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ABSTRACT

This document presents a summary of the activities conducted during GFY 1994 on decontamination and decommissioning of the Rockwell International Hot Laboratory. This is a multi-year program to decontaminate the RIHL facility to levels that allow release for unrestricted use.

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ACRONYMS AND ABBREVIATIONS

ANSI-AGA	American National Standards Institute - American Gas Association
ANL	Argonne National Laboratory
ASME	American Society of Mechanical Engineers
D&D	Decontamination and Decommissioning
DOE	Department of Energy
DOE-OAK	Department of Energy - Oakland Field Office
DOE-NV	Department of Energy - Nevada Field Office
DOS	Dioclyl Sebacate
DOT	Department of Transportation
DTSC	California Department of Toxic Substance Control
EPA	Environmental Protection Agency
GFY	Government Fiscal Year
HEPA	High Efficiency Particulate Air
LLW	Low Level Waste
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
R/A	Radioactive
RCRA	Resource Conservation Recovery Act
RIHL	Rockwell International Hot Laboratory
RMDF	Radioactive Material Disposal Facility
TRU	TRansUranic

ANNUAL REPORT ROCKWELL INTERNATIONAL
HOT LABORATORY DECOMMISSIONING GFY 1994

1.0 INTRODUCTION AND SUMMARY

This document presents a summary of the activities conducted during GFY 1994 on decontamination and decommissioning (D&D) of the Rockwell International Hot Laboratory (RIHL). This is a multi-year program to decontaminate the RIHL facility to levels that allow release for unrestricted use and subsequent demolition of the structure. 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 dense and reinforced concrete, respectively. All surfaces of the hot cells, and the floors and east walls of the decontamination rooms are clad with steel. The original layout of the facility is shown in Figure 1-1. In-cell equipment was remotely operated from the operating gallery using manipulators and other remote 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 was decontaminated and packaged. The decontamination rooms also serve as contamination control areas between the cells and the service gallery. Connected with the service gallery was 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 air filters (HEPA), and finally out a 54-in. outside diameter, 73-ft high stack (above grade). The ventilation ducts are installed in the basement directly below the hot cells.

All areas of the RIHL facility will require decontamination and/or verification that radiation levels are below limits for release for unrestricted use. Completion of this effort constitutes the primary activities of the decommissioning program. The RIHL was last used in GFY1987 and all Special Nuclear Material, tools and equipment were removed prior to GFY 1992. GFY1992 was the beginning of the major decontamination effort in the cells. The basic approach has been to decontaminate the areas of highest contamination levels first to

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FIGURE 1-1

minimize personnel exposure and to reduce the background radiation which will allow detection of lower level contamination areas.

The following decontamination methods were or are being utilized. Foam cleaning is used in conjunction with localized brushing with detergent to remove surface contamination. The liquids are drained off through the facility drain system to the facility holdup tank. When the liquids in the holdup tank reach 50% full level, the liquids are pumped out and transported to an evaporator at the Radioactive Material Disposal Facility (RMDF). The solids are packaged and disposed as R/A waste. Scabbling or grit blasting is used to remove contaminated epoxy paint. The grit blasting material is then cleaned-up and the area is vacuumed. The material is put into 55-gallon drums and disposed as R/A waste. The steel liners are further decontaminated by grit blasting and hand grinders to remove residual surface contamination and paint. The steel liners are cut with an oxyacetylene torch and removed as sections. 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 requires scarfing, core drilling, or jack hammering to reduce the contamination to allowable limits. An expansive grout is also used to fracture the concrete around components to reduce the concrete removal effort. For removal of the concrete to expose the R/A drains in the cell structure a tractor and hydraulic hammer were purchased to help recover the decommissioning schedule. In general, methods are being selected to minimize the quantity of waste generated and personnel radiation exposure.

During GFY1994 the following-major tasks were accomplished:

1. Core drilling to remove the cell/decontamination room penetrations and to detach the vertical storage tubes in the cells was completed.
2. The 13 ft vertical storage tubes were removed from the cells and downsized.
3. Removal of the radioactive drain system in the cells and decontamination rooms was completed.

