WASTE MANAGEMENT STRATEGY

FOR THE

PLUTONIUM PREPARATION PROJECT

IN THE K-AREA COMPLEX

SK-DA-WM-0007
Revision A

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1.0 PURPOSE

The purpose of this document is to provide the overall Waste Management (WM) strategy for the Plutonium Preparation Project which is designated to be constructed and operated in the K-Area Complex. The strategy covers the Demolition and Removal (D&R) phase, the Construction phase, and the Operational phase. The strategies discussed within are based upon the best available information to date and are subject to revision over time as the project evolves.

2.0 INTRODUCTION

The Plutonium Preparation Project will be located at the K-Area Complex (KAC) to prepare up to 13 Metric Tons (MT) of Environmental Management (EM) owned surplus plutonium for disposition. The Plutonium Disposition Program will disposition the 13 MT of Plutonium via two paths: 1) immobilized in glass through the Defense Waste Processing Facility (DWPF) to the Federal Geological Repository, and 2) as feed stock for the National Nuclear Security Administration (NNSA) Mixed Oxide Fuel Fabrication Facility (MFFF). The DWPF canisters will be stored in the Glass Waste Storage Buildings and later transported to the geologic repository at Yucca Mountain. The plutonium preparation operations in KAC are currently slated to start 2014-2016 and run for 6 years. The plutonium preparation project is critical to meet the Department of Energy's strategic goal of providing a responsible resolution to the permanent disposal of the nation's excess high-level radioactive materials and waste; and to enable the cleanup of Environmental Management sites.

The Plutonium Preparation Project will generate waste during the Demolition & Removal (D&R), the Construction and the Operational phases of the project. The D&R phase will remove excess equipment from the -20 basement of Assembly, some additional equipment from the Presentation Point and Final Storage areas on 0' level, some minor equipment/structures on -20 below Final Storage, and will completely D&R the 190-K Cooling Water Pumphouse. In addition, the 186-K Basin will be drained and the sludge removed and disposed by the D&D organization. There is a potential for a variety of waste types to be generated during this phase. The Operational phase will also have the potential to generate a variety of waste types, both from the main process and maintenance activities.

3.0 ROLES AND RESPONSIBILITIES

NMM Engineering Design Authority

- Responsible for maintenance of this strategy
- Responsible for development of conceptual Waste Management system design
- Responsible for approval of all documentation related to Waste Management system final design.
- Responsible for addition of requirements associated with this strategy into Facility Design Description and System Design Description documents.

KAC Operations

- Responsible for facility implementation of this strategy.
- Responsible for procedure development required to implement this strategy.

Design Engineering Services

- Responsible for design development to meet this strategy.

Analytical Laboratories Project /Non Destructive Assay (ALP/NDA) Group

- Responsible for specification and approval of NDA equipment used to implement this strategy.

4.0 WASTE TYPES

The different waste types expected to be encountered during either the D&R or Operational phases of the project are defined below.

A. Clean Waste: waste that reads no more than background when monitored in an area with low background radiation, or <20 dpm alpha, < 200 dpm beta-gamma (includes Green-is-Clean waste)

B. Low Level Waste (LLW): radioactive waste that does not meet any other definition

C. Transuranic Waste (TRU): waste that is contaminated with alpha-emitting Transuranic radionuclides (atomic number > than 92) with half-lives > 20 years, and at concentrations > 100 nCi/g of waste matrix at time of assay. The mass of the waste container or shielding cannot be used in calculating the TRU concentration. However, if stabilization is required of the waste, a reclassification would be performed to determine whether TRU or LLW remains.

D. Hazardous Waste (HW): clean waste that is designated hazardous by South Carolina Hazardous Waste Management Regulations (SCHWMR) and as defined in the Resource Conservation and Recovery Act (RCRA)

E. Mixed Waste (MW): waste that contains both radioactivity and RCRA constituents (heavy metals, solvents, Methyl Ethyl Keytone (MEK), etc.)

F. PCB Waste (PCBW): waste that is contaminated with PCBs (Bulk Product: paint, light ballasts, cables, oils, gaskets, etc.). PCBW could be clean, LLW or also characterized as a Mixed Waste.

G. Mixed TRU Waste (MTRU): waste that is TRU and contains RCRA constituents

H. Low Level Liquid Waste (LLLW): liquid waste that is contaminated with radioactivity (could also contain RCRA constituents and be categorized as Mixed)

I. Liquid Waste (LW): non radioactive liquid waste (could also contain RCRA constituents and be categorized as Hazardous)

J. Beryllium Waste: waste that is contaminated with non-hazardous beryllium waste forms in concentrations requiring specific packaging/labeling (IH limits) and or reporting to the Waste Management Area Project (WMAP) facilities (waste containers with >1g Be)

K. Asbestos Waste: all waste containing, or with the potential to contain, asbestos fibers and which requires disposal at permitted disposal site (friable and nonfriable)

5.0 ASSUMPTIONS

The following assumptions were made in the development of this Waste Strategy for the Plutonium Preparation Project.

D&R:

None

Operations:

1. Waste Management operations are located within the Material Access Area (MAA) on 0' level, on -20 in the Assembly Basement Waste Management (WM) area, and on 0' level (Assembly and the LLW Waste Staging Building) outside of the MAA.

2. For FFTF Disassembly (FMDS), oxide pellets will be extracted from slender steel pins that are approximately 8 feet in length. Hundreds of these pins are located within a Driver Fuel Assembly (DFA) or IDENT-69G, of which 4-7 are stored inside a Core Component Container (CCC). The CCC with contents will be transported from Hanford to SRS enclosed in a DOT Type-B shipping container called the Hanford Unirradiated Fuel Package (HUFP). Prior to startup of PuP processing, 13 loaded HUFPs will be received and stored in KAC Protected Area. The HUFP and CCC will be nested as an assembly after removal of the DFAs/IDENTS, and staged until the completion of material processing. At that time, the assembly will be removed from the MAA and staged until placed into the appropriate waste stream or recycled if possible. Based on current knowledge, all assembly components are expected be clean with minimal contamination potential (i.e., LLW) for the DFAs/IDENTS. The DFAs may also be contaminated with up to 3000 dpm cesium (mostly non-transferable). The pins are expected to be TRU waste, but based on the purity of the contained oxides, will not be Mixed-TRU. The pins will be cut to size that will fit a standard TRU-pail, and will be sent to the PuP waste stream.

