air samplers (about 1 ft^3/min) or lapel air samplers (about 5 ft^3/h) are required in all locations where there is a potential for airborne radioactive material in concentrations in excess of 25% of the occupational exposure standards, based on knowledge of the material, facility, and operations. To the extent practical, sampler inlets are located at positions representative of the air to which workers are exposed. Samples are removed for evaluation in counting systems at the end of each shift or more frequently, as necessary, to prevent inhalation exposures from exceeding regulatory standards. Air must be drawn through filters by use of vacuum pumps (Gast Manufacturing Model 0211-V103-G8 or equivalent) equipped with filter holders (Gelman Instruments Model 4170 or equivalent), or by use of house vacuum lines equipped with filter holders (Gelman Instruments Model 4170 or equivalent). A typical lapel sampler would be Mine Safety Appliance Monitair or equivalent. Filter paper efficiency is at least 99% for particles of 0.3-μ diameter or greater. Provisions are made for the determination, with 20% accuracy, of the volume of air drawn through the filter. Sampler flowrate calibration and adjustment are performed every 6 months.

3.4 CONTRACTOR PERSONNEL

The same safety requirements apply to all personnel in a radiologically controlled area. Contractor personnel must utilize the same protective equipment training and proficiency as company personnel and operate with approved procedures.

3.5 RADIOACTIVE WASTE MANAGEMENT

Disposal site and transportation requirements must be complied with when packaging hazardous waste. Material, form, concentration level, toxicity, quantity, etc., are some of the considerations that determine the type of packaging as well as the type of disposal site. For decontamination planning, only radioactive wastes will be addressed. Any other hazardous waste, such as chemicals and asbestos, will be disposed through normal interplant channels.

Radioactive waste packaging has been an ongoing, routine function of the hot cell and Radioactive Materials Disposal Facility (RMDF). Procedures and guidelines are established and in place; these shall be used for the final packaging and disposition of radioactive waste during the D&D program. If unique conditions arise that are not covered by existing procedures, they shall be addressed by exception in the individual detailed work procedure under which the work is being performed. All radioactive materials removed from the RIHL will be shipped to the RMDF for subsequent shipment to an authorized disposal site.

Asbestos waste must be handled under special procedures and by specially trained personnel even if not radiologically contaminated. Existing asbestos handling procedures will be used where applicable. If unique conditions exist that are not covered by established procedures, these shall be addressed, by exception, in the detailed working procedure under which the work is being performed.

Every effort will be made to avoid generating mixed waste. (A mixed waste is defined as an EPA hazardous waste that is also radioactively contaminated.) If mixed waste material is generated, store the waste at the RMDF, currently operating under interim status under the authority of the California Department of Health Services. The regulation of mixed waste and disposal or treatment of such waste is not clearly defined and will remain in storage at RMDF until proper disposal or treatment can be ascertained. Currently, about 30 gal of radioactively contaminated acid are at the RIHL. This material is in use for electropolishing operations. No additional solution will be generated. This material will eventually be a waste product. Under Environmental Protection Agency rules, the solution will fall into the mixed waste category. Also, fewer than 40 gal of radioactively contaminated lubricants and hydraulic fluids, which are listed as hazardous waste in California, are in facility equipment and hydraulic systems.

Mixed waste from the D&D of the RIHL will be disposed of through channels established by the DOE. The DOE has assumed responsibility for the D&D of the RIHL, which includes disposition of all wastes generated therefrom. Mixed wastes will be stored at the

RMDF, which is a state and federal interim status storage facility and which has an application for a Part A Permit (No. CA890090001) filed with the USEPA, until such time as a DOE/EPA/ State of California-approved disposal channel is established. The treatment standards for the wastes will be met, relative to both state and federal requirements; these requirements are currently not completely defined, and there is uncertainty as to what treatment standards will have to be met. Once the mixed waste meets the land disposal restrictions and the DOE specifies to which site the waste is to be shipped for disposal, the waste will be disposed of.

There are several known areas in the RIHL that contain asbestos-containing materials (ACM). Most of the floor tiles, pipe insulation, and the thermal insulation in the boiler and heaters contain asbestos.

Before demolition activities in these areas can begin, samples will be analyzed for asbestos content. Asbestos demolition and removal operations will be done by radiation- and asbestos-trained personnel with proper protective clothing and respirators for both radiation- and asbestos-removal work if asbestos is encountered. The work will be supervised by an EPA-certified asbestos-abatement supervisor.