4. The 50 ft underground drain line to the R/A liquid holdup tank was removed and downsized to 5 ft sections.
 5. The remaining 40,000 lbs of lead was removed from the cell/decontamination room passthroughs.
 6. The 3,000 gallon R/A liquid holdup tank was removed and transported to RMDF for storage.
 7. Procedures were completed which meet the new waste acceptance criteria for the Nevada Test Site (NTS) and waste shipments to NTS were resumed.
- <

2.0 PROGRAM PLANNING ACTIVITIES

Regulatory requirements that must be met on the program include: Nuclear Regulatory Commission (NRC), Occupational Safety and Health Agency Administration (OSHA), Environmental Protection Agency (EPA) (including clean air and water acts), Department of transportation (DOT), American Society of Mechanical Engineers (ASME) Quality Assurance, California Department of Toxic Substance Control (DTSC), and local regulations. The hierarchy of documents which have been prepared in response to these requirements is presented in Figure 2-1. Prior to August 1991, RIHL D&D planning assumed the NRC was going to reduce their criteria on acceptance levels for surface contamination, based on NRC draft NUREG/CR-5512 "Residual R/A Contamination from Decommissioning", January 1990. NUREG/CR-5512 specified a dose based pathway analysis criteria instead of a surface contamination criteria, the effect of which would have significantly reduced the RIHL decontamination effort. However, NRC instructed Rockwell to disregard the NUREG/CR-5512 criteria in August 1991. This, along with a better knowledge of the extent of contamination in the RIHL, and other regulatory changes resulted in major changes in the RIHL decontamination effort. Table 2-1 lists the subjects of major changes which have occurred in the planned decommissioning effort. Substantial effort in GFY 1994 was spent on preparing to meet the requirements of the new waste acceptance criteria for the Nevada test Site (NTS).

Table 2-1
Changes in Decommissioning Plan

1.	New NTS Waste Acceptance Criteria
2.	Removal of Radioactive Drain System
3.	Removal of Through Tubes and Storage Tubes by Core Drilling
4.	Removal of Shield Doors
5.	Removal of Steel Liners
6.	Recycling of Lead Shielding
7.	Handling Mixed Wastes
8.	Hot Laboratory Demolition

Document Chart for Hot Laboratory D&D

2.1 Program Changes

The effect of the program changes listed in Table 2-1 are described below.

2.1.1 New NTS Waste Acceptance Criteria

Rockwell has been shipping waste to the DOE Nevada Test Site (NTS) for over 30 years. The NTS has, however, now issued a new set of requirements for accepting radioactive waste from other sites. These new criteria are reflected in the Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Document, NVO-325 Revision 1, dated June 1, 1992. The new criteria require that the R/A waste be treated like a manufactured product which requires extensive quality assurance, environmental, health physics oversight and inspection of the process during generation and packaging of the product. This required activity is over and beyond that previously required for the decommissioning effort.

Rockwell submitted Revision A to the Application to Ship Radioactive Waste to the Nevada Test Site on March 24, 1992. This application was structured to meet our interpretation of the NVO-325 Revision 1 document. In response to our submission, DOE-NTS conducted a Pre Audit Visit to the Hot Laboratory on August 4-6, 1992. The Pre-Audit team pointed out numerous modifications required in our old procedures to meet the new NVO-325 requirements.

The application for shipment of R/A waste to NTS was revised to reflect DOE comments and the application was forwarded by DOE to NTS for their review. The NTS review was expected to be completed in September and an NTS audit of RIHL was scheduled for November 1993. An eight person audit team was on site at RIHL from November 16 to 18, 1993. Four concerns were identified by the audit team: 1) process knowledge files need to be separated by waste stream and supplemented with additional data; 2) several documents needed to be revised to include approval by the Rocketdyne Waste Certification Official; 3) Waste streams which include asphalt probably will be required to be sampled; and 4) Containers for Waste Streams 4 and 5 with filters and drain piping probably will be required to be sampled.

Corrective actions were initiated to resolve the NTS audit concerns and a meeting was held at DOE-NV on February 3, 1994, to

review the post-audit corrective actions. Waste characterization files were reviewed and found to be acceptable. The application to ship LLW to NTS was revised in accordance with the final agreements with DOE-NV and resubmitted for review and approval. Approval to resume shipment of LLW from Rocketdyne to NTS was provided by letter from DOE-NV to DOE-OAK in May 1994.