3. A powered lift will be available to move waste containers from between the -20 Assembly basement and 0' level.

4. Fire suppression will include room sprinkler systems for all portions of the PuP Facility (potential generation of LW).

5. WM activities will be on a daily, if not 24/7, schedule, and an office area with computer station will be available in the -20 Assembly Basement WM area.

6. Facility personnel, and not the Analytical Laboratories Project personnel, will operate the NDA equipment, unless special portable assays are requested.

7. Only waste from gloveboxes requires MC&A assays. Waste generated from general process rooms does not, unless failure to pass SNM and/or metal portal monitors.

8. There are no security or MC&A issues associated with establishing MBAs outside of the MAA if required for waste containers staged while awaiting shipment to WMAP.

9. All TRU waste requiring packaging in an SWB will require assay prior to placement in the SWB as it is not practical to model a full SWB for assay (due to uncertain configuration of waste items inside SWBs).

10. All TRU pails and drums, including drums direct loaded with waste that would not fit into a 5-gallon pail, will be subjected to assays utilizing either the PG/GIC or a portable system, and Shuffler.

11. Characterization as MW or MTRU waste (RCRA metal content), or as Beryllium Waste, is based on the following levels [6]:

Arsenic	5.0	mg/L (ppm)	
Barium	100.0	mg/L (ppm)	
Cadmium	1.0	mg/L (ppm)	
Chromium	5.0	mg/L (ppm)	
Lead	5.0	mg/L (ppm)	
Mercury	0.2	mg/L (ppm)	
Selenium	1.0	mg/L (ppm)	
Silver	5.0	mg/L (ppm)	
Beryllium	1.0	gram/container	(detection level for lab analysis to use 5 mg/L (ppm))

12. Glovebox waste (i.e., gloves and filters only) generation is estimated to be 3 m^3 per year. This is based upon the following assumptions:

    Glovebox Filters:
    - Size: 12" x 12" x 11 1/2" = 0.96 ft^3
    - Qty: 3 filters per GB (6 total)
    - Change out Rate: assume 1X/yr
    - Waste Generation: 5.75 ft^3/yr = 0.16 m^3/yr

    - Size: 8" x 8" x 5 7/8" = 0.22 ft^3
    - Qty: 6 filters per CAPS GB; 3 filters per FMDS GB
    - Change out Rate: assume 1X/yr
    - Waste Generation: 1.98 ft^3/yr = 0.06 m^3/yr

    Gloves:
    - Qty: CAPS GB = 84; FMDS GB = 40
    - Change out Rate: assume 1X/2mo; = 744 gloves/yr
    - Waste Generation: assume 5 gloves per pail; 0.67 ft^3 per pail; therefore, 100 ft^3/yr = 2.8 m^3/yr

13. The 186-K Basin will be drained and sludge removed by the D&D organization. No D&R of the basin structure is expected.

6.0 WASTE SOURCES

The three sources of waste related to the Plutonium Preparation Project include: D&R, Main Process, and Balance of Plant (maintenance activities).

6.1 D&R/Construction Phases:

D&R of (including construction within) the -20 Assembly basement, Presentation Point, Final Storage, -20 below Final Storage and the 190-K Cooling Water Pumphouse will involve the removal of a variety of equipment and piping which may present challenges in the characterization and packaging for disposal in the appropriate Treatment, Storage, and Disposal Facility (TSDF). Walkdowns will be conducted by the NMM Waste Management and Environmental personnel representatives from the Environmental Services Section, Waste Management Area Project, Export Control, and Asset Management groups to evaluate potential issues with the D&R/Construction wastes (e.g., PCBs, RCRA, Universal Waste, required destruction, etc.). NMM waste and environmental personnel will review/approve all D&R work packages to ensure wastes/recyclables are handled appropriately. Some sampling and analysis may be required to determine the appropriate disposal path. If required, a Sample and Analysis Plan will be developed to document the characterization strategy for the D&R/Construction wastes. In addition to the D&R, the 186-K basin will be drained and the sludge removed and disposed by the D&D Organization. The different types of D&R/Construction wastes that could be generated are listed below with examples of each.

1. Clean/Sanitary Wastes and Recyclable/Salvageable Items:

The majority of the items to be removed are expected to be non-radioactive. Radiological Controls Operations (RCO) personnel will have to be involved in determining which items can be free released, which items fall under the metals moratorium, and which items may have to be treated as LLW due to unknown history. Sampling and analysis may be required to defend the categorization of certain wastes as non-radioactive. In addition, all items will require evaluations for asbestos, PCB and RCRA constituents prior to determining a final disposition path. Export control and asset management evaluations will also be required.

2. Low Level Waste (LLW):

If any items cannot be free released, then they will be disposed of as LLW. This waste will fall under the established routine process area waste stream. If a waste with suspect origin requires disposal, NMM waste certification engineering will develop an appropriate waste stream. Sampling and analysis to quantify the radionuclide content of the waste may be required to determine the appropriate disposal facility. Waste will be packaged and handled in accordance with the established NMM Waste Certification Program Plans (WCPP), procedures, and training in approved containers as dictated by the disposal facility and the waste size. A potential challenge with some of the larger items, if categorized as LLW, will be whether size reduction will be required for either removal from the facility or to meet disposal facility requirements. Characterization methodologies may also require further definition to ensure accurate accounting of waste activity. NMM Waste Management, RCO, and WMAP personnel will be required to work closely with the project in pre-planning the D&R activities. Export control and asset management evaluations will also be required.

