

Building 771/774 Cluster Closure Project

Reconnaissance Level Characterization Report

Revision 2

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**RECONNAISSANCE LEVEL CHARACTERIZATION REPORT FOR THE 771 CLOSURE
PROJECT**

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1.0 INTRODUCTION:

The following information has been compiled to document a detailed walkdown, process knowledge and analytical based characterization of the 771/774 cluster. The 771/774 cluster consists of the main 771 and 774 buildings and all additions and structures attached to or immediately adjacent to buildings 771 and 774. This report has been prepared prior to the full deactivation of the facility to provide a reference that will be used to plan the deactivation and ultimate decommissioning of the 771/774 cluster. The report is divided into three primary sections, 1. A written description of the facility including its history and descriptions of the many materials processed, 2. Table 1 describing the process equipment and associated structures, and 3. Appendix A listing the process equipment and the known hazards with the levels or physical forms expected.

2.0 PURPOSE:

To establish a preliminary estimate of the type of contamination or safety hazard present.

The type and tractability of radiation and hazardous substances contamination and physical hazards will be evaluated.

This report will describe the presence of materials and isotopes that will be considered in planning the closure of the 771/774 cluster. The importance of the presence of these items is based on both worker safety and waste disposal/regulatory concerns. Each of the isotopes or materials has been identified through investigation of facility related documents, a thorough walk down of the facility, a review of historical data and process knowledge. The inclusion of the listed hazards is as complete as possible without delaying the creation of this document for the collection of additional empirical analytical data. The isotopes and materials of concern are contained in or are components of the process equipment and non-structural building systems or utilities. Residual contamination may also exist in the building structure. This Reconnaissance Level Characterization Report (RLCR) may be used as a basis to define the required sampling needed to support facility deactivation, decontamination and structural demolition. Additionally, the RLCR provides information to support ALARA (As Low As Reasonably Achievable) planning for the protection of the workers and environment.

The quantities and locations of Special Nuclear Material (SNM) described in this report are approximations based on field analysis. This analysis is affected by other equipment components in the vicinity of that which is being reviewed. These affects may produce error or increased uncertainty in the analytical result. Precise location of the hold-up is not known and it is expected that the hold-up is spread throughout tanks, gloveboxes, ventilation ducts and piping. The general quantities and location of the SNM is known well enough to plan its remediation. The specific information will not be known in some locations until physical entry is gained during deactivation and decommissioning. Much of the SNM described in this report is

manually unrecoverable and dispersed through out system components. This material may be in the form of sludge and scale, or is deposited in porous substrates. Enough information is available on the range and type of contamination and hazards present to bound the conditions and facilitate the planning for a safe and compliant remediation and waste management. This RLCR meets the required purpose of providing a summary level overview of the hazardous materials, contamination, and the hazards associated with the 771/774 cluster including the type, general location, and quantity. Specific information about these parameters will be determined when activities to remove the contamination and hazards are planned and carried out. The process for planing and conducting the work is discussed in the 771/774 cluster Decommissioning Operations Plan DOP. Intrusive measures such as dismantling equipment or systems is necessary to fully characterize some hazards, so full characterization will be deferred until deactivation or decommissioning activities begin in order to reduce worker exposure and too increase efficiency. Additional specific information regarding the presence of SNM in some locations is presently known however, it cannot be stated due to material safeguard and security reasons.

3.0 SCOPE:

The scope of this document is to gather enough characterization information to document the characterization of the 771/774 cluster at the reconnaissance level as described in the Rocky Flats Clean Up Agreement (RFCA) and Decommissioning Characterization Protocol (DCP). Additionally, this information will be used to support the generation of specific Job Safety Analysis and D&D Characterization Programs. The RCLR is compared against proposed decommissioning activities to determine if those activities are feasible and to identify the need for quantitative in-process sampling and analysis. The facility closure process comprises six discrete phases; Major Hazard Reduction, Equipment Removal, Building Decontamination, Utility Systems Shutdown, Building Demolition and Site Remediation. The RLCR provides information to better plan for those tasks necessary to complete these phases, with the most appropriate protection to workers and the environment.

4.0 REFERENCES:

- Basis For Operation Building 771 - Kaiser Hill LLC.
- Chew & Associates, History for Building 771 at the Rocky Flats Plant, April 1992 (ref. Contract No. 06S10044)
- Waste Stream Residue Identification and Characterization (WSRIC) for Building's 771 and 774
- Building 771 Chemical Control Database

5.0 TERMS AND ACRONYMS:

ACM - Asbestos Containing Materials.
ALARA - As Low As Reasonably Achievable
Am - Americium
Be - Beryllium
Bix - Benelex
Cd - Cadmium

CFC's - Chloro-fluoro-carbons
Cr - Chromium
DOE - Department Of Energy
DOP - Decommissioning Operations Plan
DQO - Data Quality Objective
EPA - Environmental Protection Agency
HASP - Health and Safety Plan
HEPA - High Efficiency Particulate Air (filter)
HCl - Hydrochloric Acid
HF - Hydrofluoric Acid
Hg - Mercury
HNO₃ - Nitric Acid
HVAC - Heating Ventilation and Air Conditioning
MFP - Mixed Fission Products
NDA - Non-Destructive Assay
OSHA - Occupational Safety and Health Agency
Pb - Lead
PCB - Polychlorinated Biphenyl's
PPE - Personal Protective Equipment
Pu - Plutonium
RFETS - Rocky Flats Environmental Technology Site
RLCR - Reconnaissance Level Characterization Report
RCRA - Resource Conservation and Recovery Act
SNM - Special Nuclear Material
TCE - 1,1,1 Tri chloro ethylene
TSI - Thermal Systems Insulation
WAC - Waste Acceptance Criteria
WMP - Waste Management Plan
UST - Underground Storage Tank
U - Uranium

Deactivation: The process of placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public and the environment until closure is complete. Actions include the draining and/or de-energizing of non-essential systems, removal of stored radioactive and hazardous materials and related actions. As the bridge between operations and closure, based upon facility-specific considerations and final disposition plans, deactivation can accomplish operations-like activities such as final process runs and also decontamination activities aimed at placing the facility in a safe and stable condition. Deactivation does not include decontamination necessary for the dismantlement and demolition phase of closure, i.e., removal of contamination remaining in fixed structures and equipment after deactivation. Deactivation does not include removal of contaminated systems, system components, or equipment except for the purpose of accountability of SNM and nuclear safety. It also does not include removal of contamination except as incidental to other deactivation or for the purposes of accountability of SNM and nuclear safety.

Closure: Takes place after deactivation and includes surveillance and maintenance, decontamination and/or dismantlement. These actions are taken at the end of the life of the facility to retire it from service with adequate regard for the health and safety of workers, the public and protection of the environment. For those buildings in which no deactivation occurs, the term includes characterization as well as the above activities. The ultimate goal of closure is unrestricted release, or if unrestricted use is not feasible, restricted use of the site.

Decontamination: The removal or reduction of radioactive or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning or other techniques to achieve a stated objective or end condition.

Dismantlement: The disassembly or demolition and removal of any structure, system, or component during closure and satisfactory interim or long-term disposal of the residue from all or portions of the facility.

Facilities: Buildings and other structures, their functional systems and equipment and other fixed systems and equipment installed therein; outside plant, including site development features such as landscaping, roads, walks and parking areas; outside lighting and communication systems; central utility plants; utilities supply and distribution systems; and other physical plant features.

Hazard: A source of danger (i.e., material, energy source or operation) with the potential to cause illness, injury, or death to personnel, damage to a facility or the environment without regard for the likelihood or credibility of accident scenarios or consequence mitigation.

6.0 BUILDING HISTORY:

This section provides a brief history of the Building 771/774 cluster, including significant abnormal occurrences. The processes and events described below provide a historical account of the contamination incidents attributing to the clusters current condition.

Building 771 which began operations in 1953, housed five major groups: Plutonium Recovery, Plutonium Special Recovery, Plutonium Chemistry, Plutonium Metallurgy Research and the Analytical Laboratory. Plutonium Recovery processed a variety of plutonium-bearing residues to recover as much plutonium as was economically feasible. Special Recovery Operations processed scrap metal and oxide residues containing elements and isotopes that could have otherwise contaminated or diluted the War Reserve plutonium stream. Plutonium Recovery research and development groups in Building 771 supported and developed methods for recovering, separating and purifying actinides. The Plutonium Metallurgy group assisted the design agencies and plant production in developing processes. Liquid and solid samples were received by, or prepared in, the Building 771 Analytical Laboratory. Samples were analyzed for plutonium, americium, uranium, neptunium and other radioactive isotopes. The laboratory was also used to analyze solutions for normality and for impurities present in the process streams.

As one means of identifying the hazards in the building, past incidents were reviewed. Most of the abnormal occurrences occurred during production. Hazards inherent in the production processes such as operating equipment and production volumes of various chemicals are no longer present. Also, modifications to the building and improvements in conduct of operations based on past incidents minimize the potential for reoccurrence of the major events and many of the less severe events.

A review of the Chronology of Incidents Reported in Building 771 is presented in Chew & Associates, *History for Building 771 at the Rocky Flats Plant*. Reports of radiological contamination and inhalation increased in the mid-1970s. This was due to better monitoring equipment and greater attention to monitoring of personnel. Additionally, some reportability limits were lowered. Beginning in the early 1980s, incidents of exceeding nuclear material safety limits began to appear as incident reports. Major incidents are summarized below, as extracted from the Chew Report and recent interviews with building personnel.

A large plutonium metal chip fire occurred in the Room 180 area in September 1957, seriously contaminating the entire area (metals laboratory and most of the building). One drain line from Room 180 went directly to the outfall (Walnut Creek) and may have led to contamination of the creek. Decontamination of the building (except Room 180) took approximately three to six months. Room 180 was sealed for approximately four years before it was decontaminated. Contamination remains under surface coatings in the Room 180 area (as well as other regions of the operational area of the building). Extensive renovations to the area were made in the late 1960s after completion of the decontamination efforts. The Zone I exhaust filters were modified to provide improved filter seals and to repair heat stress damage caused by the fire.

Floor drains in building 771 were sealed following the 1969 fire in Building 776. Some drains in Room 180 that had been contaminated during the 1957 fire were capped in that condition. The below grade piping in Room 149 is the only other verified contaminated piping in the floor slab.

Room 148 has been heavily contaminated several times. Several incidents have contaminated the room from floor to ceiling and wall to wall. Many incidents involved nitric acid solutions spills that etched the floor or walls. These areas could not be effectively decontaminated. After the removable surface contamination was removed, floors and walls were painted over and only fixed contamination remained.

Process equipment throughout Building 771 has been used to purify large quantities of plutonium. Contamination occurred frequently in all tanks, process piping and bag in/bag out areas. Due to glovebox ventilation pressure surges that forced liquid out of the criticality drain cups, drains occasionally overflowed. This has resulted in routine floor and room contamination.

In 1989, all plutonium operations were curtailed in place and there have been limited activities since this stoppage. Gloveboxes were cleaned and wiped-down and the HEPA filters were replaced during the initial curtailment. Although there has been no maintenance of glovebox windows gloves and bags have been replaced as necessary. The criticality drains on the gloveboxes have been inspected bi-weekly per OSR surveillance requirements. Except for Line 30, all criticality drains have been replaced by the new "J"- style drains.

There has been no major action to remove plutonium from the ventilation ducts; however, some Non-Destructive Assay (NDA) measurements and characterization activities have occurred. Some of the HVAC ducts contain hold-up that exceeds the plutonium contamination action limits (400 grams per duct run). The planned valve gasket replacement from Teflon™ to Gycon™ was not finished.