2.1.2 Effect of Having to Remove Drain System

RIHL D&D Planning assumed that the radioactive (R/A) drains and support drains could be decontaminated in situ using mechanical honing followed by electropolishing. Final survey of the drains was to have been conducted using a special radiation probe which fits inside the drains. The approach was in final demonstration when it was concluded that the acid being used for electropolishing had been added to the EPA hazardous materials list and the process would generate mixed hazardous waste. Also, the in situ R/A survey results would not be acceptable because of the inability for 100% verification as clean; the person conducting the in situ R/A survey would not be able to verify the absence of cracks or penetrations through the surface being surveyed. In order to insure no contamination remains the drains must be removed from the concrete (and re-bar structure) and disposed of as R/A waste at a considerable increase in costs. The drains are buried 3 to 4 feet under the concrete floor as well as being underneath the 3 1/2 foot thick cell walls.

A substantial portion of the high-density (magnetite) concrete flooring had to be removed to provide access to the drain piping. This increased both the manhours required for decommissioning and the volume of waste generated.

2.1.3 Removal of Through Tubes & Storage Tubes by Core Drilling

RIHL D&D Planning assumed that the through tubes that penetrate the thick concrete structure of the hot cell faces and the storage tubes buried in the cell floors and support pillars could be decontaminated in situ using electropolishing similar to that proposed for the drain systems. Since the electropolishing process would generate mixed waste, an alternate means of removing the contamination had to be found. The most cost effective alternative was to use diamond core drilling to remove the entire tube.

2.1.4. Removal of Heavy Shielding Doors

RIHL D&D Planning assumed that the nine heavy shielding doors to the hot cells and decontamination rooms could be cleaned in situ. The doors were, however, on tracks which are close to the walls with limited access to door jams, wheels and some portions of the back of the door. This prevented the doors, jams and wheels from being decontaminated to NRC release requirements and also restricted visual access during survey. Therefore, the heavy doors were removed from the facility and transported to the RMDF where there is unrestricted access for decontamination and surveying.

Out of the nine doors removed from the RIHL, five are solid steel and four are composite steel and high-density concrete. Three of the four composite doors were decontaminated and released for unrestricted use.

2.1.5. Removal of Steel Liners from Hot Cell

RIHL D&D Planning assumed that the 1/4 inch thick steel liners in the hot cells could be decontaminated in situ and left for removal during demolition. However, the liners had been breached during the hot cells operating life and significant contamination was found behind the liners in selected areas during decontamination in Cell 1. In order to meet the requirement that any area suspected of being contaminated be completely exposed for meter survey requires that the steel liner be completely removed from the hot cells. RA contaminated concrete behind the liners must also be removed and shipped to burial.

2.1.6. Recycling Lead Shielding

RIHL D&D Planning assumed that the radioactive contaminated lead could be disposed of as normal radioactive waste. The EPA has designated lead as a hazardous material and when contaminated with radioactive material it becomes a mixed waste which requires special treatment. About 80,000 pounds of lead was used in the hot laboratory as shielding. All lead must now be separated into R/A contaminated and non-contaminated waste streams. The contaminated lead must then be sent to a certified reprocessor to decontaminate the lead for recycling.

2.1.7. Handling Mixed Waste

The EPA and California EPA Department of Toxic Substance Control (which has the EPA responsibilities in California) continues to add materials to the list of designated hazardous materials, reduce the concentration levels of compounds specified as toxic, and modify the methods that must be used to sample and analyze for hazardous materials. The hazardous waste list has been expanded to include paint, oils, asbestos, etc. that are found in many older commercial items. These items become mixed waste when removed from R/A contaminated areas in the RIHL. Special planning must be established as each new item is encountered.

2.1.8. Hot Laboratory Demolition

The RIHL will be demolished to assure there is no activity remaining in or under the building. The RIHL will be demolished by a subcontractor once the building has been decontaminated, all surveys have been completed, and the building has been released for unrestricted use by the NRC. NRC release is scheduled to occur at the end of November, 1996. Prior to facility release, a subcontract will be awarded for the actual demolition and the subcontractor will start mobilization. Demolition will begin in December 1996, and will be complete in March 1997. Once the building debris has been removed from the site, a final survey by an independent source from Oak Ridge will be conducted. When the site has been released the remaining hole will be filled with clean dirt and the site will be graded.

2.2 External Meetings and Reviews

Table 2-2 presents a listing of external meetings and reviews related to D&D activities.