3. Mixed (Non-TRU)/Hazardous:

There is a potential for MW/HW to be generated from the D&R/Construction activities. Process knowledge and sampling & analysis will be utilized to evaluate all waste items to appropriately categorize them to ensure proper handling, staging, packaging, labeling and shipment. When MW/HW is identified, it will be moved to a RCRA satellite accumulation area (SAA) or staging area (SA), depending on the volume of waste. If there is less than 55 gallons of the particular mixed/hazardous waste generated and additional generation is expected, the SAA will remain established at or near the point-of-generation until 55 gallons has accumulated. Once 55 gallons has accumulated (or if more than 55 gallons is generated initially), the waste will be moved to a SA. At this time, the 90-Day regulatory clock will begin within which time the waste must be characterized and transferred to an approved TSDF. Waste Management, Environmental Compliance Authority (ECA), and Environmental Services Section (ESS) personnel will be required to work closely with the project in pre-planning the D&R activities. Examples of MW/HW that could be encountered include: circuit boards, mercury switches, silver contacts, fluorescent lightbulbs, oils, excess chemicals, painted items, and lead shielding (i.e., bricks). Export control and asset management evaluations will also be required.

4. Polychlorinated Biphenyl (PCB) Waste:

There is a potential for PCB waste to be generated from the D&R activities. Process knowledge and sampling & analysis will be utilized to evaluate all waste items to appropriately categorize them to ensure proper handling, staging, packaging, labeling and shipment. When PCB waste is identified, it will be moved to the appropriate temporary PCB waste storage area as designated by the ECA. Depending on which type of area is utilized, the regulatory time frame within which the waste must be packaged, characterized and transferred to WMAP can range from 30 days to 180 days. Waste Management, ECA and ESS personnel will be required to work closely with the project in pre-planning the D&R activities. Examples of PCB waste that could be encountered include: painted items (including walls, floors), rubber gaskets, rubber & plastic electrical cables, oils, caulking, roofing materials, capacitors, voltage regulators, and light ballasts. Export control and asset management evaluations will also be required.

NOTE: If PCBs are found in wall and/or floor paints that are to remain on the facility, there are requirements for painting over these areas with two coats of contrasting colors and labeling with the EPA Large Mark. The potential for painting for insitu PCB contamination needs to be considered in the D&R and Construction phases of the project.

5. Asbestos Waste:

There is a potential for asbestos waste to be generated from D&R activities. Process knowledge and sampling & analysis will be utilized to evaluate all waste items to appropriately categorize them to ensure proper handling, staging, packaging, labeling and shipment. Although there is no regulatory time clock associated with asbestos waste, there are specific packaging and labeling requirements. Waste Management, ECA and ESS personnel will be required to work closely with the project in pre-planning the D&R activities. Examples of asbestos waste that could be encountered include: electrical cables, Transite boards, gaskets and pipe insulation. Export control and asset management evaluations will also be required.

6. Liquid Waste (LW):

There is the potential for LW (non-radioactive) to be generated from the D&R/Construction activities. If LW is generated, it will be handled using the standard building procedures and capabilities. The disposal path for LW would include staging, sampling, and evaluating against allowable release criteria. If the LW meets the release criteria, it would be released per facility procedures. If the LW does not meet the release criteria, then evaluation against other disposition criteria would be completed. Mixing with grout (or some other type of absorbent/solidification agent) may be required. The final LW containers will be staged in a designated staging location until transferred to the final disposal location. Waste Management personnel will be required to work closely with the project in pre-planning the D&R activities. Examples of LW that could be encountered include: oils, sump liquids, and decontamination liquids.

7. Low Level Liquid Waste (LLLW):

There is a potential for LLLW to be generated from the D&R/Construction activities. This LLLW will be collected in appropriate containers (e.g., drums, TUFF tanks), sampled, characterized and dispositioned utilizing existing facility procedures. Depending on the amount generated, the purity of the tritiated liquid, and other sample results, the liquid may be placed into the moderator program versus the waste program. If determined to be waste, the final LLLW containers will be staged in a designated staging location until transferred to the final disposal location. Waste Management personnel will be required to work closely with the project in pre-planning the D&R activities. Other examples of LLLW that could be encountered include: tritiated oils, sump liquids, and decontamination liquids.

6.2 Operational Phase: Main Process and Maintenance Activities

The operational phase of the process will generate a variety of the waste types. There will be main process wastes which include glovebox waste such as the empty 3013 containers along with any additional cans inside the 3013s, failed new inner 3013 cans, weld stubs, pin components from FFTF Disassembly, HEPA filters, contaminated equipment, gloves, wipes, and other glove box and Job Control Waste (JCW). Some of these wastes, due to their size and location in the process, may present challenges in the logistics of waste container movements within the PuP Facility. The different types of Operational waste that could be generated are listed below with the general process, flow path, requirements, and examples of each.

1. Clean/Sanitary/Green-Is-Clean Wastes:

The operational phase of the project will generate clean/sanitary/Green-is-Clean (GIC) wastes from the MAA in general and the Non-Nuclear Material Handling portions of the project. This will include empty packaging from supplies required for the process, cleared items designated for disposal, and any excess/unused chemicals. Excess/unused chemicals requiring disposition will be handled per established procedure with the assistance of the NMM Chemical Coordinator. GIC waste will consist of RMA waste that is non-radioactive and associated waste as defined per the 1S Manual.

2. Low Level Waste (LLW):

The operational phase of the project may generate LLW from glovebox operations in the FFTF Material Disassembly System (FMDS). General room waste and JCW are generated throughout the entire process. Additional LLW may be generated from the use of containment devices. The two sources of LLW will be differentiated as follows: GB-LLW for LLW from the glovebox processes and RM-LLW for LLW from the general rooms (outside of glovebox).