Asbestos-containing waste will be double bagged, identified as containing asbestos, and packaged as "R/A" waste. It will then be shipped to a radioactive waste repository in Mercury, Nevada, using a permitted hauler.

The estimated volume of LSA waste that will be generated during the decontamination activities is 26,500 cubic feet. No TRU waste is expected. This estimate is based on radiological surveys, history of activities in the facility, and the decontamination level to be achieved. A breakdown of the assessed volume of waste for different areas of the facility is presented in Table 3-1. The total activity estimated for waste is 2.2 Ci. This estimate is based on an extrapolation of data from 2,860 ft^3 of material generated during RIHL decontamination in 1989. The activity in these shipments is due primarily to Cs-137 and Sr/Y-90, with significantly lesser amounts of CO-60, Cs-134, Sb-125, and U/Pu.

3.6 CRITICALITY SAFETY

The current licensed possession limit is 400 gm, and actual quantity of SNM contamination is less than 0.03 Ci. Both these figures are below the 450-gm limit of 10 CFR 70.24 which defines the requirements for criticality alarms; therefore, Rocketdyne is not subject to these requirements. Also, the NRC is currently reviewing Rocketdyne's request to be exempted from all requirements established in Part I of the current license (application) relating to criticality control.

Table 3-1. Radioactive Waste Volume Estimate

	Boxes 117 ft³/Box	Truck 10 Box/Truckloads
Decon cells	25	2.5
Decon decons Decon slaves and through tubes	6.5	0.6
Service gallery and storage	12.5	1.3
Room 141 (complete)	5.5	0.6
Room 139 (complete, includes glove box)	3.5	0.4
Air lock	3.5	0.4
Cell and decon paint stripping	(384 drums)	6.4
Cell and decon room liner removal	48	4.8
Windows (remove, decon and package)	4	0.4
Through tube liner flanges	9	0.9
Drain removal	6	0.6
Cell and decon room scabbling	3	0.3
Service gallery, final	3	0.3
Operating gallery - face	4	0.4
Operating gallery - floor and trench	3	0.3
Basement	8	0.8
Cell exhaust system	16	1.6
Building exhaust	16	1.6
Basement	10	1.0
Attic	10	1.0
Waste tanks	10	1.0
Gas holdup tank	2	0.2
Excavate holdup yard and spots	16	3.2 (heavy)
Final survey	2	0.2
TOTAL	226.5	30.8

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4.0 FINAL RADIATION SURVEY PLAN

The RIHL facility and adjacent ground within the security perimeter will be surveyed to determine the residual surface (dpm/100 cm^2) and volumetric (pCi/g) contamination. Following current NRC guidance, the data and methodology described in the draft report, "Residual Radioactive Contamination from Decommissioning," NUREG/CR-5512, January 1990, will be utilized to perform pathway analyses and determine the total effective dose equivalent (TEDE), based on measured levels of contamination. The TEDE will be compared to the interim criterion of 10 mrem/yr to demonstrate that the facility can be released for unrestricted use. The bases and rationale for this criterion are given in the NRC Policy Statement on "Below Regulatory Concern," July 3, 1990. The GENII software package developed by BMI during the NUREG/CR-5512 study will be used as appropriate for the analysis. A detailed work procedure will be prepared that covers each aspect of the survey. This will ensure that the survey is conducted in a reliable, reproducible manner and is documented uniformly.

4.1 SURVEY AREAS

The RIHL facility will be divided into 10 areas for purposes of the final survey:

- Hot Cells And Decontamination Rooms
- Liquid waste drain system, including Building No. 468
- Fuel storage tubes
- Cell penetration tubes
- Basement
- Service Gallery and Hallway (Room 147), Hot Manipulator Repair (Room 128), Glove Box Laboratory (Room 139) Air Lock (Room 155), Laboratory (Room 141), and Hot Storage (Room 153)
- Remainder of offices and support areas, including the HP and the Engineering trailers
- Cask storage yard
- Remaining outside surfaces (roof, pads, trailers)
- Soil samples.

4.2 INSPECTION

Throughout the decontamination process, surveys are performed to identify areas requiring further cleanup. As these areas are cleaned, surveys are performed to verify that adequate decontamination was performed. After a portion of the facility has been decontaminated, and there is little risk of recontamination, a final survey is performed to demonstrate that the limits for remaining radioactivity have been satisfied. This final survey is performed using 100% inspection methods, as directed by the NRC.