Process valves have not been operated and may leak when used. The cooling water supply and return system has been in limited use and the steam supply system has only been used to supply heat to the building. The plant air has been used for HVAC controls and valve manipulations and the inert air supply system has not been used since the curtailment.

The following buildings and structures presently make up the 771/774 cluster.

<u>Building/Structure #</u>	<u>Description</u>
262	Diesel Fuel Tank
714	Hydrofluoric (HF) Storage Shed
714A	Hog shed
714B	Emergency Breathing Air Station
715	Emergency Generator
716	Emergency Generator
717	Sampling Shed
728	Process Waste Pit - UST
770	Maintenance and offices
771	Pu Operations
771A	Corridor F Office Area
771B	Carpenter Shop
771C	Nuclear Waste Packaging/Drum Counting
772/772A	Fluorine/Acid Storage Building
773	Guard Post
774	Pu Waste Treatment Facility
775	Sanitary Lift Station
T771A thru H, J thru L	Various Trailers

7.0 PREVIOUSLY PREPARED FACILITY CHARACTERIZATION

During the facility operating and recent risk reduction periods, data has been collected to gain a better understanding of the risks present in the 771/774 cluster. This includes management of known and suspected asbestos materials and the determination of SNM hold-up in many parts of the facility. This data has been collected in accordance with approved procedures and records are maintained by the facility management. Other significant information such as the facility Waste Stream Residue Identification and Characterization (WSRIC) exist and shall be reviewed when planning closure activities.

8.0 EVALUATION OF THE SYSTEMS

Protocols for the assessment and identification of characterization data have been defined. Specifically "Data Quality Objectives" (DQO) as defined by the US Environmental Protection Agency (USEPA), are designed to promote a process to efficiently prepare characterization programs. A similar process was utilized in the preparation of this report.

The USEPA defined the DQO process as: *Qualitative and quantitative statements derived from the output of each step of the DQO process that clarify study objectives, define the appropriate type of data and specify the tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.* (USEPA QA/G-4, 1994). A more detailed explanation of the EPA DQO process and the need for additional sampling is covered in the Building 771 Decommissioning Operations Plan (DOP).

Assessment of the 771/774 cluster gloveboxes and other process systems for the composition of this report included the following process. Each of the established work sets¹ were evaluated and a list of known and expected contaminants was recorded. To perform this assessment decommissioning experience and other factors such as process knowledge and engineering evaluations were used. Investigations conducted during walkdowns of the facility have yielded additional observations and the identification of potential hazardous contaminants. Each of these contaminants present the need for worker safety controls and have regulatory standards and limits applied to handling and disposal.

It is known from decommissioning experience gathered at Rocky Flats and other DOE and commercial nuclear facilities that common building materials and normal maintenance items contain materials that are presently considered to be hazardous to both workers and the environment. An example is: Thermal Systems Insulation (TSI) installed on equipment prior to 1977 was commonly fabricated with asbestos

¹ The 771 facility has been divided into approximately 80 discrete units or work sets. These sets are made up of individual process lines or specific room(s) in the 771/774 facility cluster.

fibers. Additionally lead was commonly used in the manufacture of paint and it is expected that most of the painted surfaces for buildings of this era contain lead.

The presence of a particular hazard in many cases is a yes or no fact and the establishment of specific levels may not impact work planning.

Example: Lead shielding in the form of plate, lead lined gloves and leaded glass windows are present on many of the glove boxes and tanks. Lead will require special handling, disposal requirements and safe work instructions for the removal of lead plate gloves and glass will have to be evaluated prior to commencing work activities. These forms of lead can be adequately quantified in place; i.e. dimensions/volume of the plate and glass, number of gloves (a known standard quantity of lead per glove must be previously established). The regulatory limit for elemental lead is 5mg/L and any substance containing greater than this amount is classified as EPA waste code D008

In cases where the measurement of specific levels or quantities are needed as determined by the specific Job Safety analysis, an evaluation will be performed before each deactivation or decommissioning activity is performed. These hazards are primarily those where Personal Protective Equipment (PPE) and engineering controls are established and adequately protect the worker, but quantification of the hazard in the waste stream is required. Sampling will be conducted in accordance with established protocols such as EPA SW-846 and the Rocky Flats Radiological Controls Manual.

Example: Chromates are expected to have been included in cooling water and water wall shielding systems. Typical applications utilizing chromates as a corrosion preventative have resulted in regulated levels of chromium metal in the waste stream so it is likely that chromates will be found in cooling water systems. Concerns as to the presence of this material as a worker safety issue can be managed through the use of proper PPE, however it must be further evaluated to quantify the waste stream. The EPA has established sampling and analysis method 6010 to evaluate the presence chromium in substances. The regulatory limit for chromium is 5mg/L and any substance containing greater than this amount is classified as EPA waste code D007.

Consideration of the potential for additional hazards that have been generated in place during the period that the facility has been shut-down must be performed. These hazards include the formation of reactive acidic salts, hydrogen gas and the in-growth of americium yielding an increase in gamma radiation. Many of these new hazards have similar characteristics to their predecessor or parent chemicals

and thus the PPE and engineering controls utilized may be sufficient. The potential for new unrelated hazards is also possible and must therefore be considered. New PPE requirements and engineering controls will be developed as these hazards are evaluated. Here the Rocky Flats Integrated Safety Management (ISM) program becomes important in evaluating the proposed work scopes to investigate the potential for these hazards. ISM sets priorities to do the work as safely as possible, and integrate the infrastructure programs which already exist. Rocky Flats programs such as Radiation control, Waste stream Identification, and building specific programs such as Beryllium investigations are all reviewed to insure that the work planning takes into consideration all hazards associated with the work. In the ISM process 5 functions have been defined; 1. Define the Scope of Work, 2. Identify and analyze the Hazards, 3. Identify and Implement controls, 4. Perform the Work, and augmenting 1-4 with 5. Feedback generated from both the workers, and the work process. Insitu production of a few hazards and contaminants has been previously observed and this experience will allow for contingency planning.

Example: Hydrogen gas has been found in piping systems where oxalic acid corrosion of the stainless steel pipe combined with the introduction of nitric acid has occurred. The resulting chemical reactions have the potential to produce both hydrogen and nitrous oxide gases. Therefore the tap and drain operations are utilizing equipment such as explosion proof pumps and non sparking tools to access the pipe lines.

Therefore the characterization objectives for the RLCR are: 1) can an estimate of the type and presence of a contaminant of concern be established from what is known today and 2) is further evaluation necessary to meet worker safety and waste disposal requirements?

Where discreet analytical data are not needed to support current planning goals, the sampling may be deferred. As deactivation of the B771/774 cluster progresses, there will be changes in both the physical and chemical constituents. Ongoing facility programs such as Tap and Drain and the SNM Removal programs will affect the characteristics of the building and equipment components. These ongoing programs have already performed various evaluations of the process systems and will also conduct sampling activities to support project goals. Current information such as the confirmation of the presence of liquids in process piping has been performed. Ongoing actions to drain these liquids will change the characteristics that affect subsequent piping and associated equipment removal.

Further assessments look towards the consideration that all likely contaminants have been identified. This concern relies on the existing WSRIC profiles to identify all contaminants in process waste streams. If the contaminant exists in a waste stream resulting from the operation of the process line, then it is assumed that the specific contaminant is present in the system today.

Example: Chromium was found in the sand, slag and crucible waste streams. This contaminant has been identified in various sets and any residual materials in the systems are expected to contain regulated quantities. The EPA has established sampling and analysis method 6010 to evaluate the presence chromium in substances. The regulatory limit for chromium is 5mg/L and any substance containing greater than this amount is classified as EPA waste code D007

9.0 BUILDING AND MATERIAL BREAK-DOWN:

The 771 facility has been divided into approximately 80 discrete units or work sets. These sets are made up of individual process lines or specific room(s) in the 771/774 facility cluster. The materials identified as items that are of concern in the characterization process are those that pose a threat to the safety of the workers and/or the environment. These hazards identified in each of the defined building sets are those items that may be present in the fixed process equipment and non-structural building components or utilities. This characterization effort makes no assumptions of those chemicals or radionuclides that may be held-up in the building structural components/concrete. Various inventory data has been obtained to support earlier building characterization and management programs. (Ref. section 4.0). These include the insitu evaluation of SNM hold-up in process piping and vessels and the identification of asbestos containing materials. A brief description of each of the 771/774 cluster work sets are shown in Table 1 of this report.

10.0 ISOTOPES AND MATERIALS OF CONCERN:

The building 771/774 cluster contains various chemicals and isotopes that will impact building closure and waste disposal actions. These two factors, worker safety and waste disposal, are guided by federal regulations and disposal site limits. Table 2 lists these hazards of concern and associates each hazard and its expected physical forms with a level of concern. The levels of concern are derived from factors including familiarity with handling or processing of the materials, and the expectation that some unknowns may exist. The table 2 levels of concern have been evaluated by both Health and Safety and Engineering personnel to examine the types of hazards present in the 771/774 cluster, and define the levels or physical forms that will require enhanced safety and engineering measures to deactivate and decommission the facility.

Example: Metallic oxides are typically in a finely divided powder like form. These powders are difficult to control and have a propensity to become uncontrolled airborne particulate in normal atmospheres. Therefore oxides such as radioactive plutonium oxide, or hazardous lead oxide are considered a High level of concern. Conversely metallic oxides suspended in solution do not present a substantial airborne problem and solid, clad and containerized metals present lessor concern.

Table 3 describes the regulatory limits for many of the EPA regulated chemicals and hazardous metals. Not all of these materials have been identified as being associated with the 771/774 cluster, however this information has been included here for reference. Table 2-2 of the RFETS Radiation Control Manual describes the Rocky Flats Environmental Technology Site limits on the radioactive materials. These limits are established for worker safety and release to the environment. Finally Appendix A of this report, reviews each of the major components of the 81 work sets, and defines the specific hazards and levels of concern for each of those items. Additionally appendix A lists some of the materials or physical forms which have not been identified but may be present in the specific systems.

Americium - Isotopes of americium metal and oxides were processed in certain areas of the 771 facility. Americium is produced through the normal decay of Pu and in many cases is a contaminant of the plutonium production stream. Am is considered a global (building wide) contaminant associated with plutonium contamination.

Plutonium - Isotopes of plutonium metal and oxides were processed in many areas of the 771 facility. Many areas where unclad plutonium was stored or processed were involved in flood and fire situations leading to contamination of most of the facility and equipment. The manufacture, processing and handling of plutonium metal and its oxides throughout the 771/774 cluster has led to contamination of many parts of the facility. Plutonium is also considered a global contaminant.

Uranium - Isotopes of uranium metal and oxides were processed in a few areas of the 771 facility. Additionally uranium has been identified as a contaminant in feed and analytical solutions, leading to its presence in many of the 771/774 cluster process lines. Where uranium was identified as a component of a process it is considered a contaminant of concern. Its presence represents a minor component of the radionuclide inventory.

Mixed Fission Products (MFP)- Fission products such as Cs¹³⁷, Co⁶⁰, Sr⁹⁰, etc. are present in some areas of the 771 facility. These isotopes were introduced in special operations and were not part of the normal production/mission of 771/774 cluster. The source of these isotopes is a result of the production of plutonium at other DOE sites. These isotopes are impurities in the production grade plutonium stream. Residual MFP contamination can be found in a few isolated areas of the facility.

Special Nuclear Material - SNM hold-up has been selected as a special concern due to disposal requirements and handling concerns. Concentrations of SNM such as Pu239, Am241 and U235 holdup are present in process lines, equipment and the building structure. In situ characterization of the SNM hold-up is presently being performed and is currently estimated to be in excess of 75 kilograms. Additional characterization data is being collected and should be consulted for proper closure planning.