Table 2-2 External Meetings and Reviews

November 16-18 1993	Eight person team representing DOE-NV to audit waste characterization of LLW to be shipped to NTS. One DOE-OAK person attended the audit.
January 5, 1994	Facility tour for two California Department of Health Services personnel
January 11-14, 1994	Safety inspection by U.S. NRC inspector, Michael Cillis
February 1, 1994	Facility tour for two ANL personnel to view D&D operations
March 4, 1994	Familiarization tour for Michael Lopez of DOE-OAK
March 19, 1994	Facility tour for Paul Fox of American Nuclear Insurers
April 26, 1994	Three DOE-OAK personnel were on site for a safety tour
April 28, 1994	Five DOE personnel were on site for a surplus facilities tour
May 16, 1994	Two Westinghouse Hanford personnel involved with D&D toured the facility
May 24, 1994	P. Smith from Ventura County Air Pollution Control District inspected the natural gas furnace and reviewed the permit posting
June 21, 1994	Discussions at Canoga Park with Ms. Ronna Promani and Mr. Mike Lopez of DOE-OAK on un-negotiated proposals
June 28, 1994	Five Westinghouse Hanford personnel toured the facility as part of an annual review to ship R/A contaminated waste to Hanford
July 6, 1994	A briefing was presented to Ms. Sally Robison of DOE showing an accelerated D&D schedule with a 12/95 completion date

3.0 DECONTAMINATION ACTIVITIES

This section presents a summary of the decontamination activities performed during GFY1994. Figure 1-1 shows the relative location of the cells and areas within the RIHL.

3.1 Core Drilling Operations

As noted in Section 2.1.3, the cell and decon room penetrations for through tubes and conduits were removed by diamond core drilling. Core drilling to remove the remaining penetrations was completed in GFY 1994. Figure 3-1 shows typical core-drilled penetrations after removal. Figure 3-2 shows a penetration being removed.

Core drilling was also completed to detach the 13 ft vertical storage tubes in the cells (See Figures 3-3 to 3-6). A storage tube lifting device was fabricated by the Rocketdyne weld shop. A temporary steel floor plate was placed in each cell to allow forklift and manlift access and the storage tubes were removed, lowered into the basement, and downsized for packaging into a low level waste container.

3.2 Radioactive Drain System Removal

The drain header in the east wall of cell 3 was removed. The high radiation debris (22R/hr) from inside this drain line was placed in vented one gallon cans, overpacked in a shielded 55 gal drum, and shipped to RMDF for interim storage and characterization. This was the last known high radiation source in the building. Concrete removal around the cell 4 north door drain line and the service gallery header under cell 4 was completed (See Figure 3-7). The drain lines were removed and downsized for packaging.

Jackhammering was used to remove the concrete around the R/A drain line in the east basement wall to expose the underground drain line that runs to the R/A liquid holdup tank (Figures 3-8 and 3-9). TRU material and machining debris found in the piping was removed, placed into shielded drums, and transported to RMDF for interim storage. Exposure of the 18 in. diameter outer casing at the basement wall disclosed a welded angle iron support bracket holding the 4 in. drain line in place about midway between the basement and the drain tank in Building 468. The welded support bracket was broken loose by applying pressure on

one end of the line with a hydraulic jack. The drain line was then drawn back into the basement and cut into 5 ft lengths for packaging. A total weight of 290 lbs of debris from inside the line was packed in 1 gal cans, overpacked in shielded drums, and shipped to RMDF for interim storage.

3.3 Radioactive Exhaust System Removal

The radioactive exhaust system ducting that penetrated the floor of each cell was removed, downsized and packaged for disposal. The RA exhaust ducting to each decon room was left intact and operating to draw negative air pressure on the total combined volume of each cell-decon room space. The connection points at each of the removed cell duct locations was blanked off to maintain system integrity.

3.4 Removal of R/A Hot Spots

Removal of radioactive hot spots from the floor, ceiling and walls of each cell was initiated in FY94 (See Figure 3-10).