The final survey data will be generated by measurements taken at specific locations in the facility. The entire facility will be mapped in a 1 m x 1 m grid to ensure uniform coverage by the survey of each area. This grid will be used in areas expected to have higher radiation levels. Areas known to be clean (with background levels) will be sampled on a statistical basis. For the uncontrolled office and peripheral support areas, a minimum of 5% of the floors, walls, and ceilings will be included in this final survey.

All of the inner surfaces of the radioactive waste drain system, fuel storage tubes, and cell penetration tubes will be surveyed 100%.

The final survey will include 10 m x 10 m survey of the ground surface within the facility perimeter fenceline. In addition to the radiation instrument survey, a 1 L sample of soil will be taken at each survey location for gamma spectroscopy and gross alpha/beta activity measurements, and, if deemed necessary, chemical analysis.

4.3 BACKGROUND RADIATION

Background radiation measurements will be made at the beginning of each work day, at midday, and at the end of the work day to coincide with the daily calibration checks on survey instruments. The average of the backgrounds and efficiency factors determined for each half of the work day will be used for correction of survey data taken in the time period.

4.4 SURVEY INSTRUMENTS

Radiation measurements will be made using the following instruments or the equivalent:

- Ludlum Model 2220-ESG Scaler/Ratemeter
- Ludlum Model 43-1 Alpha Scintillation Probe
- Ludlum Model 44-9 Thin-Window Pancake GM Probe
- Ludlum Model 44-2 High-Energy Gamma Probe
- Tennelec Alpha/Beta Counting System
- Canberra Series 10-MCA System with High-Purity Germanium Detector.

Measurements of the average and maximum alpha surface activities for the survey will be made with alpha scintillation detectors, sensitive only to alpha particles with energies exceeding about 1.5 MeV. The detectors shall be calibrated with a Th-230 alpha source standard. The energy of the alpha particles from this source is similar to that of the alpha emitters handled at the RIHL.

Measurements of the average and maximum beta surface activities will be made with a thin-window pancake Geiger-Mueller tube. The detectors will be calibrated with a Sr-90 beta source standard. This calibration source is appropriate for the mixture of beta emitters present at the RIHL.

Measurements of removable surface activity (alpha and beta) shall be made by wiping approximately 100 cm^2 of surface area using standard smear disks. Measurements in the liquid waste drain lines, the fuel storage tubes, and the cell penetration tubes will require special remote smear handling equipment. The activity on the disks will be measured using a gas-flow proportional counter. The counter will be calibrated using Th-230 and Sr-90 standard sources.

Surface activities (total) on the inner surface of the 3-in.-diameter liquid waste drain lines and the 3-in.-diameter cell penetration tubes will be made with a special probe. One design which is being built and tested is a gas-flow proportional counter which uses the pipe wall as the cathode. This type detector will be able to differentiate between alpha and beta activity. Whatever detector is used will be calibrated for a pipe geometry using appropriate standard sources. The fuel storage tubes and the 10-in.-diameter periscope and master/slave manipulator sleeve through-tubes are large enough to accommodate a rectangular geometry alpha probe and the standard pancake beta probe, but special remote positioning equipment and longer signal cables will be needed.

Gamma spectroscopy measurements will be made on soil samples to qualify and quantify the specific activities. The high-purity germanium detectors used for these measurements will be calibrated using standards that approximate the geometry and density of the soil samples. Gross detectable beta activity of soil samples will be measured using gas-flow proportional counters. Calibration of these detectors is done by use of KCl to represent the sample self absorption.

All portable survey instruments shall be serviced and calibrated on a quarterly basis. In addition, daily checks and calibrations shall be performed on all instrumentation to verify acceptable performance. All daily calibrations and checks will be made at the beginning of the work day, at midday, and at the end of the work day.

4.5 DATA ANALYSES

Data sets will be created for each of the 10 survey areas defined for the RIHL decontamination program. Generally, the following data will be defined for each area:

- Alpha total activity averaged over 1 m^2 and standard deviation (dpm/100 cm^2)
- Alpha maximum activity and standard deviation (dpm/100 cm^2)
- Alpha removable activity and standard deviation (dpm/100 cm^2)

- Beta total activity averaged over 1 m^2 and standard deviation (dpm/100 cm^2)
- Beta maximum activity and standard deviation (dpm/100 cm^2)
- Beta removable activity and standard deviation (dpm/100 cm^2)

4.6 SUMMARY PRESENTATION

The results of the surveys in the test areas of the RIHL will be presented in a tabulation which is easily interpreted in reference to regulatory limits. This summary will be comprehensive and include all of the final survey results. It will clearly illustrate that the facility meets the limits imposed for release for unrestricted use.

