RIHL BUILDING 020 WASTE CHARACTERIZATION PLAN

1.0 PURPOSE

This plan describes the methods utilized to characterize all waste generated during the Decommissioning and Decontamination (D&D) of the Rockwell International Hot Lab (RIHL). The process of performing D&D operations is described in Detailed Work Procedures (DWP’s) and Operating Procedures (OP’s) that control the low level radioactive waste generation, packaging and shipping activities. These are listed in N001ERO00021, Application to Ship Radioactive Waste to the Nevada Test Site. The largest category of waste to be generated during the D&D of the RIHL is building rubble consisting of concrete and structural building components. Because the D&D operations are controlled by detailed process procedures, process knowledge and independent Quality Assurance (QA) oversight during packaging provides the assurance that no hazardous constituents are included in the low level waste (LLW) stream to the Nevada Test Site (NTS).

2.0 PROJECT DESCRIPTION

2.1 Program Objective

The objective of the program is to decontaminate the RIHL facility to radiation levels that allow release for unrestricted use. The remaining structure will then be demolished and the rubble sent to disposal as commercial waste. The D&D activities at the RIHL have been ongoing since 1989. Low level waste generated early in the program was shipped to the Nevada Test Site. Waste generated since the beginning of D&D operations has been shipped off site, held within the RIHL fenced boundary or held at the Radioactive Material Disposal Facility (RMDF) approximately 1/2 mile from the RIHL. Low level radioactive waste packaged prior to October 16, 1992, did not have a traveller and an independent Quality Assurance representative present during the packaging. LLW packaged without a traveller and an independent QA oversight is designated as "backlog" low level radioactive waste.

Steps have been taken during the D&D planning phase to prevent contamination of LLW with RCRA hazardous waste. A significant effort was performed to remove all laboratory chemicals and other hazardous materials/RCRA waste from the facility prior to the initiation of D&D operations. Confirmatory sampling and analysis is performed to verify the composition of transuranic (TRU) and Rescission, Conservation & Recovery Act (RCRA) hazardous waste streams designated for NTS. The cells and decon rooms were decontaminated by washing down using water without additives into the active RAL Waste System. Oils used in hydraulic equipment were changed to hazardous vegetable oil.
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To preclude contamination of NTS RA waste streams from outside sources, LLW packaging operations take place within radioactive control areas, either the RIHL Building 020 facility or the Radioactive Materials Disposal Facility. Prior to October 1992, low level waste packaging operations were performed per the procedures provided with the application to ship LLW to NTS. The packaging, closing and sealing of the waste containers were performed by trained Nuclear Operations Department personnel with overcheck by an independent person from the Health Physics (HP) Department and the RIHL Building 020 Facility Manager. A Lot Follower accompanied each container during packaging operations and provides a detailed listing of the items/materials placed in each container. The Lot Followers are signed by those persons involved in the packaging operations. Backlog waste containers referred to in this question were packaged and closed with lid closure clips prior to NVO-325, Rev. 1 implementation at RIHL. Containers were then transported to the RMDF for interim storage in a limited access radioactive materials storage area.

The RIHL Building 020 D&D operations are performed by one work group under a single manager. This is administratively easier to control than a multi-task facility thus minimizing the possibility of contamination of the waste streams from outside sources. Only RIHL radioactive waste is generated at Building 020. Currently, written procedures, independent inspection during load out, and tamper indicating devices are utilized to prevent contamination of the waste stream from outside sources. Waste containers are closed and sealed with tamper indicating devices before they are shipped to the RMDF for interim storage. The seals and tamper indicating devices are maintained in tact at the RMDF. If container opening or repackaging is required, this is performed in accordance with approved control procedures under the direct overview of an independent QA inspector.

In summary, the Quality Assurance controls in place at the RIHL to prevent contamination of the waste streams from outside sources include training of personnel, utilization of controlled access generation and storage areas, detailed work procedures for the generation or repackaging of waste, and operating procedures for the packaging of waste. Waste packaged from October 16, 1992, is under the overview of an independent QA inspector. Backlog LLW designated for initial shipment to NTS was verified to be free of hazardous waste by performing an inspection of 22% of the containers with an independent QA inspector and WCO present.