Polychlorinated Biphenyl's - Items containing Polychlorinated Biphenyl's (PCBs) in excess of the EPA regulatory limit of 50 ppm have been identified in a variety of sources. EPA issued a proposed rule [Ref: Federal Register 12/6/94 62788 - 62887] amending the PCB regulations. The Agency acknowledged the potential for the presence of PCBs in a wide variety of materials including:

- Gaskets
- Small rubber parts
- Caulking
- Ceiling tile coatings
- Plasticizer
- Electrical components
- Paints
- Plastic
- Roofing/siding materials
- Adhesive/tape
- Electrical cable insulation
- Lighting equipment

Asbestos Containing Materials (ACM) - ACM in the forms of Thermal Systems Insulation and non-friable forms such as Transite and floor tile is present in many areas of the facility. Asbestos is regulated in accordance with the Toxic Substance Control Act 40CFR761 and OSHA 29CFR1926.1101. Asbestos has also been identified in many commercial materials including:

- Gaskets
- Roofing/siding materials
- Floor tile and mastic
- Pipe/duct insulation
- Window caulking
- Ceiling tile
- Lab counter-tops
- Equipment brakes

Current ACM management practices have identified many locations where ACM exists. Additional characterization data is being collected and should be consulted for proper closure planning. Consideration of asbestos as a contaminant of concern for select building materials and insulation installed prior to 1979 has been made.

Benelex - Benelex is a brownish masonite like material. On its own benelex is relatively inert (non-flammable) however multiple approximately. 0.375" benelex sheets have been glued/laminated together to increase shielding capabilities. The glues used to laminate the benelex sheets are highly flammable and virtually inextinguishable. Benelex is used as shielding on many gloveboxes and surrounding tank farms.

Lead - Elemental lead has been used as shielding on many gloveboxes and components in the 771/774 facility cluster. Additionally lead is present in many other materials such as dry-box gloves, leaded glass glovebox windows, brass and items such as fire suppression systems. Lead metal wastes and residues are regulated in accordance with EPA 40CFR261 and OSHA 29CFR1926.62.

Chromium - Chromium is expected to be present in some of the B771 processes as a result of impurities in feed and analytical solutions. Chromates also exist in solutions for cooling and shielding systems. Chromium is regulated in accordance with EPA 40CFR261.

Cadmium - Cadmium is expected to be present in some of the B771 processes as a result of impurities in feed and analytical solutions. Cadmium has also been recognized as a constituent of paint and plated surfaces. Cadmium is regulated in accordance with EPA 40CFR261.

Mercury - Mercury is known to be present in older electrical components and thermal instrumentation. Mercury contamination resulting from past mercury spills is not currently considered a contaminant of concern since it is expected that those spills were properly remediated. Elemental mercury wastes and residues are regulated in accordance with EPA 40CFR261.

Beryllium - Again the limited presence of beryllium can be associated with special operations in certain areas of the 771/774 cluster. Wide spread contamination associated with Be is not expected. Beryllium contamination in the 771/774 cluster has been evaluated and described in the site beryllium characterization report.

Acidic Characteristic - Acids including Hydrochloric (HCl), Nitric (HNO₃) Sulfuric (H₂SO₄) and Hydrofluoric (HF) were used in the facility production processes. It is expected that radionuclide bearing acid solutions are present in piping and vessels in the facility. Additionally, salts and other residual materials from the acids are expected to be present. Acid wastes meet EPA characteristic (corrosive) properties where the pH is <2.0.

Basic/Caustic Characteristic - Caustic chemicals (pH > 7) such as potassium hydroxide (KOH) and sodium hydroxide (NaOH) were used to neutralize acidic solutions. It is expected that radionuclide bearing caustic solutions are present in piping and vessels in the facility. Caustics with a pH > 12.5 are regulated in accordance with EPA 40CFR261.

RCRA classified waste solvents - 1,1,1Tri chloro ethylene (TCE) and other solvents were used in the 771 facility. These chemicals were used for their solvent properties therefore any waste resulting from their use is regulated. Containers of unused solvents could be found in the facility during the closure process. Solvents as defined in EPA 40CFR261 including the listed and characteristic solvents are present in 771.

Oil - Oils such as hydraulic and machining oils were used in many areas of the 771 facility. Many reservoirs of the process equipment still contain oils, greases and other petroleum lubricants. Waste halogenated oils and resulting waste are regulated as hazardous wastes. Also see PCB's

Chloro-fluoro-carbons (CFC's) - CFC's such as freon are primarily present in cooling and refrigeration units. Additionally, it has also historically been used as a cleaning solvents. CFC's are known to be present in some facility HVAC equipment.

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
1	<p>Corridor B Office Area - This set includes all of Corridor B and Offices 116, 117, 117A, 118, 118A, 119, 119A, 119B, 119C, 119D, 124, 125, 125A, 125B, 125C, 125D, 125E, 126, 126A and 126B. Room 116 contains the connection point to the plant fiber optics system. Asbestos containing materials are expected to exist in building components such as wall board, thermal systems insulation and solid surfacing components.</p>	ACM
2	<p>Corridor F Office Area - This set includes Room, 103, 104, 105, 105A, 105B, 107, 109, 110, 110A and 110B, Corridor F, Criticality Panel and walls. Asbestos containing materials are expected to exist in building components such as wall board, thermal systems insulation and solid surfacing components. CFC's exist in window air-conditioners.</p>	ACM, CFC's
3	<p>Locker Room Area - This set includes both the Men's and Women's locker rooms, the janitor's closet and the laundry cage in the Men's locker room. This equipment consists of lockers, benches and plumbing fixtures. Asbestos containing materials are expected to exist in building components such as wall board, thermal systems insulation and solid surfacing components.</p>	ACM
4	<p>129 Maintenance Area - this set includes Room 129, 129A, 129B, 129C, 129D, 129F, 130, 131, 132 and 132A; Dock 2; machine tools; wall; and roof. Asbestos containing materials are expected to exist in building components such as wall board, transite, Thermal Systems Insulation (TSI) and solid surfacing components. Lead shielding was machined and formed in the maintenance area. CFC's such as freon was used for refrigerant in Air conditioners and was stored in the Maintenance area. PCB's may exist as a result of historical storage of electrical components.</p>	ACM, Pb, CFC's, PCB's
5	<p>Room 141 - This set includes Room 141, concrete pedestals, concrete walls and presents a significant Pu contamination problem Room 141 was</p>	Pu, U, Pb, Acid

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18

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	<p>an SNM storage vault and then a pump room. Operational problems with the pumping operation on Room 141 resulted in radionuclide bearing acidic solution spills that contaminated the concrete floor and pedestal. The contamination occurrences were so great that the operation was eventually phased out. Subsequent remediation actions to remove the contaminated concrete resulted in high airborne concentrations of Pu and the room was eventually sealed. Lead shielding existed during the pump operation period. It is expected that acid spills may have deposited lead contamination in the concrete structures. It is estimated that several grams of SNM hold-up are present in the concrete and room structures.</p>	
.6	<p>Room 114 Glovebox 1 - This set includes Glovebox 1, Tanks D-705, D-706, D-713, D-714, D-715, D-716, D-764 and D-765, piping and valves. Glovebox 1 was used to precipitate Am for solution and is highly contaminated. Am is a contaminant of the Pu process. Glovebox 1 was used to purify the Am stripped from the Pu processes. Pu and Am contamination exists as a result of the processing and several grams of SNM hold-up exists in this system. Lead shielding such as plate, gloves and leaded glass windows are present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed lines to the process. Oxalic acid was used in the precipitate process. Additionally, ammonium thiocyanate was used as a reagent chemical in the process. Residual quantities of these chemicals may exist.</p>	<p>Pu, Am, SNM, ACM, Pb, Acid, Base</p>
.7	<p>Room 114 Glovebox 2 - This set includes Glovebox 2, piping and the shielded drum storage area on the south wall of Room 114. Glovebox 2 was used for Pu metal dissolution and other miscellaneous processing. Pu contamination in this system is a result of the purpose of the system itself,</p>	<p>PU, U, SNM, ACM, Pb, Acid, Base</p>

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	several grams of SNM hold-up exist in the dissolution system. The dissolution process included the use of acid. Lead shielding such as plate, gloves and leaded glass windows are present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. Small quantities of U was processed in this system in the 1960's and should be considered when planning removal actions.	
8	Room 114 Glovebox 3 - This set includes Glovebox 3, vault storage areas and hot tool storage cabinets. Glovebox 3 was the dissolution line for Plutonium Oxides. Plutonium oxide was dissolved in heated acid and residual contamination including multiple kilograms of SNM holdup exist. Lead shielding such as plate, gloves and leaded glass windows are present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process.	Pu, SNM, ACM, Pb, Acid.
9	Room 114 Gloveboxes 4, 5A, 9A and 22 - This set includes Gloveboxes 4, 5A, 9A and 22; tanks D-6 and D-967, piping, valves, motors and control panels. Gloveboxes 5A and 9A contain vacuum pumps for lines 16 & 5. Glovebox 4 contains a blower for the pneumatic transfer system. Oil is expected to be contained in equipment reservoirs and lubricated components. Gloveboxes 5A and 9A are both H4 Nash vacuum systems. Pu bearing acidic and basic solutions were drawn into the vacuum systems. Nash vacuum pumps utilizes a water based seal liquid that was also passed through a heat exchange system. Asbestos in the form of thermal systems insulation is expected to be present on the heat exchange system. Glovebox line 22 was used to burn Pu metal chips to produce oxide. Be metal coatings may have existed with the Pu. Several hundred grams of SNM hold-up are known to exist in these gloveboxes. Lead	Pu, SNM, ACM, Pb, Be, Acid, Oil

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
10	<p>shielding such as plate, gloves and leaded glass windows are present.</p> <p>Room 114 Glovebox 5 - This set includes Glovebox 5, Tanks D-548, D-549, D-550, D-551, D-552, D-609 and D-610. This system was a hot nitric acid spray leaching system used to remove (leach) metals from Pu objects and fixtures. U and Be metals were removed from Pu components through acid dissolution. There are 3 spray leach hoods 2 FulFlo filters and a heat exchanger. Multiple kilograms of SNM hold-up exists in process lines and equipment. Asbestos in the form of thermal systems insulation is expected to be present on the heat exchange system. Benelex and lead shielding is present on this glovebox. Oil is expected to exist in equipment reservoirs.</p>	Pu, U, SNM, ACM, Bix, Be, Acid, Oil.
11	<p>Room 114 Gloveboxes 6, 7, 7A - This set includes Gloveboxes 6, 7 and 7A; Tank D-7; cinderblock shielding walls; electrical control panels; pumps; piping and valves. Glovebox 7A contains the Nash Vacuum pump for lines 6 and 7. Glovebox contains the Hydrofluorinator and Glovebox 6 has the Flourinator Hydrofluorinator Scrubber. The main feed for this system consisted of Pu bearing solids resulting in contamination of the process system. Multiple kilograms of SNM hold-up exists in these systems. Hg may be present in analytical instruments. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Oils are expected to be present in equipment reservoirs. KOH (potassium hydroxide a basic solution) was used to scrub the acidic off gasses from the hydrofluorinator.</p>	Pu, SNM, ACM, Pb, Acid, Oil Base, Hg
12	<p>Room 114 Gloveboxes 8, 8E, 9 - This set includes Gloveboxes 8, 8E and 9, piping and valves. These were used for storing calcined Pu oxide.</p>	Pu, SNM, Pb

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	Containers were moved by pneumatic transfer from other process lines to these boxes for storage of Pu oxide. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Multiple kilograms of SNM hold-up exist in the transfer lines and filters.	
13	Room 114 Gloveboxes 11, (New) 14 - This set includes Gloveboxes 11 and 14 (new), Tanks D-507, D-508, D-509, D-510, Glovebox 11 was used for evaporating Pu nitrate solutions. Equipment used in this process includes tanks, pipes, pumps, evaporator and condenser. Pu contamination exists as a result of the operation of this process, several hundred grams of SNM hold-up exists. Acids may exist in process piping and vessels. Mercury may be present in analytical instruments. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. CFC's may be present in process cooling equipment. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Oils are expected to be present in equipment reservoirs.	Pu, SNM, ACM, Pb, Acid, Oil, CFC, Hg, Cr
14	Room 114 Glovebox 12 - This set includes Glovebox 12, valves, piping, Tanks D-949, D-950, D-951, D-952, D-953, D-954, D-955, D-546, D-547, D-553 and D-554. Also included is shielding wall around the tank farm. Pu nitrate from various sources was stored in these tanks. The glovebox was used as a sampling station for those tanks listed above. Benelex and lead shielding around the tanks and gloveboxes is present. Pu contamination is present in all of the tanks, piping and the glovebox.	Pu, Pb, Bix, Acid
15	Room 114, Glovebox 13 and (Old) 14 - This set includes Glovebox 13 which is attached to Glovebox Old 14 and Tanks D-500, D-501, D-502, D-503, D-504, D-505, D-506, D-507, D-508, D-509, D-510, D-544 and D-545. Also included is a shielding wall around the tank farm and piping in	Pu, SNM, U, ACM, Bix, Pb, Acid, Oil, Cr.