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5.0 FUNDING

The estimated cost to complete decommissioning the RIHL is $9.8 million. DOE s liable for decommissioning of the facility as stated in Contract DE-AC-03- 86-SF16021, Modification 004, dated 9/30/86, entitled "Fermi Fuel Declad Program." A cost estimate has been prepared for the DOE. The funding requested by fiscal year is $1.7 million (1990), $3.1 million (1991), $3.3 million (1992), and $1.7 million (1993). This funding is based on current planning and is reflected in this Decommissioning Plan.

More detail of the estimated cost to complete (as of April 1990) is presented in Table 5-1, "Cost Estimate Details," which shows the cost elements by task and by quarter for the remainder of the program.

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	JFM 1990	AMJ 1990	JAS 1990	OND 1990	JFM 1991	AMJ 1991
Engineering	46.0	114.0	91.2	116.1	126.0	129.2
Operations	34.0	84.5	68.2	85.5	92.0	95.1
D&D	135.5	316.4	228.7	270.0	286.6	302.6
Demolition support						
Compliance support	37.7	121.5	120.0	120.6	130.3	132.8
Program management	6.8	20.6	20.9	20.3	22.0	22.4
Demolition subcontract						
Materials and other S/C	74.0	90.2	43.9	43.6	43.5	43.6
Waste freight and burial				49.6		5.8
NRC and ORNL fees	8.2	8.2	8.2	7.0	7.0	5.9
Total estimated price	342.2	755.4	581.1	712.7	707.4	737.4

*Costs presented in thousands of dollars

Note: These prices are consistent with cost and pricing data of April 4, 1990, and do not reflect our current approved rates. The target date for submitting a revised proposal and cost and pricing data is September 17, 1990

Table 5-1. Cost Estimate Details*

JAS 1991	OND 1991	JFM 1992	AMJ 1992	JAS 1992	OND 1992	JFM 1993	AMJ 1993	Total
125.0	125.4	134.2	130.0	133.2	89.0	27.9	37.0	1,424.2
92.0	92.0	98.0	96.1	97.0	60.0	30.0	13.4	1,037.8
410.1	307.0	288.6	356.7	377.7	166.3	0.0	0.0	3,446.2
					23.4	84.9	53.1	161.4
129.2	130.4	137.1	135.5	136.0	193.8	80.7	41.8	1,647.4
22.0	21.7	23.1	22.6	23.2	20.0	17.5	18.1	281.2
				81.9	245.9	164.0		491.8
43.6	43.5	43.5	43.5	43.6	24.0	14.7		595.2
112.4				175.8	125.5		44.1	513.2
5.9	5.8	7.0	5.8	7.0	81.7		23.3	181.0
940.2	725.8	731.5	790.2	1,075.4	1,029.6	419.7	230.8	9,779.4

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6.0 PHYSICAL SECURITY AND MATERIAL CONTROL PLANS

Based on the current possession limit of 400 g for SNM, neither a Physical Security plan nor an SNM Control and Accountability plan is now required for the SNM-21 license.[1] The NRC Division of Safeguards and Transportation concur with this assessment[2] and have exempted Rockwell from the requirements of the prior subject plans within the license, namely, "Physical Security Plan for the Protection of Special Nuclear Material at the Hot Laboratories of the Rocketdyne Division of Rockwell International" (ESG-80-17) and "Fundamental Material Control for Special Nuclear Materials" (RI/RD-86-190).

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[1] Rutherford, P. D., Rockwell International. Letter to C. J. Haughney, Nuclear Regulatory Commission. Subject: Request for Exemption of Certain Requirements of 10 CFR 70 and 1CJFR73 in the SMN-32 License (Rockwell International Docket No. 70-25). Rockwell letter 90RC07088, 14 June 1990.

[2] Kason, D. J., Nuclear Regulatory Commission. Letter to P. D. Rutherford, Rockwell International, 10 August 1990.