3.5 Other Decontamination Activities

In addition to the major decontamination tasks described above, the following tasks were also performed:

- 1) The remaining 40,000 lbs of lead was removed from the pass through shields in cells 1, 2, 3, and 4. About 10,000 lbs was R/A contaminated and is being handled as radioactive low level hazardous material.
- 2) Shipments of low level waste (LLW) to NTS was resumed. Seventy nine boxes of LLW were shipped in July. During July 1994 3,208 Cu. Ft. of packaged solid low level waste was shipped to RMDF and 5,788 Cu. Ft. of waste was shipped to NTS. Waste packages totaling 5,786 Cu. Ft. were stored at RIHL at the end of the year.
- 3) The inside of the R/A liquid waste holdup tank was viewed with a waterproofed miniature video camera. A moderate amount of sludge was observed on the bottom. In addition, several objects were observed (rubber gasket, metal rods, and a nylon strap) in the tank. Sludge and water samples show the presence of Am, Pu, Cs, and Co isotopes. The tank was removed and transported to RMDF for storage (See Figures 3-11 and 3-12).

4) The facility exhaust system was shut down 1 time to allow HEPA filter replacement. Following filter replacement the system was reactivated and DOS (Dioclyl Sebacate) tested. R/A contaminated filters are being stored pending approval of this waste stream by NTS (See Figure 3-13).

4.0 BUDGET AND SCHEDULE

The current schedule for completing the RIHL decontamination is shown in Figure 4-1. The schedule is based on the specified funding level of \$1650K for GFY 1994, \$1200K for GFY 1995, \$1700K for GFY 1996, and \$2200K for GFY 1997. The decontamination was on schedule at the end of 1994.

Core Drilled Penetrations and Sump Pumps

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Figure 3-1

Core Drilled Penetration Removal

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Figure 3-2

Core Drilling of Vertical Storage Tubes (1)

Figure 3-3

Core Drilling of Vertical Storage Tubes (2)

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Figure 3-4

Core Drilling of Vertical Storage Tubes (3)

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Figure 3-5

Core Drilling of Vertical Storage Tubes (4)

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Figure 3-6

Concrete Removed Around Drain Line Under Cell 4

Figure 3-7

Underground Drain Line to R/A Liquid Tank

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Figure 3-8

Underground Drain Line in Conduit

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Figure 3-9

Removal of Hot Spots in Concrete

Figure 3-10

R/A Liquid Holdup Tank Removal (1)

Figure 3-11

R/A Liquid Holdup Tank Removal (2)

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Figure 3-12

Air Filters Bagged For Disposal

Figure 3-13

FY 94 SCHEDULE FOR RIHL D&D

ACTIVITY	S/A	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
NUCLEAR OPERATIONS													
Yards/Asphalt	10006												
Storage/Airlock	10007												
Attic	10008												
Service Gallery	10009												
Support Drains	10010												
Office/Ch Rm	10011												
Op. Gal/Mockup	10012												
RM 133, 135, 137	10014												
Basement	10015												
RM 128, 139, 141	10016												
Roof	10017												
Hot Cells & Decon Rm.	10018												
Exhaust	10019												
RA Drains	10020												
RD Final Survey	10022												
Surplus Eq.	10023												
Mix Waste Sample	10025												
Cell Liner Removal	10030												

Figure 4-1

2/2/94

FY 95 SCHEDULE FOR RIHL D&D

ACTIVITY	S/A	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
NUCLEAR OPERATIONS													
Yards/Asphalt	10006												
Storage/Airlock	10007												
Attic	10008												
Service Gallery	10009												
Support Drains	10010												
Office/Ch Rm	10011												
Op. Gal/Mockup	10012												
RM 133, 135, 137	10014												
Basement	10015												
RM 128, 139, 141	10016												
Roof	10017												
Hot Cells & Decon Rm.	10018												
Exhaust	10019												
RA Drains	10020												
RD Final Survey	10022												
Surplus Eq.	10023												
Mlx Waste Sample	10025												
Cell Liner Removal	10030												

FY 96 SCHEDULE FOR RIHL D&D

ACTIVITY	S/A	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
NUCLEAR OPERATIONS													
Yards/Asphalt	10006												
Storage/Airlock	10007												
Attic	10008												
Service Gallery	10009												
Support Drains	10010												
Office/Ch Rm	10011												
Op. Gal/Mockup	10012												
RM 133, 135, 137	10014												
Basement	10015												
RM 128, 139, 141	10016												
Roof	10017												
Hot Cells & Decon Rm.	10018												
Exhaust	10019												
RA Drains	10020												
RD Final Survey	10022												
Surplus Eq.	10023												
Mix Waste Sample	10025												
Cell Liner Removal	10030												