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	<p>the overhead.</p> <p>Glovebox 13 is a piping manifold system used for batching solutions for the precipitation process. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Various contaminants of concern associated with other processes in B771 are also expected to be present. Several hundred grams of SNM hold-up is present in this system. Glovebox 14 (old) contains a steam heated evaporator used to concentrate plutonium solutions for batch processing. Nitric acid Pu bearing solutions were the primary feed for this process, several hundred grams of SNM hold-up exists in process equipment. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Additional benelex shielding is present on the glovebox and surrounding the associated tank farm. Oils are expected to be present in equipment reservoirs. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process.</p>	
16	<p>Room 114 Gloveboxes 15 and 16 - This set includes Gloveboxes 15 and 16, electrical control panels, pumps, piping and valves. Glovebox 15 was used for Pu peroxide precipitation and Glovebox 16 was used for calcination of plutonium peroxide to Pu oxide.</p> <p>Glovebox 15 is a purification step for solutions from high level dissolution. This process uses tanks, pumps, pipes, various filters, vessels and a precipitation digester. Pu contamination in this system is a factor of the purpose of the system itself. Several hundred grams of SNM hold-up exist in line 15 equipment. Acids including nitric and sulfuric were used in this process. Oils are expected to be present in equipment reservoirs. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Asbestos in the form of thermal systems insulation is expected</p>	Pu, SNM, Pb, Acid, Oil, CFC's

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	<p>to be present on process equipment and steam heat feed to the process. CFC's are present in the precipitator digester cooling systems. Glovebox 16 removes excess nitric acid moisture from the Pu peroxide cake formed in the precipitation process. The process uses a screw feeder, rotary tube calciner, scrubber, filter, hot plate, scale and transfer system. Pu contamination in this system is a factor of the purpose of the system itself. Multiple kilograms of SNM hold-up are present in the line 16 systems. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process.</p>	
17	<p>Room 114 Glovebox 17 - This set includes Room 112 and 114B, Glovebox 17, two motor generator sets, ovens and control panels. This set contains the glovebox system for Reduction and Burton Break Out. This glovebox system was inerted with nitrogen when it was operational. The process was to convert Pu tetrafluoride to Pu metal. Several hundred grams of SNM holdup exist in the glovebox and associated equipment. This process resulted in contamination of the process components. Additional operations included machining of the Pu metal to collect QA samples. Oils may exist as cutting fluids or in equipment reservoirs. Lead in the form of shielding of the glovebox walls, gloves and windows is present.</p>	Pu, SNM, Pb, Oil, Cr
18	<p>Room 114A Glovebox 18 - This set includes Glovebox 18; Tanks D-70, D-71, D-72 and D-73; motors; pumps; piping and valves. Glovebox 18 contains two H6 high volume Nash Vacuum pumps to produce negative pressure to transfer radionuclide bearing acidic solutions. This is commonly known as the "House Vacuum System". Pu and U contamination of the pumps and the glovebox is a result of system</p>	Pu, U, ACM, Pb, Acid, Oil

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	operation. Oils such as lubricants exist in process equipment. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. Lead in the form of shielding on the glovebox walls, gloves and windows is present.	
19	Elevator Area - This set includes Rooms 142, 145 and 242; electrical control panel; elevator cage and hydraulic unit. The presence of oils is expected in equipment reservoirs and as a lubricant on machine parts.	Oil
20	Annex Area - This set includes Rooms 301, 302, 303, 304, 305 and 306. Drum counters and scales; exhaust fans and motors; interior walls and doors. Oils in the form of lubricants on equipment and other machinery exist. Fixed radionuclide contamination is present as a result of past operations. Lead shielding is present in the material storage areas.	Pu, U, Am, Pb, Oil
21	Room 149 Process Room and C-Cell - This set includes the Contamination Control Cell and Air Handling Unit. Radionuclide contamination exists on exposed surfaces of the contamination control cell as a result of past operations.	Pu, U, Am
22	Room 149 Gloveboxes 33, 37, 38 and 39 - This set includes Gloveboxes 33, 37, 38 and 39 and Tanks D-5, D-176, D-177. This system was used to incinerate Pu contaminated combustibles. Glovebox 33 is a caustic fume scrubber filtration system. It is expected to contain residual radionuclide bearing acids and bases remaining from operations. Lead in the form of leaded glass glovebox windows and lead lined glovebox gloves is present. Several grams of SNM hold-up exist. Chromates are expected to be present in the cooling water system. Glovebox 37 is the incinerator glovebox. Radionuclide contamination is a result of the incineration of contaminated scrap combustibles. Multiple kilograms of SNM hold-up is present. Mercury is expected to be contained	Pu, U, SNM, ACM, Pb, Hg, Acid, Base, Oils, Cr

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
23	<p>in analytical equipment and instruments. Asbestos in the form of firebrick, insulation, gaskets and transite is present. Lead in the form of lead plate shielding, leaded glass windows and lead lined gloves exists.</p> <p>Glovebox 38 contains a milling and grinding operation to pulverize radionuclide bearing ash from the incinerator. Several hundred grams of SNM hold-up is present. Oils in the form of lubricants exist on the grinding and material transfer equipment. Asbestos containing fireproofing materials are present. Chromates are expected to be present in the cooling water system.</p> <p>Glovebox 39 contains a H4 Nash vacuum system to provide negative pressure for the Glovebox 33 scrubber system. This system is contaminated as a result of operation. Chromates are expected to be present in the cooling water system.</p>	Pu, SNM, ACM, Pb, Acid, Cr, Base, Oil
	<p>Room 149 Gloveboxes 23, 24 and 25 - This set includes Gloveboxes 23, 24 and 25; Tank D-928; shielding wall; piping and valves. Gloveboxes 23, 24 and 25 were used as cascade dissolver lines. Glovebox 24 "High Level Dissolution" dissolves high gram value Pu Oxides. Primary feed for this system was impure oxides and fluorides from in house operations. Gloveboxes 23 and 25 "Low Level Dissolution" dissolves high impurity/low Pu content residues to recover Pu in two identical process lines. Pu bearing materials processed in these lines has led to Pu contamination through out the gloveboxes and the high potential for SNM hold-up in the process equipment. Multiple kilograms of SNM hold-up is contained in these systems. Acids were present in each of these systems as the primary method of dissolution is in acid dissolvers. Caustic solutions of Potassium Hydroxide were used to control the acidic solutions. Lead in</p>	

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
24	<p>the form of shielding of the glovebox walls, windows and gloves is present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. Chromates are expected to be present in both water-wall shielding and cooling water systems. Lubricating oils were also present on the mechanical equipment. Additionally the feed materials sand, slag and crucible wastes have exhibited regulated levels of Chromium metal.</p> <p>Room 149 Glovebox 26 - This set includes Glovebox 26, Tanks D-979, D-980, Scrubbing Towers and D-982, piping, valves, pumps and motors. Glovebox 26 contains the Fume Scrubber recalculation pumps for recalculation KOH through the scrubber towers to scrub fumes from dissolution off gas systems and evaporator off gases. Asbestos insulation on steam and cooling water systems is present. Oil lubricants are present on equipment and within reservoirs. Acids and bases are contained in system piping. Chromates are expected to exist in cooling water piping. The cooling water refrigeration system contains CFC's.</p>	Pu, ACM, Acid, Oil, Base, Cr, CFC's
25	<p>Room 149 Glovebox 27 - This set includes Glovebox 27, storage racks and non load bearing walls. This was a former SNM staging area for materials to be counted for Pu value. Leaded glass windows and lead lined gloves are present on GB 27. Additionally lead shielded containers are present.</p>	Pu, Pb
26	<p>Room 149 Glovebox 29 - This set includes Glovebox 29 and Tanks D-360, D-361, D-362, D-363 and D-364, piping and valves. Glovebox 29 was a laboratory waste processing glovebox with a chloride ion exchange. Glovebox 29 "Cation Exchange" processed radionuclide bearing chloride solutions from various site sources. This process involved ion exchange to separate out the Pu content and the resulting Pu bearing nitric acid elute</p>	Pu, U, Am, SNM, ACM, Pb, Cr, Acid,

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
27	<p>was then compatible with the remainder of the B771 processes. Pu contamination in this system is a factor of the purpose of the system itself, several grams of SNM hold-up in the process equipment exists. Acids were utilized as a feed material and to strip/clean the ion exchange resins. Asbestos is considered to be a contaminant concern for set 26 by association with surrounding thermal systems insulation. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Other effluent from this system contains a wide range of other contaminants from the feed materials, including U, Am and Cr.</p> <p>Room 149 Glovebox (old) 30 - This set includes Glovebox 30 (old) and Tanks D-302, D-204, D-205, D-206, D-207, D-208, D-218 and D-219, piping and valves. This system was used to dissolve Am salts and separate Pu from Am in acid dissolvers. Several hundred grams of SNM hold-up is present in the old line 30 process. KOH (base) was used to neutralize the acids. Thermal systems insulation on steam lines feeding the process is expected to contain asbestos. Lubricating oils were used on components and is expected to be contained in equipment reservoirs. Lead shielding is present inside the glovebox surrounding the process columns.</p>	Am, Pu, SNM, ACM, Pb, Acid, Oil, Base
28	<p>Room 149 Gloveboxes 31 and 50 - This set includes Gloveboxes 31 and 50; Tanks D-920, D-921, D-922, D-923 and D-927; piping and valves. Glovebox 31 is used for tank sampling and glovebox 50 is used for filtration of liquids.</p> <p>Glovebox 31 is a sampling glovebox used to collect samples from tanks D921, D922, D923 and D927.</p> <p>Glovebox 50 contains a manifold filtering system to filter out solids from the tanks noted above.</p>	Pu, Pb, Acid, Base, ACM