APPENDIX A

RESPONSES TO NUCLEAR REGULATORY COMMISSION COMMENTS IN LETTER DATED JULY 3, 1990

The April 15, 1990 revision of the Decommissioning Plan for Rockwell International Hot Laboratory was submitted to the Nuclear Regulatory Commission (NRC) for approval in April 1990. The NRC reviewed the plan and, in a letter dated July 3, 1990, identified 12 areas where additional information was needed before final approval could be given.

This appendix presents a response to each of the 12 comments enclosed in the NRC letter:

COMMENT NO. 1:

Annex B limits are no longer being used as the release criteria for buildings; however, this criteria can still be used for the release of equipment that is removed from the facility. The NRC is currently developing new criteria for residual levels of radioactivity for decommissioning of nuclear facilities. The interim criteria require that a pathway analysis be conducted to ensure that the annual total effective dose equivalent (TEDE) not exceed 10 mrem/yr. The interim release criteria provide the allowable levels of residual contamination following decommissioning of buildings and soil. When mixtures of radionuclides are encountered, the allowable levels of contamination can be determined using the sum of fractions rule. This rule states that the sum of the ratios of the concentration of individual radionuclides in the mixture to their allowable levels must be less than or equal to 1.0. Rockwell will need to determine the mix of radionuclides present as contamination or assume that all contamination is from the most restrictive radionuclide. NUREG/CR-5512 (copy enclosed) contains the technical basis for the new criteria.

RESPONSE:

Section 4.0, "Final Radiation Survey Plan," and Section 4.2, "Inspection," have been rewritten to respond to this comment. Sections 4.5.1 and 4.5.2, "Sampling Inspection by Variables" and "Acceptance Criteria," respectively, have been deleted because they are superfluous to the revised plan. Section 4.5.3, "Summary Presentation," has been renumbered Section 4.6.

COMMENT NO. 2:

Provide a more detailed description of the proposed decommissioning activities that will be performed in the various areas. Include all areas.

RESPONSE:

Section 2.2, "Decommissioning Description," has been rewritten to provide additional detail. The list of areas in the RIHL which will require decontamination was rearranged to be consistent with the schedule and the written description. Figure 2-1 was modified to show north and the location of Rooms 103 and 157.

COMMENT NO. 3:

Commit to performing a hazards analysis for any new decommissioning activities that may be conducted.

RESPONSE:

The policy of performing readiness reviews, which incorporate hazards analysis, for all new decommissioning activities is already in place. Use of this policy is explained and confirmed in Section 2.4, "Readiness Reviews."

COMMENT NO. 4:

If pipes, drains, stacks, etc., are to be left in place, Rockwell must be able to demonstrate that the release criteria are met and the NRC must be able to confirm the measurements. Additionally, Rockwell must determine if the pipes have leaked in the past and contaminated the area surrounding the pipe.

RESPONSE:

Rockwell recognizes the responsibility to demonstrate that the release criteria are met with pipes, drains, stacks, etc., that are left in place. Rockwell also recognizes the responsibility to prove that no material which is contaminated above release criteria remains in the area around a pipe or drain. Rockwell is reviewing the *in situ* approach to ensure that it meets the requirements at this time. Rockwell has also initiated steps to define alternative approaches to remove the drains and other such items.

COMMENT NO. 5:

What are the plans for disposing of the mixed waste present on the site?

RESPONSE:

Section 3.5 has been revised to describe the current situation regarding mixed waste.

COMMENT NO. 6:

We note that the sodium burn pit, which is not mentioned in the plan, is an area suspected to be contaminated. This area and any other area or building on the non-DOE controlled land must be addressed either in the plan or in a supplement to the plan. Rockwell should carefully review its records to assure that all areas where radioactive material was used is included in the decommissioning efforts and final survey.

RESPONSE:

This plan, AI-78-10, addresses only the Rockwell International Hot Laboratory. Additional plans for the few remaining contaminated non-DOE controlled areas at the Santa Susana Field Laboratory are being developed under DOE funding and project management; the DOE has assumed responsibility for these areas. See the response to Comment No. 12, which is related to this comment.

COMMENT NO. 7:

The final survey as described in your plan is not adequate to show that the site meets release criteria. The effected areas (areas expected to be contaminated) must be 100 percent surveyed using a 1 m x 1 m grid system. A 10 m x 10 m grid system may be used outside. Clean areas may be sampled on a statistical basis. Refer to NUREG/CR-2082 (copy enclosed) for more information on confirmatory sampling. Additional guidance is currently being prepared on conducting the confirmatory survey. It will be necessary for Rockwell to conduct a pathway analysis in accordance with NUREG/CR-5512.