2.2 Description of the Site

The facility is a structurally reinforced concrete building consisting of four rectangular hot cells abutted by decontamination
rooms. Figure 2.1 shows the original facility layout. The outer walls establish a building boundary of ___ ft long by ___ wide. A vacuum is maintained on the building from the outer rooms to the inner cells by means of a blower and exhaust system that has prefilters and HEPA filters. This system is maintained during decontamination operations to prevent airborne radiological (RA) contamination from entering the outside environment. There is an interior Operating Gallery (Room 117) and a Service Gallery (Room 147) where D&D operations are staged, packaging of waste is performed, and interim storage is provided. There is a small RA Liquid Waste Storage building 468 within the fenced boundary of the RIHL that will also be included in the D&D efforts. It consists of sumps pumps, piping, structural steel and a 3000 gallon storage tank.

The hot cells and decon rooms are constructed of dense concrete reinforced with rebar. There are penetrations into the cells and decon rooms that will be removed by core drilling or jack hammering during D&D operations. Each cell has a vertical storage tube that extends from the cell floor to a depth of 12'-6" into the basement shield columns. All surfaces of the cells and decon rooms were clad with steel plate. Access into the cells is from the Service Gallery.
Figure 2.1 RIHL Building 020 Layout
3.0 IDENTIFICATION OF WASTE BY TYPE

3.1 Waste Stream Designation

Waste designated for shipment to NTS is divided into five waste streams that are described in the application, NOOIER000021. In summary, they are as follows:

Waste Stream BNRC-DD2000001

Solid building materials including concrete and rebar, stainless steel hoods, a General Mills remote manipulator, structural steel components, gear ring, steel ducting, butterfly valves, and soft trash from D&D operations.

Waste Stream BNRC-DD2000002

One large glovebox from Room 139 filled with plastic bags containing RA contaminated disposable clothing and compactible soft trash consisting of booties, plastic, rubber and paper.

Waste Stream BNRC-DD2000003

Solid asphalt, rock and small quantities of soil adhering to the underside of the asphalt.

Waste Stream BNRC-DD2000004

Internal wall plaster, stucco, wire mesh, steel wall studs, tubing, filters, and soft trash from D&D operations.

Waste Stream BNRC-DD2000005

General D&D waste consisting of concrete, steel rebar, piping, steel conduit, steel tubing, steel plate, steel ducting, electrical wiring, structural members, grit blast debris, vacuum cleaner dust, PVC plastic sheeting, and compactible soft trash from D&D operations.

3.2 Types of Waste Evaluated

3.2.1 Cleaning Agents

Cleaning agents were used to .......

3.2.1.1 Big Orange

3.2.1.2 Big K
3.2.1.3 Turco
3.2.1.4 Windex

3.2.2 Liquid Mercury
3.2.2.1 Liquid mercury was contained within a storage vessel at the RIHL and transported to RMDF for interim storage and disposition.

3.2.3 Filters
Filters from Room 139, the Hot Laboratory, within Building 020 where mechanical work was performed on RA contaminated equipment such as manipulators are contained in NTS Waste Stream 5. These filters are the same as the ones that we currently use as pre-filters for the negative air system and are also included in Waste Stream 5 because the entire bank including the support frame structure was removed from the room during D&D operations. The filters are Purolator Mark 80’s. The filtered media was room air.

3.2.4 Copper
Copper in the waste streams is in the form of tubing, solid wiring or motor components subject to exclusion from RCRA and Title 22 as scrap metal.

3.2.5 Complexing Agents
3.2.5.1 Electropolish
Power Kleen 500 (GJ-389 Descaler), a phosphoric acid/sulfuric acid complexing agent, was utilized early in the D&D process in an attempt to electropolish and decontaminate the inside of the cells/drain lines. The liquid RA waste was captured, segregated and stored in 5 and 30 gallon drums. These drums were overpacked with 55 gallon drums which are stored in the segregated mixed waste Building 621 at the RMDF. The piping system was flushed and rinsed with demineralized water to remove any acid residue. Upon rearmining during the D&D process, the inside of the pipe sections are visually verified to be dry when packaged as waste. The liquid mixed waste will be processed and disposed as a separate waste stream applicable to the current NTS application.