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	Tanks D921 and D922 received caustic (base) waste from the acid fume scrubber system (line 33). Lead in the form of shielding, lead lined gloves and leaded glass windows are present on both gloveboxes. Thermal systems insulation on the steam feed to the gloveboxes is expected to contain asbestos.	
29	<p>Room 149 Gloveboxes 40 and 44 - This includes Gloveboxes 40 and 44, Tanks D-78 and D-79, piping and valves.</p> <p>Glovebox 40 contains two Bingham vacuum pumps for the house vacuum system.</p> <p>Glovebox 44 contains a Bingham pump for the house vacuum system. Pu contamination has resulted from house vacuum applied to various tanks containing Pu bearing acidic solutions and gloveboxes. Caustic (base) pump seal liquids were replaced by water seal liquid during the operating life. Lubricating oils were used on the pump equipment. Lead in the form of shielding, lead lined gloves and leaded glass windows are present on both gloveboxes.</p>	Pu, Pb, Acid, Oil, Base
30	<p>Room 149 Glovebox 42 - This set includes Glovebox 42, Tanks D-451, D-452, D-453, D-454, D-456, D-457, D-466, D-467, D-468, D-469, D-470, D-472, D-971, D-972, D-973, D-974, D-975 and D-976. Also included is piping, valves, shielding walls around tank farm and electrical control panel. Glovebox 42 is one of the Anion Exchange Purification Gloveboxes. Anion exchange removed elemental impurities from Pu nitrate solutions. Pu contamination is present by virtue of the process, additionally uranium, beryllium and cadmium may have existed as an impurity in the feed solutions. Several hundred grams of SNM hold-up is present in the process piping and tanks. Acids were utilized to both strip the exchange columns and was a component of the feed material. Lead in the form of</p>	Pu, U, SNM, ACM, Blx, Pb, Be, Cd, Acid, Oil Base

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
31	<p>shielding of the glovebox walls, gloves and windows is present. Asbestos in the form of thermal systems insulation is expected to be present on process equipment and steam heat feed to the process. Oils are expected to be present in equipment reservoirs. Basic solutions were also used as a function of the process. Benelex shielding is also present in this set.</p> <p>Room 149 Gloveboxes 43A, B, C and D - This set includes Gloveboxes 43A, 43B, 43C and 43D; piping and valves.</p> <p>Glovebox 43A is graphite scarfing, pipe clean-out and filter disassembly. Radioactive material contamination is a result of these operations. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Several hundred grams of SMN hold-up is present in this system. Glovebox 43B is used for grinding of sand, slag and crucible waste. Radioactive material contamination is a result of these operations. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Several hundred grams of SMN hold-up is present in this system. Oils in the form of lubricants is expected to exist in the equipment reservoirs.</p> <p>Glovebox 43C included a ball mill for pulverizing the sand, slag and crucible waste. Radioactive material contamination is a result of these operations. Lead in the form of shielding of the glovebox walls, gloves and windows is present. Several hundred grams of SMN hold-up is present in this system. Oils in the form of lubricants is expected to exist in the equipment reservoirs.</p> <p>Glovebox 43D is a Anion Exchange Purification Glovebox. Radionuclide and Be bearing acidic solutions were processed through this system. Multiple kilograms of SNM hold-up are present. Lead shielding is present on the glovebox walls, gloves and windows. Asbestos in the form of</p>	<p>Pu, U, Am, SNM, ACM, Bix, Pb, Be, Acid, Oil</p>

Am = Americium, Pu = Plutonium, U = Uranium, SNM = Special Nuclear Material, MFP = Mixed Fission Products, PCB = Polychlorinated Biphenyls, ACM = Asbestos Containing Materials, Bix = Benelex, Cr = Chromium, Cd = Cadmium, Pb = Lead, Hg = Mercury, Be = Beryllium, Acid = Characteristic Acid, Base Characteristic Basic/Caustic, RCRA = RCRA Classified Solvents, Oil = Oil, CFC = Chloro-fluoro-carbons

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix		
Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	thermal systems insulation is expected to be present on steam heating components.	
32	Room 149 Glovebox (new line 30) - This set includes Glovebox 30 (New) Tanks D-1925, D1926, D-1927, D-1928, D-1930, D-1931, D-1932, D-1934, D-1935, D-1936, D-1937, D-1939, D-1940, D-1941, D-1942, D-1943, D-1944 and D-1945 This new glovebox system, tanks, electrical control panel, valves and piping were never put into service. There are also two large water wall shielding walls that are cold. This is a 35 ft x 40 ft area that the equipment removal would free up work space for other projects in Room 149. The system was never tied into the process system. Lead shielding is present on the exterior of the glovebox and the 18 tanks. Oil lubricants are expected in the pumps. Two water walls are known to contain liquid and are expected to contain chromates.	Pb, Oil, Cr
33	Room 149 Tank Farm - This set includes Tanks D-931, D-932, D-933, D-934 and the shielding walls around the tanks, piping and valves. This tank farm was used for storage of Pu nitrate solutions. The tank farm is surrounded by a Benelex, Plexiglas and lead shielded walls. SNM hold-up is expected in these tanks, however it has not yet been measured.	Pu, Bix, Pb, Acid, SNM
34	Room 148 Process Area - This set includes Room 148, Tanks D1-976, D-1977, D-1978, D-1979, D-1984, D-1987, D-1990, D-1991, D-1992 and D-1993. This area has lead shielded annular tanks that were never put into service and should be cold (non-contaminated). Radioactive material contamination is known to exist under the stainless steel floor cover. Asbestos is expected to be present in the form of thermal systems insulation on pipes in the area.	Pu, ACM, Pb
35	147 Office Area - This set includes Rooms 140B, C, D & E, 147, 147A, B, C, D & E, training glovebox and the internal walls and doors. These rooms	Pu, U, ACM, Oil, RCRA

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
36	<p>Room 146 Process Area - This set includes Rooms 146, 146A and 146C, Gloveboxes MT1, MT2, MT3, MT4, MT5, MT6, MT7, MT8, SR11 and SR12, Tanks D-1001, D-1002, D-1003, D-1004, D-1005, D-1006, D-1007, D-1008, D-1009, D-1010, D-1011, D-1012, D-1013, D-1014, D-1019, D-1020 D-1022, D-1023, D-1024, D-1032, D-1033, D-1050, D-1051, D-1053, D-1054, D-1055, D-1062, D-1063, D-1064, D-1065, D-1066, D-1067 and D-1069. These gloveboxes, tanks, pipes and vaults were used for a process called Special Recovery. Special Recovery was a set of processes to recover Pu from materials containing other contaminants. This area also contained a fluidbed flourination system and a vault type storage room. The special recovery operations consisted of Pu stripping from unique radionuclide bearing solutions. The variety of process feed included waste lab samples, solvents and specially made up chemical formulations. Asbestos containing insulation is present on steam heat feeds and surrounding various equipment. Benelex shielding is present around the tank farms, lead shielding is present on the gloveboxes. CFC's and Chromates are expected to be present in the cooling systems. Several hundred grams of SNM hold-up is present in the gloveboxes and transfer piping. Lubricating oils are present on components and equipment reservoirs.</p> <p>Room 146A contains gloveboxes SR11 and SR12 that are pilot plant</p>	Am, PU, U, SNM, MFP, ACM, Bix, Pb, Hg, Be, Acid, RCRA, Oil, CFC, Cr, Base

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	<p>designed fluidbed hydrofluorination process. This project supported the onsite prove in of additional processing facilities. The fluidbed hydrofluorinator has no organic lubricants. The SR11 glovebox is shielded with both Benelex and lead, a water wall surrounds the glovebox. Multiple kilograms of SNM hold-up is present in SR11, SR12, and associated equipment.</p> <p>Room 146C is a former vault area used to store low level residues. The vault is surrounded by both Benelex and lead shielding. Minor residual radionuclide contamination is expected.</p>	
37	<p>Room 181A Process Area - The west end of the room contains 55 gal drums of High Level Mixed Waste. This material will need to be moved before an NDA assessment can be performed to get an accurate value of the SNM hold-up.</p> <p>This set includes Room 181A, Glovebox SR14, Tanks D-1400, D-1401, D-1402, D-1406, D-1407, D-1409, D-1410, D-1411, D-1414 and D-1415, an electrical panel, a scrubber refrigeration unit and associated valves and piping. SR14 is a solvent extraction process for U bearing acidic solutions. Acids and bases were used in the stripper/scrubber and residual amounts are expected to be present. CFC's and chromates are present in the chiller/refrigeration unit. Oils and lubricants are expected to be present on components and equipment reservoirs. Lead plate shielding, leaded glass windows and lead lined gloves are present on the glovebox.</p>	Pu, U, SNM, Pb, Acid, Oil, CFC, Cr, Base
38	<p>Room 182 Process Area - This set includes Room 182, Gloveboxes 201, 202, 203, 204, 205, 206, 207, 208 209, 213, 214, 215, 221, 223, 224, 225, 227, 228, 229, 241, 242 and an overhead conveyor system. The room contains a number of gloveboxes that are new and were never placed into service. These boxes would be removed first so as not to</p>	Pu, U, SNM, PCB, ACM, Blix, Pb, Hg, Be, Acid, Oil

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	contaminate them. Removal of the rest of the equipment would follow.	
39	<p>Room 182A Process Area - This set includes Gloveboxes 261, 262, 263, 264, 269, 270, 662 and a hydraulic press and piping.</p> <p>Gloveboxes 261, 264, 269, 270 and 662 are used for Pu metal storage and sampling.</p> <p>Glovebox 262 and 263 are used for storage of Pu metals and oxides</p> <p>Each of these gloveboxes have lead shielding, windows and gloves. RCRA regulated solvents were used to strip oils and grease from metal samples. U metal samples were periodically processed.</p>	Pu, U, Pb, Oil
40	<p>Room 183 Storage Area - This set includes Room 183, 184 and 185.</p> <p>Room 183 is full of High Level Residue drums. Room 184 is a residue storage vault for SNM. Room 185 is a small storage room. Residual fixed radiological contamination from past glovebox operations exists. Insulated piping in the overhead areas is expected to contain asbestos.</p>	Pu, U, ACM
41	<p>Room 186 Process Area - This set includes Room 186, 186A, 186B, 187 and 188, Gloveboxes 862, 863 864, 865, 866 187A, 187B, 187C, 187D, 187E and Hood 187F. This was an R&D area (186/187) and an SNM storage vault (188). The office area (186A) has desks and cabinets and Room 187 has a set of cabinets that are cold, the rest of the equipment, gloveboxes and B-Boxes are Tru-Waste. Room 186 is a R&D metallurgical lab. The equipment used for sample testing includes a large hydraulic press and misc hand tools to prepare samples of Pu metal. A refrigeration unit in the room has CFC's, lead plate shielding, lead gloves and leaded windows. Present storage of other wastes make accurate SNM hold-up counting problematic.</p> <p>Room 186 A is an office. A refrigerator in the office contains CFC's</p> <p>Room 186B is a storage closet. Drywall partitions exist and are suspected</p>	Pu, U, SNM, ACM, Pb, Hg, Oil

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	<p>of containing asbestos.</p> <p>Room 187 is an R&D analytical lab for dissolution of metals. Lead lined gloveboxes, leaded windows and lead lined gloves are used. Insulation of steam lines is suspected of containing asbestos. Various chemical such as acids, bases and solvents were used in this lab. Mercury in analytical instruments is likely to be present.</p> <p>Room 188 is a storage vault with lead shielding and water wall containers. The water-walls are suspect of containing chromates. The room has been washed down and RCRA closed.</p>	
42	<p>180 Office Area - This set includes Room 180G, 180H, 180I, 180J and 180L. This is an office area and a corridor (L). This area contains cabinets and office furniture. Insulation and solid surfacing materials are present and expected to contain asbestos. Various RCRA listed chemicals were formerly stored in these rooms.</p>	ACM, RCRA
43	<p>Room 180A thru F and K Process Area - This set includes Rooms 180A, 180B, 180C, 180D, 180E, 180F and 180K; Gloveboxes A10, A20, A30, A31, A32, A51, A52, A53, D1, D2, D3, E10, E11, E20, E30, E31, E32, E50, E51, F20, F30, F60 F70, K10, K20 and K30; Tanks D-1803, D-1804, D-1805, D-1809, D-1810, D-1811, D-1813, D-1816, D-1817, D-1818, D-1819, D-126A, D-126B, D-2, T-5, T-6, T-7, T-8, T-22, T-25, T-26, D-1830, D-1831, D-728, D-729, D-730, D-80, D-81, D-82, D-83, D-84, D-85 and K-30. There are some cold gloveboxes and tanks in R180D all remaining waste is expected to be Tru-Waste.</p> <p>Room 180A is a process simulation lab used for R&D work to define process parameters. Radionuclides, acids, bases, solvents and other chemical formulations are present. Lead plate shielding, gloves and windows are present. A water wall shield is expected to contain</p>	Pu, U, SNM, MFP, ACM, Blx, Pb, Acid, RCRA, Oil, CFC, Base