GB-LLW:

FMDS GB-LLW will include all non-pin material from the disassembly of the DFAs/IDENT-69s. The DFAs/IDENT-69s will be size reduced and removed from the air hood as LLW. The DFA/IDENT pieces designated as LLW will be packaged into 55-gallon drums, weighed, TID attached, assayed in the Shuffler for theft diversion, and relocated to the 0' Waste Staging Building. The contents of the drums will be either repackaged into B-12/B25s or the drums themselves loaded into B-25s on 0' Assembly and the B12/B25s relocated to the 0' Waste Staging Building. The HUFP and CCC will be closed, assayed by the slab detectors for theft diversion, then relocated to the 0' Waste Staging Building located outside of the main facility until they are categorized appropriately as either waste or recyclable materials.

RM-LLW:

RM-LLW will be waste that meets the LLW trigger limit provided by the WCE and will include general room waste and containment device waste expected to consist of typical JCW, such as tape, cloth gloves, etc. RM-LLW will be collected in radioactive waste bags and segregated with regard to the waste stream. Receptacles, which are lined with a radioactive waste bag, will be located throughout the facility (i.e., at stepoff pads) for collection of LLW. Once full, each bag will be surveyed and cleared by RCO. Each bag will then be weighed and tagged with a Radioactive Waste Tag, which includes the following information: generation location, date, alpha room posting, bag weight, contents and waste generator initials. The waste generator will ensure that RCO obtains the dose rate of the bag. The LLW bags will then be removed from the MAA utilizing existing procedures. If the LLW bags fail either the SNM or metal portals, the bags will be returned to the PuP to be packaged into 55-gallon drums to be assayed in the PG/GIC or portable system for characterization and/or Shuffler for theft diversion. Once removed from the MAA, the LLW bags will be loaded into a B12/B25 located on 0' level. A Curie logsheet is filled out for each B12/B25 listing every LLW bag loaded. Once the B12/B25 is full, it is weighed, secured, and relocated to the 0' Level Waste Staging Building located outside of the main facility until shipment to the appropriate WMAP facility. Production support requires the 0' Waste Staging Building to have a minimum capacity of ten (10) B12/B25s.

NOTE: Depending on the quantification of RCRA constituents in the plutonium oxide material that is to be processed through the PuP process, and how that transfers to the waste to be disposed from K-Area, the LLW waste discussed above may in actuality be categorized as Mixed waste (either all or at least some portion). The exact volume will not be determined until either process knowledge or analysis can be conducted to complete the evaluations.

3. Mixed (Non-TRU)/Hazardous:

The operational phase of the project is expected to generate limited amounts of Mixed (Non-TRU)/Hazardous waste. Examples would be lead carbonate from 9975s, decontamination chemicals, non-clearable fluorescent lightbulbs, non-clearable batteries (lead-acid, nickel-cadmium), circuit boards, painted items, etc. When MW/HW is identified, it will be placed into a RCRA satellite accumulation area (SAA) or staging area (SA), depending on the volume of waste accumulated by the end of that shift. This SAA or SA will be established within the MAA. If there is less than 55 gallons of the particular mixed/hazardous waste generated and additional generation is expected, the SAA will remain established at or near the point-of-generation until 55 gallons has accumulated. Once 55 gallons has accumulated (or if more than 55 gallons is generated initially), the waste will be moved to a SA located outside of the MAA within the 0' Waste Staging Building (see Section 8.0 for description). At this time, the 90-Day regulatory clock will begin within which time the waste must be characterized and

transferred to an approved TSDF. Characterization of the waste may involve RCO surveys, NDA assays, and/or sampling & analysis, depending on the type of waste and the generation point. Once the drum is characterized, it will remain staged until shipment to WMAP. The 0' Waste Staging Building shall provide a minimum capacity for ten (10) drums of HW/MW in a RCRA SA.

4. Transuranic (TRU) Waste:

The operational phase of the project will generate TRU waste throughout the glovebox operations. For clarification purposes, three "sources" of TRU waste have been identified. First is that from the FFTF Disassembly (FMDS), referred to as FMDS-TRU. The second source is the waste from processing material contained in 3013s, referred to as CAPS-TRU. Though separated for ease of discussion, the two portions of the process may be interconnected, with CAPS-TRU relying on FMDS to handle any "high" TRU 5-gallon pails that require size reduction (e.g. cutting). Any "high" pails that do not require size reduction will be returned to the glovebox they were removed from for segregation to prevent any cross contamination (e.g., beryllium). The third source is from the Balance-of-Plant (BoP) operations, such as equipment and HEPA filter change-outs, and maintenance activities, referred to as BoP-TRU. The -20 Assembly Basement WM area will have a non-destructive LLW/TRU Waste Assay System (e.g., Q^2) available to determine waste package categorization (LLW or TRU) for any pails that assay below detection limits (measurements at MLD), estimated at 30%. The LLW/TRU Waste Assay System must be located in an area of low background or shielded such that it can detect to the levels necessary to differentiate between the two. NDA personnel will assist with the requirements for placement of this instrument (e.g., required shielding from staged TRU waste). Consideration of separate spacing for TRU and Mixed TRU (MTRU) waste is required to facilitate expedited disposal requirements for MTRU.

Anticipated CAPS-TRU waste consists primarily of empty inner/outer 3013 cans, empty convenience cans, failed inner 3013 cans, weld stubs, and other glovebox waste. It is assumed that all of the waste will be of a geometry that can be handled by standard 5-gallon pails. Based on a processing rate of two (2) 3013 containers per 24 hours, it is estimated that an average of four (4) CAPS-TRU 5-gallon pails will be generated by the process each day.