3.2.6 Chelating Agents
3.2.6.1 CST-92
The basic and most common chelating agents are used as industrially...
boiler scale inhibitors. The Building 020 heating system utilizes a closed hot water system which is isolated. The chiller system has closed cold water circulation which is isolated. Both systems are treated with CST-92, a 40% sodium nitrite solution with 1% sodium hydroxide and 5% sodium tetraborate additives. Sodium tetraborate is the chelating agent. It is not radioactive and the liquid will be disposed as RCRA hazardous waste near the end of the Building 020 D&D process. CST-92 is controlled by Plant Services (maintenance) personnel and is not stored at the Building 020 site. There are no bulk or containerized chelating agents on site at Building 020. The gas fired hot water heater for showers does not utilize chemical additives in the water box since it is a once through system. No chelating agents were used or are planned for use in the D&D activities.

3.2.7 Grit Blast Debris

3.2.7.1 Aluminum Oxide Grit

Cell and decon room walls were grit blasted with an aluminum oxide grit. The large shield doors from the cells and decon rooms will be grit blasted to remove surface RA contamination. RA grit blast waste will therefore be generated and packaged in accordance with the requirements of NVO-325, Rev. 1. No sampling of the material is planned since we have real time knowledge and control of the D&D material and process.

As per NVO-325, Rev. 1, and State of Nevada regulations, waste designated as hazardous in the state of generation will be considered hazardous if imported into the State of Nevada. The State of California regulates certain metals, such as aluminum, that are not regulated under RCRA. The metallic aluminum included in the NTS low level waste streams is not regulated as hazardous material by the State of California. Such regulations apply only to elemental metals in the form of finely divided or powdered material. The aluminum oxide grit blast is not considered a hazardous material in its product form therefore it is not considered hazardous in the waste form since its physical structure is not altered during D&D operations.

3.2.7.2 Black Silica Grit

3.2.8 Paint Chips

Paint chips are sampled and analyzed for lead content.
3.2.9 Water

RA contaminated water is generated during D&D concrete core drilling operations. Water also accumulates in the Building 020 sump and the Building 468 sump. This waste water is pumped into 55 gallon drums and transported to the RMDF for processing in the Water Evaporator. The Evaporator tank is cleaned annually and residue is packaged in 55 gallon drums stored at RMDF pending disposition.

3.2.10 Asbestos

3.2.10.1 Floor Tile

3.2.10.2 Duct Gasketing

3.2.11 Transuranics

The grinding and machining of uranium and transuranics (TRU) can create particles of the size that become pyrophoric and spontaneously combust. Grinding and machining operations involving uranium and TRU were performed within the Hot Cells of the RIHL Building 020. The decon rooms and cells were decontaminated early in the D&D process and no significant quantities of potentially pyrophoric materials were generated in NTS designated waste streams. During removal of the RA Drains System, small accumulations of TRU debris was found inside several sections of piping. This piping was size reduced and the chips were removed by emptying them into one gallon vented metal containers and packaged in shielded 55-gallon drums. 85 gallon vented TRU overpack containers will be purchased for this material which is not a part of the current NTS waste stream application. The piping packaged for NTS waste is visually examined and radiologically verified to be below TRU waste categorization limits (100 nCi/g).

3.2.12 Lead

Lead block shielding was removed from the facility. It was ..... 

3.2.13 Plaster

Sampling and analysis of the wall material included in NTS Waste Stream 4 were performed in January of 1993. The wall waste is a cement base stucco approximately 3/4" thick over wire mesh with a 1/8" thick plaster finish coat which was painted. The paint/plaster/cement matrix was sampled and analyzed for total lead. The analysis was performed by the Rockwell International on-site chemistry laboratory. The results verified that the wall matrix contains lead that is below the limit requiring a hazardous designation. In California, the regulatory limit is STLC - 5.0 mg/l and TTLC - 1000
mg/kg. The matrix sampled contained no detectable quantities for the STLC and from 0 to 21 mg/kg TTLC.

Plaster can produce fine particulates which could increase during handling and shipping. The plaster from Building 020 was applied over stucco cement as a cover layer approximately 1/8" thick and is tightly adhered to the cement. We do not believe that the particulate limits specified in NVO-325 will be exceeded during shipment. This waste is packaged in strong-tight metal containers with a lid gasket to prevent leakage meeting the requirements of NVO-325, Rev. 1, Section 5.5.1.1 (D). Since we are packaging the low level RA waste in gasketed metal containers, we do not intend to solidify the particulates.

3.2.14 Oils

3.2.14.1 Radioactive Oils

RA contaminated oils were processed in the RMDF Molten Salt Oxidation (MSO) unit. Residue from the processing is stored at the RMDF and is pending disposition.