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	<p>chromates. Lubricating oils are used on pumps and other equipment. A refrigeration unit exists and is expected to contain CFC's.</p> <p>Room 180B is a vault that has been cleaned out and RCRA closed. Water wall shielding is known to contain lead and is expected to contain chromates.</p> <p>Room 180C is an extension of 180A and shares much of the same contaminants.</p> <p>Room 180D includes two clean gloveboxes and one glovebox used for hydroxide precipitation and neutralization of lab wastes. This included radionuclide bearing acids and bases.</p> <p>Room 180E is a furnace casting and metal storage for R&D operations. Multiple kilograms of SNM hold-up is present in the 180E gloveboxes and process lines.</p> <p>Room 180F is a R&D analytical lab for radionuclide bearing acidic and basic samples.</p> <p>Room 180K is a R&D processing and storage facility for aqueous radioactive solutions.</p> <p>Asbestos insulation, lead plate, lead lined glovebox gloves and leaded glass windows exist in each of the 180 area rooms. The 180 area is the origin of the 1957 fire, resulting in wide spread radioactive contamination. Many areas were painted to fix contamination, that is still present.</p>	
44	<p>Room 179 Maintenance Area - This set includes Rooms 178, 179, 179A and Glovebox 179A. This area contains lathes, mills, saws and other maintenance equipment that may become low level waste. Asbestos insulation and solid surfacing materials are present. Lead and other metals were machined and formed on the shop tools. Lubricating oils, cutting oils and solvents were used and stored here. Additionally Freon was</p>	ACM, Pb, Pu, RCRA, Oils, CFC's

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
45	<p>commonly used as a degreasing cleaner. The glovebox in room 179A was primarily used for maintenance of contaminated equipment.</p> <p>Room 174 Process Area - This set includes Rooms 172, 174, 175 and 176; Gloveboxes A1, A2, A3, A4 and A1097; Tanks D-1081, D1082, D01083, D-1084, D-1085, D-1086, D-1087, D-1088, D-1089, D-1095, D-091(N) and D-091(S) There are six storage cabinets and a refrigeration unit that are either cold or at the very least low level waste. The refrigeration unit is expected to contain CFC's and lubricating oils.</p> <p>Gloveboxes A1 and A4 are an nitric acid spray leach process to strip Pu contamination off of U components. SNM hold-up for these boxes is expected to be several grams. Lead in the form of plate shielding, leaded glass windows and lead lined gloves are on the gloveboxes.</p> <p>Gloveboxes A2 and A3 are evaporators for concentrating the spray leach chemicals from A1 and A4. Lead in the form of plate shielding, leaded glass windows and lead lined gloves are on the gloveboxes. Mercury is expected to be contained in analytical instruments. Insulation on the steam heat feed lines are likely to contain asbestos.</p> <p>A caustic scrubber is connected to the gloveboxes to neutralize the acidic fumes.</p> <p>Glovebox A1097 contains a H4 Nash vacuum pump that provided the primary negative pressure to transfer solutions to the storage tanks. A heat exchanger cools the pump and is expected to contain chromates.</p>	<p>Pu, U, SNM, ACM, Pb, Cr, Hg, Acid, Oil, CFC, Base</p>
46	<p>164 Lab Area - This set includes Room 154, 155, 155A, 156, 156A, 161, 162, 163 and 164; Gloveboxes 49, 50, 13, 12, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 72, 73, 74, 79A, 79B, 80A, 80B, 81A, 81B, 82A, 82B, 83A, 83B, 98, 99, 100, 101, 102, 103, Flame Hood 77, Flame Hood 94 and</p>	<p>Am, Pu, U, SNM, MFP, ACM, Bix, Pb, Hg, Be, Acid, RCRA, Oil, Base, CFC's</p>

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Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	Chemical Hood; Propane System; piping and valves. Laboratories typically receive samples from all other areas of the facility. Therefore many types of materials and contaminants are present. Many of the gloveboxes contain mercury filled instruments, asbestos insulation, lubricants, solvents, lead shielding, acids and caustics. Additional equipment including refrigeration units, calciner furnaces, propane gas burners and general laboratory fixtures are present.	
47	151 Radiation Control Area - This set consists of Rooms 135A, 135B, 151, 151A, 151B, 151C, 151E, 151F and 152. This includes the RCT areas, selective alpha air monitor (SAAM) alarm panel, Radcon support lab, doffing area and decontamination showers. Room 152 has many lead bricks. The partition walls are expected to contain asbestos fibers.	ACM, Pb
48	153 Process Area - This set includes Gloveboxes 153A, 153B, 153C, 153D, 153E, HC1, HC2, HC3, HC4, HC5 and HCG and tanks T-3, T-4, T-86, T-87, T-88. Also included is piping, remote manipulators and water-walls. The 153 area is a R&D area that includes hot cells and various test equipment. Gamma and neutron emitting lab samples were analyzed and or processed in this area. Various types of shielding, including Benelex, Lead and Plexiglas are present. Asbestos insulation is present on steam lines. Mercury filled instruments are present. Various other chemicals were used, including acids, bases, oils and solvents.	Am, Pu, U, SNM, MFP, ACM, Bix, Pb, Hg, Acid, Oil, Base
49	157 Stock Room Area - This set includes Room 157. This area was an R&D support area until it was converted to a stock room/storage area in 1992. Asbestos in the form of solid surfacing materials and pipe insulation are expected. Residual contamination from past operations may exist, in inaccessible areas.	ACM
50	158 Lab Area - This set includes Rooms 158, 159, 160, 165, 166A,	Am, Pu, U, ACM, Cr, Pb, Acid,

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	<p>166B, 168 and 169; Gloveboxes 158 North, 158 South, BX1, BX2, BX3, BX4, BX5, BX6, BX7, BX8, BX9, Hood 2, 663A, 663B, 663C and 664. This set contains gloveboxes and B-Boxes used for laboratory analysis of Pu, Am and U. This area also contains the calorimeters and the Standards Laboratory where standards for counting equipment were fabricated. Residual radioactive contamination from laboratory radionuclide bearing chemical samples is present. Rooms 158 and 159 are the radiochemistry labs. Room 160 is the calorimeter lab and the equipment cooling system is expected to contain chromates and CFC's. Room 165 is the smear counting room that has cooling systems and may contain residual radioactive contamination. Room 166A is the electronics maintenance shop, solvents have been used and stored here. Lead solder was also commonly used in the instrument shop. Room 166B was used as a R&D metal casting laboratory and is expected to contain ACM insulation, oil and grease lubricants and radioactive contamination. Room 168 is a janitors closet and storage area. Room 169 is the standards fabrication and calorimeter analysis lab. The calorimeter includes a cooling system where chromates and CFC's may be present. Many lead brick are also stored here.</p>	<p>Oil, CFC, Base</p>
51	<p>149 Utilities Support Area - This set includes Room 149A, 149B, 149C, 149D and 149E, plumbing fixtures, condensate tanks pumps and piping. Room 149A contains the steam condensate collection tanks for the utilities condensate system. Water is collected then pumped to cooling towers. These tanks are insulated and asbestos is expected. Room 149B and 149C are currently used as a storage rooms. Vinyl asbestos floor tile and asbestos containing mastic are expected. Room 149D is the new condensate collection system which was never put</p>	<p>ACM, Oils</p>

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	<p>into service. Rooms 149A and 149D have pumps that contain lubricating oils. Room 149E is a maintenance storage closet. A sump is also located here.</p>	
52	<p>190 Deluge Process Area - This set includes Room 190, Tank V-2, piping, exterior walls and roof. Tank V-2 collects fire suppression water from the zone 1 plenums. These liquids are known to be contaminated with the particulate from glovebox exhaust.</p>	Pu, U
53	<p>Main Plenum Area - This set includes Room 280, 281A, 281B, 281, 281A, 281B, 2, 282A, 282B, 282C and 282D; filter elements, cinderblock walls and doors. Tanks 309E/309W collect liquid from sumps, sinks and decon showers in B771. The primary filter bank contains 525 filters. The secondary filter bank contains 391 filters. All airborne radioactive particulate from the of the processes and process rooms maybe deposited into the filter media.</p>	Am, Pu, U, MFP, Be.
54	<p>283 HVAC Exhaust and Utilities Area - This set includes Rooms 283, 283A, 283B, 283C, 283D, 283E, 283F, 283G, 283H, 283I and 283J; the six main exhaust fans and motors; office walls, Uninterruptable power supply system, main electrical switch gear and control room panels. PCB's have been removed from the existing electrical components, however residual contamination may remain as a result of past spills. Asbestos in the form of thermal systems insulation, solid surfacing materials and electrical components. Mercury filled instruments were used and residual contamination of the concrete may exist. Lead exists in electrical components. Oils for cooling electrical components and as lubricants for other machinery are present.</p>	PCB, ACM, Pb, Hg, Oil
55	<p>235 HVAC Supply and Utilities Area - This set includes Rooms 232, 233, 234, 235, 236, 237, 238, 238A, 239, 240, 240A, 240B, 240C, 240D,</p>	ACM, Oil

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	240E and 240G; supply fans motors, plenums and walls. This is the building air intake system consisting of filters, heaters, blowers and dampeners. Asbestos pipe insulation on steam lines for the heating units. Oil and grease lubricants on equipment.	
56	<p>249 HVAC Exhaust and Utilities Area - This set includes Rooms 229, 230, 231, 241, 245, 246, 246A, 247, 248 and 249; Zone 1 Filter Plenums, fans, motors and ductwork; Chem Make Up tanks; piping and valves. These are the reagent chemical supply tanks for building operations. The filter plenums are contaminated and have the potential to contain any thing that was exhausted from the gloveboxes.</p> <p>Room 247 is the wet chemical make-up system. Acids, Bases and other process chemical feeds were formulated.</p> <p>Multiple kilograms of SNM hold-up is present in the plenum. Cooling water systems in this set are suspected of containing regulated levels of chromium. Asbestos pipe insulation is likely to be present on steam heat lines.</p>	Am, Pu, U, MFP, ACM, Acid, RCRA, Oil, Base, Cr
57	<p>309 Tank Area - This set includes room 309, Tanks D309E and D309W, two outside walls, piping and valves. The tanks collect liquids from the building sumps, sinks and decontamination showers for sampling prior to release to waste processing. Lubricating oils and greases are present on pumps and equipment.</p>	Oil
58	<p>Corridors A, D, E, G, H, Stairwell 1,2,3, 127 Utility Room and Tunnel Area - This set includes Corridors A, D, E, G and H; stairwells 1, 2 and 3; Room 127; Tunnel (only to south outer wall of Bldg. 771); security electronics equipment, lockers, doors and piping. Residual contamination from the 1969 fire and the Building 776 water main break is expected.</p> <p>Radionuclide bearing acidic and basic chemicals have been transferred in</p>	Pu, U, ACM, Acid, Base