Anticipated FMDS-TRU waste includes the portion of the fuel pins in contact with the pellets, wipes, and other glovebox waste. Due to the length of the fuel pins, size reducing equipment will be required as part of the process. Based on FMDS production rate of an equivalent to one 3013 container per 24 hours, it is estimated that an average of two (2) FMDS-TRU pails will be generated by the process each day.

All glovebox waste will be bagged out at each station utilizing established procedures, placed into 5-gallon pails and staged in the unassayed pail staging rack located in the FMDS portion of the facility. The unassayed 5-gallon pail staging rack may require criticality-safe (i.e., minimum 2 foot surface to surface) spacing, depending on the results of a criticality analysis. Rack capacity should be for a minimum of six (6) unassayed 5-gallon pails. When designated, 5-gallon pails will be assayed utilizing a PG/GIC or portable system to determine accountability/characterization values. Once assayed, up to three assayed pails will be packaged into a 55-gallon TRU waste staging drum, assayed in the Shuffler for theft diversion, then relocated to the -20 Assembly Basement WM area for staging until repackaged into TRU waste shipping drums. There are no spacing requirements between containers of assayed waste. There may be criticality spacing requirements between assayed and unassayed waste.

Any 5-gallon pails that exceed assay limits (estimated at 0.5%), will be classified as a "high pail", and returned to the source glovebox for segregation. If size reduction is required, the high pail will be sent to the "high pail" repackaging portion of FMDS (which will contain size reduction capability). Once repacked, they will be re-assayed to determine if repackaging was successful. If not, repackaging continues until the 5-gallon pail(s) is below acceptable limits. The 5-gallon pails that are within assay limits are then packaged into 55-gallon TRU waste staging drums, assayed by the Shuffler for theft diversion, then relocated from the MAA to the Assembly -20 Basement WM area until repackaged into TRU waste shipping drums.

In the -20 Assembly Basement WM area, there are no criticality spacing requirements as all TRU waste will have been assayed by this point. Production support requires the -20' Assembly Basement WM area to have a capacity of 30 TRU waste staging drums and to account for segregation of TRU and MTRU drums.

Items too large to fit inside pails, but small enough to fit inside a drum, will be packaged directly into a TRU waste staging drum. The drum will then be weighed, TID attached, assayed on the PG/GIC or portable system for accountability/characterization values, assayed on the Shuffler for theft diversion, then relocated to the -20 Assembly Basement WM area for staging until evaluation for repackaging/shipment is completed by the Waste Certification Engineer .

After determined ready by the Generator Certification Official (GCO) and/or Waste Certification Engineer (WCE), the assayed 5-gallon pails are evaluated for packaging into a TRU 55-gallon shipping drum. The selected 5-gallon pails are opened, the bags removed and placed into a TRU waste shipping drum. A containment device (e.g. hut, hood) will be available for the drum loading operation. The empty 5-gallon pails will be recycled back into the process if cleared by RCO. Non-cleared 5-gallon pails will be disposed of as LLW. The loaded drum will be weighed, a TID attached, and staged until shipment to the appropriate WMAP facility. Drums that contain suspect or low levels of transuranics may be placed in the LLW/TRU Waste Assay System to determine if the contents meet LLW disposal limits. Production support requires the -20' Assembly Basement WM area to have a capacity of 30 TRU waste shipping drums and to account for segregation of TRU and MTRU drums.

Items that are too large to fit inside a drum, will either require size reduction to fit in a drum, or will require assay utilizing a portable waste assay system prior to loading into standard waste boxes (SWBs). The SWBs will be transported into the MAA through the same doorway that the HUFPs. Once loaded with the assayed items, the full SWBs assayed with the portable neutron slab detectors for theft diversion, TID attached, and relocated to the -20 Assembly Basement WM area for staging until evaluation for further packaging and/or shipment is completed by the WCE. As this is expected to be a non-routine activity, the -20 Assembly Basement WM area is required to have a capacity for two (2) SWBs.

If the background level and/or capacity for TRU waste container staging in the -20 Assembly Basement WM area exceeds workable levels as determined by RCO or Operations, then additional capacity may be available on 0' level Assembly. Designated areas for TRU waste staging on 0' level will need to be selected and marked.

BoP-TRU:
The waste generated by the balance-of-plant portion consists primarily of waste generated due to maintenance activities from all portions of the process. Examples include spent HEPA filters and contaminated (failed) equipment. That waste removed from the glovebox with 5-gallon pails will be generated and follow the path as outlined above. In the event that a piece of equipment should fail, special procedure based response actions will be required to remove the failed piece of equipment, quantify the accountable material, potentially size reduce high-dose equipment, and process through the appropriate waste stream. Further description of the special circumstances associated with the loaded equipment failure, beyond the need for a special operations procedure and the requirement for a dedicated failed equipment room in the facility to deal with this maintenance activity, is outside the scope of this Waste Strategy at the CD-1 stage. All other items, too large for 5-gallon pails may be packaged directly into drums or SWBs depending on size. If items fit into drums, drums will be brought to that portion of the process where equipment is to be removed. If items are too large for drums and SWBs cannot be placed directly at the point of waste generation, then with RCO approval, items will be bagged, assayed and then loaded into an SWB as close to the glovebox location as safely possible. Wood or metal boxes may be fabricated to assist in relocating these items to the SWB, however, the wood/metal boxes will not be disposed of within the SWB unless they meet WAC requirements (e.g., filters).

The HEPA filters located within the MAA will be sized such that they will either fit into a 5-gallon pail or a 55-gallon drum. The HEPA filters located outside of the MAA should be low level waste, but if for some reason are categorized as TRU, will be packaged into SWBs.

NOTE: Depending on the quantification of RCRA constituents in the plutonium oxide material, in various concentrations [4] that is to be processed through the PuP process and how that transfers to the waste to be disposed from K-Area, the TRU waste discussed above may in actuality be categorized as Mixed TRU waste (either all or at least some portion). The exact volume will not be determined until either process knowledge or analysis can be conducted to complete the evaluations. The key impact would be the required expedited timeframe from waste generation to shipment for disposal (RCRA 90 Day Clock requirements).