RESPONSE:

The new sections, 4.0, "Final Radiation Survey Plan," and 4.2, "Inspection," are responsive to these comments. Please see the response to Comment No. 1 for additional related changes to AI-78-10 that were made in response to these two comments.

COMMENT NO. 8:

The schedule on page 2–10 lists demolition as a planned activity, however demolition is not discussed in the plan. The demolition activities should be discussed in the text. Demolition of the building could effect the dose calculations for final release of the facility.

RESPONSE:

The new Section 2.0, "Demolition," is responsive to this comment.

COMMENT NO. 9:

On Page 3–4, you indicate that each time a respirator is returned it is serviced before being reissued. Indicate the frequency of return, i.e., after each use, daily.

RESPONSE:

The discussion of respiratory protection in paragraph 3.3.1.2 has been modified to indicate that respirators are returned daily.

COMMENT NO. 10:

The decommissioning plan should describe the fire protection measures, including the fixed and portable fire extinguishment systems. Portable extinguishers of suitable types should be deployed throughout the facility, in accordance with NFPA 10-1988, Portable Fire Extinguishers. These should be in addition to any fixed fire suppression system. Additionally, there are other fire protection concerns listed below. In each case, we have provided suggested precautionary measures. These should be addressed in the plan.

Concern	*Precautionary Measure*
A. *Welding, torch-cutting, and such other hot working may ignite ordinary combustibles.*	*The requirements of NFPA 51B-1984, Fire Prevention in Use of Cutting and Welding Process, should be followed.*
B. *Sand or grit blasting of contaminated metal parts could produce sparks should be on hand.*	*Such cleaning work should be performed in an enclosed space, and a portable extinguisher should be on hand.*
C. *Use of flammable liquid in decommissioning (Example: aceton, carbon tetrachloride, etc.)*	*Such cleaning should be performed in an enclosed area, the flammable vapor (if substantial amounts are generated) should be exhausted out of the space, and ignition sources should be prohibited in the area.*
D. *Reactive chemicals, such as nitric acid, could spill and react with ordinary combustibles causing fires.*	*Areas using such chemicals should be diked to prevent spills from spreading. Acid soaked rags, etc., should be handled in fire-proof containers and disposed of separately from other combustible materials.*
E. *Storage of combustible liquids, such as hydraulic oil, may be ignited.*	*Remove such storages from the operating area. Also, drain manipulator systems and remove the fluid beforehand.*
F. *Ordinary combustibles, such as pallets, cardboard boxes, and plastic sheets, often are allowed to pile up and may ignite.*	*Administrative controls should be exercised to maintain good housekeeping.*

RESPONSE:

A new section, 2.8, "Fire Protection," has been added to the plan. This section complies with the comment on fire protection.

COMMENT NO. 11:

Provide a section on criticality safety.

RESPONSE:

Section 3.6, "Criticality Safety," has been added to the plan in order to address the question of criticality.

COMMENT NO. 12:

Provide more detail to the cost estimates; and provide the plan for assuring the availability of adequate funds for completion of decommissioning, other than Building 20.

RESPONSE:

Additional detail has been added to the cost estimate in Section 5.0, "Funding."

Letters of funding commitment for Buildings 020, 005, 009 and the sodium burn pit have been provided by DOE and transmitted to NRC.[1, 2] These letters acknowledge DOE responsibility for contamination and provide a guarantee that funds will be available for D&D within specified schedules. The letters have been accepted by NRC in granting an exemption from the specific financial assurance mechanisms of 10 CFR 70.25. They also eliminate the requirement to provide funding plans for these facilities.

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[1] Rutherford, P. D., Rockwell International. Letter to C. J. Haughney, Nuclear Regulatory Commission. Subject: Financial Guarantee for Decommissioning of the NRC Licensed Facilities at the Santa Susana Field Laboratory. Rockwell letter 90RC08721, 9 July 1990.

[2] Rutherford, P. D., Rockwell International. Letter to C. J. Haughney, Nuclear Regulatory Commission. Subject: Financial Guarantee for Decommissioning of the NRC Licensed Facilities at the Santa Susana Field Laboratory. Rockwell letter 90RC08725, 24 July 1990.