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
59	<p>pipe lines above the drop ceilings. Asbestos in the form of steam line insulation, solid surfacing materials and floor tile exist.</p> <p>Indirect/Direct Evaporative Cooling Area - This set includes the 8 new intake air systems, piping, valves, electrical distribution and control panels and the metal building. This comprises new ventilation equipment that has never been put into service. No contamination from building operations is expected. Unused commercial chemical products may exist in this area and should be reviewed for hazardous constituents.</p>	N/A
60	<p>771 HVAC - This set includes Zone 1 and Zone 2 HVAC1. Zone 1 ducts contain radioactive contamination and SNM hold-up of multiple kilograms of material. Zone 2 ducts are known to contain residual contamination as a result of spills and internal releases. Asbestos containing insulating materials are expected on some sections of duct work. Oils and grease lubricants are present on ventilating equipment.</p>	Pu, U, Am, ACM, Oil
61	<p>774 Room 202 Process Area 201, 202A - This set includes Rooms 201, 202 and 202A.; Gloveboxes 5, 6, 7, 8 and a pump, Tanks 1A, 1RF, 2F, 3, 4L, 4R, 5, 70, 71, 73 and a new tank. This area is know as the "First Stage" processing for solutions from B771. This area contains three gloveboxes, nine tanks, a microwave chiller and a motor control center. The piping transfer tunnel from B771 enters at the southwest corner of the room.</p> <p>Remaining radionuclide bearing solutions including acids and bases are processed for disposal. Lead in the form of plate shielding, leaded gloves and leaded glovebox windows are present. Oils and greases used as lubricants are expected to be present on equipment and in reservoirs. Asbestos in the form of steam line insulation is expected to be present. CFC's are expected to be present in the chiller system.</p>	Am, Pu, U, ACM, Pb, Acid, Oil, Base, CFC's

Am = Americium, Pu = Plutonium, U = Uranium, SNM = Special Nuclear Material, MFP = Mixed Fission Products, PCB = Polychlorinated Biphenyls, ACM = Asbestos Containing Materials, Blx = Borelix, Cr = Chromium, Cd = Cadmium, Pb = Lead, Hg = Mercury, Be = Beryllium, Acid = Characteristic Acid, Base Characteristic Basic/Caustic, RCRA = RCRA Classified Solvents, Oil = Oil, CFC = Chloro-fluoro-carbons

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
62	<p>774 Room 241 Process Area - This set includes Room 24, Tanks T-201, T-202, T-203, T-294, T-205m T-206 T-207, T-208 and T210B. 4 tanks are reagent tanks and 4 are batching tanks for precipitation. Radionuclide contamination is present in these tanks, additionally acidic and basic solutions were stored and prepared. Oils and greases used as lubricants are expected on equipment and in reservoirs.</p>	Am, Pu, U, Acid, Oil, Base
63	<p>774 Room 250 Storage Area, 251 - This set includes Room 250 and 251. This area was to be a replacement for the precipitation process equipment. Since this did not become operational, the rooms became a storage area.</p>	N/A Supply Areas. No Hazardous Concerns
64	<p>774 Room 212 Storage Area - This set includes Room 212. This area is used to store Powders for the OASIS process (oil/grease processing).</p>	N/A Supply Areas. No Hazardous Concerns
65	<p>774 Room 103 Process Area, 105 - This set includes Rooms 103 and 105; Gloveboxes 13 and 355; Tanks T-40, D-351 and KOH Receiver. This area is in the basement and is a support area to the second stage precipitation process. Radionuclide bearing acidic and basic solutions were processed and stored here. Asbestos in the form of insulation materials is expected. Oils and greases used as lubricants are expected to be contained in equipment and in reservoirs. Lead in the form of leaded glass windows and lead lined gloves is present.</p>	Am, Pu, U, ACM, Pb, Acid, Oil, Base
66	<p>774 Room 102 Process Area, 101, 104 - This set includes Rooms 101, 102 and 104; Gloveboxes 9, 10, 11 and 12; Tanks T-5, T-9, T-10, T-11L, T-11R, T-12, T-74, T-210A and C-1. This area is in the basement and is a support area for first stage precipitation /neutralization process. There is one storage area and stairwell entry from the second floor into Rooms 102 and 103. Radionuclide bearing acidic and basic solutions were processed and stored here. Asbestos in the form of insulation materials is expected. Oils and greases used as lubricants are expected to be contained in</p>	Am, Pu, U, ACM, Pb, Acid, Oil, Base

Am = Americium, Pu = Plutonium, U = Uranium, SNM = Special Nuclear Material, MFP = Mixed Fission Products, PCB = Polychlorinated Biphenyls, ACM = Asbestos Containing Materials, Bix = Benalex, Cr = Chromium, Cd = Cadmium, Pb = Lead, Hg = Mercury, Be = Beryllium, Acid = Characteristic Acid, Base Characteristic Basic/Caustic, RCRA = RCRA Classified Solvents, Oil = Oil, CFC = Chloro-fluoro-carbons

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	equipment and in reservoirs. Lead in the form of lead plate shielding, leaded glass windows and lead lined gloves is present.	
67	<p>774 Room 210 Process Area - This set includes Room 210 and 201A; Gloveboxes 1, 2, 4, 15, 206, Microwave and OASIS, Tanks 1, 2, 7, 8, 13, 14, 374A and caustic waste receiver. This area is located on the second floor above ground level. Operations performed are microwave vitrification, cementation for organics, neutralization and cementation of waste solutions at the bottle box. Radionuclide bearing oils, acids and caustic/basic solutions were processed and stored here. Asbestos in the form of insulation materials are expected. Oils and greases used as lubricants are expected to be contained in equipment and in reservoirs. Lead in the form of lead plate shielding, leaded glass windows and lead lined gloves is present. CFC's are present in the chiller system.</p>	Am, Pu, U, ACM, Pb, Acid, Oil, Base, CFC's
68	<p>774 Room 200 Dock Area - This set includes Room 209 and 220; Tanks T-102 and T-103. This area is located on the second floor ground level and is the shipping and receiving area of drums and crates for B774. There are two large waste oil storage tanks in Room 220. Approximately 10,000 gallons of radionuclide bearing waste machining oils are presently stored. These oils are known to contain PCB's, Transite siding is present on the outer walls.</p>	Pu, U, PCB's, ACM, (Oil, RCRA) - See #72
69	<p>774 Room 203 Process Area - This set includes Room 203; Glovebox 17; Tanks T-40(Old) and T-42. This area is on the second floor above ground level and was the second stage precipitation area. It is currently used as a step off pad when the rooms are posted as a Contamination Area (CA). Radionuclide bearing acids and bases were used in the precipitation process. Glovebox 17 has lead shielding and each of the gloveboxes are expected to have lead lined gloves and leaded glass windows. Oils and</p>	Pu, U, Am, ACM, Pb, Acid, Oil, Base

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix		
Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	greases used as lubricants are expected to be on components and in equipment reservoirs. Asbestos in the form of thermal systems insulation is expected to be present.	
70	774 Room 341 Utilities Area - This set includes Rooms 341, 342, 343, 344 and exhaust plenum. This area is on the third level and contains a ventilation filter plenum. Radioactive contamination as a result of B774 glovebox exhaust. The room 241 tanks extend through the floor to room 342. These tanks are included in the room 241 description.	Pu, U, (Acid, Base) - reagent tanks from 241
71	774 Room 441 Utilities Area - This set includes Room 441 and 442. This area is on the fourth level of the facility and contains a ventilation filter plenum and an UPS. This is the room air exhaust and recirculation plenum. Radioactive contamination as a result of spills and leaks is present. Oils and greases used as lubricants on components and in equipment reservoirs is present. Lead and acid exist in the UPS batteries.	Pu, U, Oil, Acid, Pb
72	774 Room 320 Utilities Area - This set includes Room s321, 321, 322. This area is located on the third level and is the utilities support to the 200 dock area. There are two filter plenums, an office and electrical switchgear. The filter plenums are radioactively contaminated as a result of past operations. PCB's may be present in the electrical switchgear and are know to be contained in the waste oil tanks. Asbestos in pipe insulation is expected to be present. Residual silver contamination may exist from a defunct silver reclamation process.	Pu, U, PCB, (RCRA, Oil) - tanks from #68 (Also may contain silver Ag)
73	774 Rooms 200-300 Office Area - This set includes Rooms 204, 205, 207, 208, 301, 302, 303, 304, 305 and 306. This area includes the control room, offices, conference room, break room and rest rooms. Asbestos is expected as pipe insulation and structural materials.	ACM
74	774 HVAC - This set includes Zone 1 and Zone 2 HVAC Ducts.	Pu, U

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Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix

Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
	Radioactive contamination in the ducts is a result of operations and the ventilation of contaminated systems.	
75	771/774 Cluster Facilities, 771 and 774 Structures and Cap - This set includes demolition of Buildings 771 and 774. This is the demolition of the remaining structure. Residual contamination in the building structure is expected. Additionally, transite siding will be included in this set.	Am, Pu, U, PCB, ACM, Pb, RCRA, MFP, Residual contamination from many sources
76	Utilities All - This set includes security, fire, steam, plant air, instrument air, breathing air, domestic water, process water, gas, sanitary waste, process waste and electrical systems.	Residual contamination from various sources
77	771/774 Out Buildings - This set includes Buildings 714, 714A, 714B, 715, 716, 717, 772, 772A, 774A, 774B, 775 ducts and the concrete stack. Included in these buildings and tanks are areas that contain chemical contamination and one building that contains diesel fuel. A number of the buildings contain asbestos siding (Transite). Two of the tanks are situated in a wetlands area and one building is the environmental sampling station for B771's exhaust air flow. Residual acids in building 714, bases in the bulk KOH storage tank, fuel oils in 715 & 716. Tanks 774-1 and 774-2 condensate collection tanks are situated in an area where ground contamination is known to contain PCB's. Building 770 contains piping systems with asbestos containing insulation. The 728 pit tanks collect overflow from the plenums and contains radioactive contamination. 775 Sanitary lift station is continuously monitored and all waste is sent to the site treatment plant prior to discharge. 773 Guard post built in 1953 may contain asbestos thermal systems insulation and floor tile.	ACM, PCB, RCRA, Acid, Base
78	Room 181A Size Reduction Area - This set includes Room 181A and size reduction equipment to be installed for closure work.	TBD

Am = Americium, Pu = Plutonium, U = Uranium, SNM = Special Nuclear Material, MFP = Mixed Fission Products, PCB = Polychlorinated Biphenyls, ACM = Asbestos Containing Materials, Bix = Borelix, Cr = Chromium, Cd = Cadmium, Pb = Lead, Hg = Mercury, Be = Beryllium, Acid = Characteristic Acid, Base Characteristic Basic/Caustic, RCRA = RCRA Classified Solvents, Oil = Oil, CFC = Chloro-fluoro-carbons

Table 1 Building 771 Reconnaissance Level Characterization Report Contamination/Hazard Matrix		
Set Number	Set Description	Radioactive and/or Hazardous Substances known to have been used, processed, or stored in this area.
79	Room 114 and 114 A Process Rooms - This set includes Rooms 114 and 114A.	TBD
80	Room 183 Package Counter - This set includes Rooms 183, 184 185 and the package counter to be installed to support building closure	TBD
81	771A Cluster Out-buildings. - This set includes buildings 770, T771A, 771A, T771B, T771C, 771C, T771D, T771E, T771F, T771G, T771H, T771J, T771K, T771L. The trailer complex there are two trailers which are shower facilities, one trailer is used for restrooms and one trailer that is condemned. The rest of the trailers are used for offices	TBD