5. *Liquid Waste (LW):*

The operational phase of the project is expected to be dry throughout. However, there is the potential for LW generation from eyewash stations, decontamination activities, emergency events such as fire, and any lubricating or cooling fluids required for equipment operation. If LW is generated, it will be handled using the standard building procedures and capabilities. LW containers may require theft diversion checks prior to exiting the MAA. The disposal path for LW would include staging, sampling, and evaluation against allowable release criteria. If the LW meets the release criteria, it would be released per established facility procedures. If the LW does not meet the release criteria, then evaluation against other

disposition criteria would be completed. If those criteria are met, the LW will be packaged to meet the received TSDF's requirements. Solidification/absorption of the LW may be required to meet the Treatment, Storage, and Disposal Facility (TSDF) Waste Acceptance Criteria (WAC) or chosen as an option for disposal, which could include mixing with grout (or some other type of absorbent/solidification agent). This evolution would take place outside the PuP MAA. The LW containers would be relocated to the 0' level Waste Staging Building for further evaluation prior to shipment to WMAP.

6.3 Operational Phase: Generation Rates

The expected waste generation rate for the Operational Phase of the PuP facility waste streams has been estimated on an annual basis assuming a 24 hour 7 day a week operation. The generation rates per waste stream are summarized in the table below:

Waste Stream	Estimated Annual Generation Rate (m^3/year)
Clean/Sanitary/GIC	10
Low Level Waste	55
Mixed Waste (non-TRU)	2
Hazardous Waste	2
TRU/MTRU	75
Liquid Waste	0 (expected)

7.0 WASTE ASSAY EQUIPMENT

All TRU waste leaving the MBA/MAA will be assayed for accountability values and diversion. Pails and/or drums will be assayed on the PG/GIC for accountability values. Full loaded drums (pail loading and direct loaded) will be assayed on the KAC Shuffler prior to leaving the MAA to ensure that no diversion of SNM has occurred. Large items, such as HUFPs, removed equipment and filters, are assayed with a portable waste gamma assay system to obtain the accountability values. The large items such as SWBs and HUFPs will also require assay by the portable neutron slab detectors prior to leaving the MAA to ensure no diversion of SNM has occurred.

LLW, depending on source, may be assayed for accountability values and diversion prior to being removed from the MAA and being placed in B12/B25 containers. Room LLW will be removed utilizing established procedures, and only assayed if it fails to pass the SNM and/or metal portal monitors at the ECF. The FMDS LLW will be assayed for theft diversion prior to removal from the MAA. The same instruments as the TRU waste will be utilized if required.

In addition, outside of the MAA in the -20 Assembly Basement WM area, a LLW/TRU waste assay system (e.g. Q^2) will be used to perform an evaluation of those pails/drums whose initial assay resulted in MLD values to determine if the pail/drum can be re-categorized as LLW. This instrument must be located in a shielded area to reduce background radiation levels.

All containers, pails, drums, bags, B12/B25s will requiring weighing. Inside the MAA, the pails and drums can utilize the scales already in place for weighing 3013s and 9975s. Outside the MAA, additional scales will be required. See table below.

Discard limits will be established and approved for all waste by MC&A closer to the startup of the project once waste streams are established.

The following assay instruments will be utilized in the Waste Management System:

Quantity	Instrument Type	Function
4	Scale	* 0-16 kg scale to weigh pails (same scale used for 3013s in MAA) * 0-500 lb scale to weigh bags/drums (same scale used for 9975s in MAA) * 0-6000 lb scale to weigh SWBs and B12s/B25s (0' Assembly) * 0-500 lb scale to weigh various items: bags, drums, etc. (-20 Assembly Basement)
1	LLW/TRU Waste Assay System (Q^2)	Assay waste pails/drums (measured at < MLD) for determination as LLW or TRUW (-20 Assembly Basement)
1	Prompt Gamma/Gamma Isotopic Counter	Assay waste pails for accountability values used for characterization (MAA)
1	Portable Waste Gamma Assay System	Assay removed equipment (items too large to fit in pail or drum), drums, and other items as needed for accountability values used for characterization, utilized within and without MAA.
1	Portable Neutron Slab Detector	Assay large items for SNM to detect theft diversion located within MAA
1	Shuffler	Assay drums for SNM to detect theft diversion located within MAA (use KAC Shuffler)

8.0 WASTE MANAGEMENT AREA DESCRIPTION

The PuP Waste Management System consists of several areas located throughout the facility on the -20 (Assembly) and 0' levels (inside MAA, Assembly, and LLW Staging Building). These areas have various purposes to support the generation, transport, staging, assaying, loading/packaging, and shipping of waste. Listed below is each area with a short description of its purpose, general location, and room content. As the project matures and waste streams are defined, the area content with respect to number of waste containers/cuts for each may change, as well as required equipment. The information described below is based on the best available data to date.

1. FMDS Unassayed Waste Staging Area: This area will be located in the FMDS portion of the MAA and will include room for a minimum of six (6) unassayed pails and one (1) unassayed drum. The unassayed pails will be staged in a rack that allows for critically safe spacing (e.g., minimum 2 foot surface to surface) and a maximum of two (2) high. The drum will also require the criticality spacing from the pails and other items (e.g., designated marking on floor).

2. FMDS Assayed Waste Staging Area: This area will be located in the FMDS portion of the MAA and will be sized to hold up to 4 TRU waste staging drums containing assayed pails (no critically safe spacing required). Each staging drum may contain up to three (3) assayed pails. The assayed drums must be kept separate from the unassayed waste (e.g., designate markings on floor).