3.2.14.2 RCRA Oils

Rotating equipment in the facility including air compressors and vacuum pumps require periodic oil changes. This work is performed by the Rocketdyne Plant Services (maintenance) employees since the oil is not RA contaminated. It is taken from the site at the time of removal from the equipment and processed as RCRA waste through the Rocketdyne Environmental Department.

3.2.14.3 Hydraulic Oils

Non-hazardous vegetable oil is utilized as hydraulic oil in mobile equipment being used during the D&D process. This includes a Bobcat loader/ram vehicle and ......

3.3 Objective of Sampling and Analysis

The objective of the sampling and analysis is to provide verifiable data utilizing analytical methods consistent with EPA requirements. This includes generating a completed chain of custody form for each sample and determining the weight percentage of solids in liquid waste. For the D&D operations related to the RIHL facility, sampling and analysis was performed to quantify levels of contamination in RCRA hazardous and RA mixed waste. The value of performing hazardous materials sampling and chemical analysis of general D&D waste such as concrete rubble and structural steel components is minimal and such
sampling is not planned for the RIHL D&D operations.

3.4 Utilization of Process Knowledge and Existing Analytical Data

3.4.1 Process Knowledge

Backlog waste was packaged utilizing detailed procedures prior to October 16, 1992, without independent QA overview. Environmental Department personnel reviewed the documentation for XX backlog waste containers. These containers were chosen based upon Lot Follower product descriptions. To verify correctness of the contents and that no prohibited materials were in the backlog waste containers, twenty-two percent (22%) were opened at the RMDF and inspected by the Rockwell International Waste Certification Official (WCO), an independent QA inspector and an Environmental Department observer. No anomalies or prohibited materials were found in any of the opened containers. This verification of the process knowledge indicated by the Lot Followers, is documented by Engineering Work Requests (EWR’s) and Lot Followers for those containers that were opened and the contents verified. The quality assurance process of backlog waste generation, packaging and verification to NVO-325, Rev. 1 requirements is described by Figure 2 of the RIHL NTS application.

Waste packaged since October 16, 1992, was performed in accordance with NVO-325, Rev. 1, with a written traveller and an independent QA inspector present during packaging. The detailed procedures utilized are listed in the application and is described by Figure 8 therein.

3.4.2 Existing Analytical Data

During March of 1991, laboratory analyses were performed on waste material stored at the RMDF some of which came from the RIHL. This is documented in 173TI000018, "Laboratory Analysis for RIHL (T020) Waste - CEP March 1991." The analysis consisted of TCLP’s and total lead. Waste material determined to be hazardous was segregated from LLW streams. Mixed waste (MW) containing both hazardous and radioactive constituents is segregated in Building 61 at the RMDF prior to treatment and/or disposal under the RMDF Part A Interim Status Permit.

Sampling and analysis of the wall material included in waste stream BNRC-DD20000004 were performed in January of 1993. The wall waste is a cement base stucco approximately 3/4" thick over wire mesh with a 1/8" thick plaster finish coat which was painted. The paint/plaster/cement matrix was sampled and analyzed for total lead. The analysis was performed by the Rockwell International on-site chemistry laboratory. The results verified that the wall matrix contains lead that is below the limit requiring a hazardous designation. In
California, the regulatory limit is STLC - 5.0 mg/l and TTLC - 1000 mg/kg. The matrix sampled contained no detectable quantities for the STLC and from 0 to 21 mg/kg TTLC.

3.5 Use of Results

The data generated in 173TI000018 is used as a basis for segregation of waste materials for RCRA regulated waste from the NTS LLW streams.

3.6 Sampling and Analysis Schedule

DNA

4.0 ORGANIZATION

See application.

4.1 Nuclear Operations

4.2 Quality Assurance

4.3 Environmental Department

4.4 Health Physics

5.0 DATA QUALITY OBJECTIVES

5.1 90 Percent Confidence Limit

5.2 Representativeness

5.3 Sampling Accuracy
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5.4 Sampling Precision

5.6 Method Detection Limit

5.7 Completeness

5.8 Comparability

6.0 SAMPLING PROCEDURES

6.1 Sampling Approach

6.2 Number of Samples

6.3 Sample Volume

6.4 Composting

6.5 Selection of Sampling Equipment

6.6 Sample Handling

6.7 Field Quality Control

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6.8 Documentation and Sample Custody

6.9 Analysis of Waste Samples

6.10 Analytical Quality Control

6.11 Data Reporting