Am = Americium, Pu = Plutonium, U = Uranium, SNM = Special Nuclear Material, MFP = Mixed Fission Products, PCB = Polychlorinated Biphenyls, ACM = Asbestos Containing Materials, Blx = Benelx, Cr = Chromium, Cd = Cadmium, Pb = Lead, Hg = Mercury, Be = Beryllium, Acid = Characteristic Acid, Base Characteristic Basic/Caustic, RCRA = RCRA Classified Solvents, Oil = Oil, CFC = Chloro-fluoro-carbons

Table 2 - Definition of the range/levels of concern for various hazards present in B771

Hazard	Physical Form	Rank	Basis
Radionuclides (Pu, Am, U, Sr, Co, Cs)	Oxides and powders	High	Tractability
	In solutions	Med	
	Clad or containerized	Low	
Special Nuclear Material (Pu239, Pu241, U235)	Greater than 1 Kilogram	High	Tractability
	Hundreds of Grams	Med	
	Less than 100 Grams	Low	
Poly-chlorinated Bi-phenyls	Oils in electrical components >1.0 oz.	High	Volume and Tractability
	Oils in electrical components <1.0 oz.	Med	
	Immobile in solid or surface coatings	Low	
Asbestos	Thermal Systems Insulation	High	Tractability
	Solid Surfacing	Med	
	Non-Friable Transite and floor tile	Low	
Lead	Dust, Chips, Oxides	High	Tractability
	Plate Bricks, and elemental Lead	Med	
	Leaded Glass and Gloves	Low	
Acids	Liquids and Reactive Crystalline Salts	High	Reactivity and Physical contact
	Dry solids	Low	
Bases/Caustics	Liquid	High	Physical contact
	Solid	Low	
RCRA Solvents	Unused Commercial Chemical Products	High	Tractability and Volume
	Liquids contained in systems.	Low	
Oils	PCB Oils	High	Physical Properties
	Hydraulic oils and Liquids	Med	
	Grease, Lubricants	Low	
CFC's	Refrigerants in fixed Equipment	Med	Potential for Release
	Refrigerants in portable Equipment	Med	
Chromium	Oxides and powders	High	Tractability
	In Solution	Med	
	Metals and alloys	Low	

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Cadmium	Oxides and powders	High	Tractability
	In Solution	Med	
	Metals and alloys	Low	
Mercury	Uncontained elemental mercury	High	Volume and Tractability
	Contained in instruments	Med	
	Contained in Fluorescent Light Tubes	Low	
Beryllium	Uncontained Oxides	High	Tractability
	Metals and alloys	Low	

Tractable; 1: capable of being easily led, taught or controlled. 2:easily handled, managed or wrought.

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Table 3
CHEMICALS/CHARACTERISTICS/METALS
REGULATORY LIMITS, ANALYSIS METHODS and USEPA
IDENTITIES

Parameter	Method	Technique	MDL	Regulatory Limit	EPA No.
Corrosivity (pH)	EPA 9045 1311 Extract	Electrometric	NA	less than or equal 2.0 pH or greater to or equal 12. 5pH	D002
Reactivity, Cyanide	EPA 7.3/9012	Colorimetric	2 ug/l	Reactive Cy. 250 mg/L	D003
Sulfide	EPA 7.3/9030 1311 Extract	Titration	1 mg/l	React. Sulf. 500 mg/L	
TCLP Volatile Organic	EPA 8260 1311 Extract	GC/MS	NOTE 1	Benzene .5 mg/L Carbon Tetrachloride 1 mg/L Chlorobenzene 100 mg/L Chloroform 6 mg/L 1,2-Dichloroethane 0.5 mg/L 1,1-Dichloroethylene 0.7 mg/L Methyl ethyl ketone 200 mg/L Tetrachloroethylene 0.7 mg/L Trichloroethylene 0.5 mg/L Vinyl chloride 0.2 mg/L	D018 D019 D021 D022 D028 D029 D035 D039 D040 D043
TCLP Semivolatile Organic	EPA 8270 1311 Extract	GC/MS	NOTE 1	o-cresol 200 mg/L m-cresol 200 mg/L p-cresol 200 mg/L Cresol 200 mg/L 1,4-Dichlorobenzene 7.5 mg/L 2,4-Dinitrotoluene 0.13 mg/L Hexachlorobenzene 0.13 mg/L Hexachlorobutadiene 0.5 mg/L Hexachloroethane 3.0 mg/L Nitrobenzene 2.0 mg/L Pentachlorophenol 100 mg/L Pyridine 5 mg/L 2,4,5-Trichlorophenol 400 mg/L 2,4,6-Trichlorophenol 2.0 mg/L	D023 D024 D025 D026 D027 D030 D032 D033 D034 D036 D037 D038 D041 D042
TCLP Metals (Ag, Ba, Cd, Cr, Pb)	EPA 6010 1311 Extract	ICP Emission Spectroscopy	7 ug/L 2 ug/L 2 ug/L 5 ug/L 30 ug/L	Silver 5 mg/L Barium 100 mg/L Cadmium 1 mg/L Chromium 5 mg/L Lead 5 mg/L	D011 D005 D006 D007 D008
TCLP Metals (As)	EPA 7060 1311 Extract	Furnace AA	3 ug/l	5.0 mg/L	D004
TCLP Metals (Se)	EPA 7740 1311 Extract	Furnace AA	5 ug/l	1.0 mg/L	D010
TCLP Metals (Hg)	EPA 7470 1311 Extract	Cold Vapor AA	.2 ug/l	.2 mg/L	D009
PCBs (TCL)	EPA 8080	GC/ECD	NOTE 1	50 ppm	NA
PCBs (TCL) - wipe test	EPA 8080	GC/ECD	NOTE 1	NA	NA
Paint Filter Test (PFT)	EPA 9095	Paint Filter	NA		NA

NOTE 1: Multi components with varying MDL's

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Foss, Dyan

From: London, Kathy
Sent: Friday, July 14, 2000 7:05 AM
To: Foss, Dyan
Subject: RE:

Dyan

I can answer one question – the sets 25, 32, etc are completed ☺

But there are also smaller/subtler differences because the Recon report is so old, the old project baseline had changed some from the Recon days.

If what you are trying to accomplish is affected by small details, you might need to talk to Brian Larsen about the drift away from the Recon report



Kathy London
B771 Closure Project
T771J
Voice: 303-966-5803
Fax: 303-966-2828
Pager 303-212-4104

-----Original Message-----

From: Foss, Dyan
Sent: Thursday, July 13, 2000 5:35 PM
To: Rudd, Linda
Cc: London, Kathy
Subject:

Linda, I have a couple of questions on the original set versus new set table. I'm trying to correlate the original sets in the reconnaissance level characterization report to the new sets and I have the following discrepancies:

I don't have an original set 82 in the report. Was there originally at set 82 and why wouldn't it have been addressed? Was it maybe set up later?

I have the following original sets in the report that are not accounted for in the matrix: 25, 32, 34, 35, 37, 39, 40, 41, 42, 44, 46, and 50. Why?

Why are original sets 60, 76 and 79 no longer applicable?

What is the title of new set 72?

THANKS!

DISMANTLEMENT SETS	Room	Original Set #	New Assigned #
Room 114, GB 2	114	07	07
Room 114, GB 8, 8E & 9	114	.12	12
Room 149, GB 33, 37, 38, 39	149	.22	22
Room 149, GB 30 (Old)	149	.27	27
Room 146 & 146C	146	36A, 36C-G	36
Room 182	182	38A-D	38
Rooms 180 A, C, D	180	.43A	43
Room 114, Line 1	114	.6	60
Room 114	114	5, 8, 9, 10, 13, 14, 15, 16, 17, 18	61
Hydroflorination	114	11	62
Room 146A, SR-11 & SR-12	146	36B	63
Contamination Control Cell	149	.21	64
Line 43	149	31	65
Room 149	149	23, 24, 26, 28, 29, 30, 33	66
Room 153	153	.48	67
OY Leach	172	45	68
Rooms 180 B, E, F & K	180	43B & 43C	69
309 Tank Area	300	.57	70
B771 Corridors		58	71
Room 158 and 164 Labs		76	72
Filter Plenum FU-1E		56B	74
Filter Plenum FU-1 & FU-4		56C	75
Filter Plenum FU-2		56B	76
Incinerator Filter Plenum		56B	77
Main Filter Plenum		52	78
Rm 149 Size Reduction - ITC 2-1	149	Not Assigned	82
Room 181A Size Reduction - ITC I-2	181	.78	83
Room 183 Drum Counter - ITC 1-1	183	80	84
Rooms 201 - 203	774	61, 69	91
Room 210	774	.67	92
Rooms 101-105	774	65, 66	93
Rms 200, 204-09, 220, 301-06, 320-22, Airlock	774	68, 72, 73	94
Rooms 241, 341, and 441	774	62, 70, 71	95

DECOMMISSIONING AREAS	Room	Original Set #	New Assigned #
Front Offices, Rm 101		1, 2	AA
Annex		20	AB
Locker Rooms		.3	AC
MTCE Shop		4	AD
West Side of Limited Area		771/776 Tunnel, 49	AE
East Side of Limited Area		19, 47, 51	AF
Stack		75	AG
Second Floor		53, 54A-C, 55A-B, 56A-C	AH
B771 Outbuildings/771A Cluster		77, 81	AJ
B790 Calibration Lab		82	AK
B771 Structure		75	AL
B774 Area/Structure		771/774 Tunnel, 63, 64, 74, 75	AM
IDEC		59	AN

NO LONGER APPLICABLE

771 HVAC	60	DELETE
771/774 Utilities All	76	DELETE
114 and 114A Process Rooms	79	DELETE

7/12/00

Set/Area	Title	Chemical Contamination Indicated?	Type of Chemical Contamination	Radiological Contamination Indicated?	Type of Radiological Contamination	Building Classification
AH	Building 771 second floor	Yes	beryllium PCB asbestos lead mercury oil acid RCRA solvents chromium	Yes	americium plutonium uranium mixed fission products	
AJ	Building 771 outbuildings, trailers, UST's, and tanks	Yes	asbestos PCB RCRA solvents acid base	No	N/A	
AK	Building 790 calibration lab					
AL	Building 771 exterior structure	Yes	asbestos lead RCRA solvents	Yes	americium plutonium uranium mixed fission products	
AM	Building 774 interior/exterior	Yes	asbestos lead RCRA solvents	Yes	americium plutonium uranium mixed fission products	
AN	Building 771 indirect/direct evaporative cooling area	No	N/A	No	N/A	

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Foss, Dyan

From: Rudd, Linda
Sent: Friday, July 14, 2000 7:53 AM
To: Foss, Dyan
Subject: RE:

Dyan,

Too many ?'s, too early.....

1. Set 82 is a brand new set that was never defined in the original baseline.
2. Sets 25, 37, 39, 40, 41, 42, 44, 46 and 50 were completed prior to the new baseline.
3. Original Set 79 was deleted due to reconfiguration of the sets. The original set was designed for a final cleanup sweep after completion of the original sets for Room 114 (Sets 5, 8, 9, 10, 13, 14, 15, 16, 17).
4. Original Set 60 was deleted due to respread of the original scope back into the sets.
5. Original Set 76 was deleted due to respread of the original scope back into the sets.

After you review this response and find it puzzling, call me!

Linda

-----Original Message-----

From: Foss, Dyan
Sent: Thursday, July 13, 2000 5:35 PM
To: Rudd, Linda
Cc: London, Kathy
Subject:

Linda, I have a couple of questions on the original set versus new set table. I'm trying to correlate the original sets in the reconnaissance level characterization report to the new sets and I have the following discrepancies:

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THANKS!