3. FMDS Standard Waste Box Loading/Staging: This area will be located in the FMDS portion of the MAA and will be for the packaging/loading of failed equipment or large waste cuts into Standard Waste Boxes (SWBs). Dedicated space does not need to be allocated as this is expected to be a non-routine activity, however, space must be available for the potential need.

4. FMDS RCRA Waste Satellite Areas: This area will be located in the FMDS portion of the MAA. There will be space for one MTRU SAA to contain one (1) drum and one non-TRU MW SAA to contain one (1) drum. Once the drums are full, they will be relocated to a RCRA Staging area located outside the MAA (see item #7).

5. 0' Assembly Area: This area will have a scale rated to weigh drums/B12/B25/SWBs. This area will also have some space for staging of shipping drums/SWBs in case overflow from -20 Assembly Basement WM area required.

6. -20 Assembly Basement Waste Management Area: This area will be located in the -20 Assembly Basement and will provide room for the following activities:

a. Waste Container Staging: this area will be sized to accommodate 30 TRU waste staging drums, 30 TRU waste shipping drums, two (2) SWBs and four (4) B12/B25s. If MTRU or MW is generated, the area must accommodate for the segregation of the mixed waste from the non-mixed waste.

b. LLW/TRUW Assay: this area will be sized to accommodate the non-destructive LLW/TRU Waste Assay System (e.g., Q^2) to determine waste package categorization (LLW or TRU) for any pails/drums that assay below detection limits (measurements at MLD). It is estimated that 30% will be re-categorized as LLW. The LLW/TRU Waste Assay System must be located in an area of low background or shielded such that it can detect to the levels necessary to differentiate between the two.

c. Office Area: this area is to provide a small area for WM personnel to stage supplies, maintain a computer for inventory purposes, potential storage of records, etc.

d. TRU Waste Repackaging/Loading: This area is to be used for loading assayed 5-gallon pail waste into 55-gallon TRU waste drums. A MAC-21 or ventilation hood will be available for use during waste loading if determined necessary by RCO. Pails will be opened, the bagged waste cuts removed and then placed directly into the designated shipping drum. Once the drum is loaded, sealed and weighed, it will be staged in the Waste Container portion of -20 until ready for shipment.

e. SWB Loading: This area is to be used for loading SWBs with assayed waste such as HEPA filter or large items, if needed. Hoisting equipment to assist with the loading of the SWBs will be available. The hoisting equipment should be able to lift a full SWB if needed. Once full, the container is staged as described in (a) above. Total number of SWBs on -20 at a time would be two (2).

f. LLW Loading: This area is to be used for loading LLW into B12/B25s, as required. Waste that has been re-categorized as LLW on the LLW/TRUW Assay will be reloaded into B12/B25s in this area. In addition, if the drums of DFA/IDENT pieces designated as LLW are to be emptied into B12/B25s, this repackaging activity would take place in this area. This area would have space for a minimum of 2 B12/B25s. This area may be within the Waste Container Staging Area as described in (a) above, and not a separate area.

7. 0' LLW Waste Staging Building: This building is to be located on 0' outside the main building and will be used for the staging of full, characterized waste containers awaiting shipment to WMAP. This building is a covered pad with no ventilation required as minimal container access (repackaging) will be required while within this area. The building must be accessible to fork trucks and/or pallet jacks and the final transport truck. The containers staged within the building will consist of drums and B12/B25s. A capacity for ten (10) HW/MW (non-TRU) RCRA drums and 10 B12s/B25s will be provided. This building must be a Hazard Category 3 facility. Fork truck access will be required. B12s/B25s may be stacked two (2) high. This area will also be used to stage empty containers of all types: 55-gallon drums, TRU drums, SWBs, B12s, B25s, etc. In addition, this building will be used for the storage of the empty HUFPs/CCS assemblies until the determination of waste or recyclable item is completed and the items dispositioned as appropriate.

9.0 WASTE STAGING AND INVENTORY CONTROL

All LLW waste staging areas in and around the KAC have been designated as Hazard Category 3 facilities. Therefore, the total inventory of all LLW waste staged (regardless of actual location or waste stream) in and around K-Area shall meet the DSA requirements (<20% of the HC2 TQ and the fissile mass limits). No credit is taken for waste stored in physically separated areas. It is assumed all LLW waste is staged together (as if in one big "pile") and subject to the proposed accidents described in the DSA.

Due to the radionuclide content of TRU waste and that the inventory of only one or two 5-gallon pails of TRU waste can exceed the Hazard Category 3 limits, all TRU waste staging areas shall be within a Hazard Category 2 facility until transferred out of the KAC. The specific structural requirements of the waste staging facilities (e.g., PC-2, PC-3, Seismic qualifications, ventilation, etc.) will be determined through Consolidated Hazards Analysis Process (CHAP) evaluation.

During the CHAPs process, the various waste processing and staging rooms will be analyzed assuming the below assigned Material at Risk (MAR). Values used will vary depending on if the event is an individual container event or a room event. The FGE Pu-239 values per container type are assumed to be as follows:

Individual Event Assayed / Unassayed TRU Pail/Drum = 195 g
Room Event Assayed TRU Pail/Drum = 24 g
SWB = 325 g
B12/B25/LLW drum = 1 g

The table below summarizes the MAR assumed per area, as needed, to be utilized in the WM CHAPS process:

Waste Management Room	Location	Contents	MAR (FGE Pu-239; grams)
FMDS Unassayed Waste Staging Area	0' MAA	6 unassayed pails ; 1 unassayed drum	1365
FMDS Assayed Waste Staging Area	0' MAA	4 assayed drums (=12 assayed pails)	780
FMDS Standard Waste Box Loading/Staging	0' MAA	1 unassayed SWB	325
FMDS RCRA Waste Satellite Areas	0' MAA	1 MTRU drum ; 1 MW drum	196
0' Assembly Area	0'	Worst case = 1 assayed SWB	325
-20 Assembly Basement Waste Management Area: Waste Container Staging	-20	30 TRU staging drums; 30 TRU shipping drums; 2 SWBs; 4 B25 (equivalent)	2094 (Room Event MAR)
-20 Assembly Basement Waste Management Area: LLW/TRUW Assay	-20	1 TRU staging drum (= 3 assayed pails)	195
-20 Assembly Basement Waste Management Area: TRU Waste Repackaging/Loading	-20	10 TRU staging drums	1950
-20 Assembly Basement Waste Management Area: SWB Loading	-20	Worst case = 1 SWB	325
-20 Assembly Basement Waste Management Area: LLW Loading	-20	2 B25s (equivalent)	2
0' LLW Waste Staging Building	0'	10 HW/MW (non-TRU) drums; 10 B12/B25	20

As a waste container is issued (drum, SWB, B12/B25, etc) it is assumed to be full at that time with a bounding activity as determined by WCE. This is for inventory tracking purposes. Prior to shipment to WMAP for disposal, actual activities for the waste cuts will be determined and waste package contents adjusted as required. All waste packages will be verified to meet the requirements of the 1S Manual prior to shipment to WMAP.

10.0 WASTE PLANS, PROCEDURES, AND TRAINING

The NMM LLW and MW Certification Program Plan, the KAC TRU and MTRU Waste Certification Program Plan, the LLW/TRU waste procedures, the LLW/TRU waste training, etc. will all require revision to implement the details of the process described in this document. In addition, WCE personnel will develop the waste stream(s), distribution(s) and bounding activities for the various waste container types for characterization, inventory tracking and disposal purposes. The potential for beryllium and RCRA content will be addressed in the Waste Certification Program Plans (WCPP), procedures, training, and waste stream(s) development. These activities are to be completed prior to the generation of the first waste from the PuP Facility. Established procedures and training will ensure that all waste handlers have the required security, radiological control, and waste qualifications (e.g., HRP, 2-person rule training, RWT, etc.). Lessons learned from the K-

Area Interim Surveillance (KIS) project will be incorporated into the overall KAC waste program and specifically to the PuP Project where benefits would be gained.

Further details regarding the required sampling for the process waste will be determined, as well as any other final refinements to the PuP waste strategy, and will be documented in further revisions to this Waste Strategy. Developing requirements resulting from the evolving PuP process design will be accumulated and documented in future revisions of this Strategy as well.

11.0 CHARACTERIZATION OF WASTE

Characterization of the D&R and Operational phases of the Plutonium Preparation Project will involve a variety of techniques. These will include, but are not limited to, process knowledge, sample & analysis, dose-to-curie (DTC), smear-to-curie (STC), nondestructive assay (NDA), and inline sampling (operational phase only) if possible. The constituents of concern for each phase include:

D&R: radionuclides, RCRA, PCBs, asbestos
Operational: radionuclides, RCRA, Be

Proper characterization of D&R waste during the planning stages is essential to success. The characterization determines the required packaging, labeling, and disposal facility. The packaging will impact the amount of size reduction required. In addition, proper characterization will ensure that all regulatory time clocks will be established and complied with in accordance with the appropriate regulations. The waste streams utilized for D&R waste are those already established for NMM process areas.

Proper characterization of the Operational process waste is equally important. There are potentially two key constituents of the process waste that must be characterized appropriately, beryllium and RCRA. Beryllium limits the amount of fissile material allowed in a waste container and RCRA institutes the 90 day clock within which waste must be shipped to the proper TSDF. Improper characterization of either could have severe consequences, such as receipt of Notices of Violation from the regulators, violations of the KAC or other facilities' DSA and/or TSR requirements, etc.

To assist with the characterization process the oxide samples taken during the Can Processing System (CAPS) process and to-be-determined sampling from the FMDS process will include analysis for Beryllium and the designated RCRA constituents. As information on the isotopic and impurity composition of the materials to be processed through the PuP Facility become available, evaluations will be conducted to determine if alternative methods are available to minimize the time and effort in the field.

12.0 ISSUES REQUIRING FURTHER INVESTIGATION/RESOLUTION

The following questions/issues require further investigation or require information that is not yet available.

1. Anticipated Radiological Classification for Waste Management Areas: Confirm with RCO if TRU waste shipping drum loading activities will require dressout/containment device. Also, confirm with RCO if bagged items, even if potentially TRU, can be transported through facility to the SWB if the SWB cannot be taken to the point of generation (in case of large equipment change out from glovebox).

2. Assembly Floor Over Basement Loading: Confirm if SWB/B12/B25s can be transported over the portion of the assembly floor that is over the basement.

3. Defense of MAR Values: Determine how to ensure the MAR values for unassayed waste containers will not be exceeded. For example, how to demonstrate that an unassayed drum will not have > 195 g FGE (e.g., material balance methodology similar to KIS).

13.0 CONCLUSION

The waste processes described within are the best estimation of how the Plutonium Preparation Project wastes, from D&R, Construction and from Operations, will be handled based upon the information available at the time of the revision date of this Strategy. As the KAC TRU waste program matures, incorporating lessons learned from on going 3013 surveillance operations, the waste management flow path, requirements, and layout will become more defined. As details and information regarding the other portions of the facility that involve major impacts to the waste management processes described become available, they will be incorporated into future revisions of this Strategy.

14.0 REFERENCES

1. Manual 1S, Savannah River Site Waste Acceptance Criteria Manual, Procedure 3.06, "E-Area TRU Pads Transuranic Waste Acceptance Criteria", Revision 11, 4/30/05.
2. Manual 1S, Savannah River Site Waste Acceptance Criteria Manual, Procedure 3.17, "Low-Level Radioactive Waste Acceptance Criteria", Revision 9, 1/14/05.
3. Manual 3Q, Savannah River Site Environmental Compliance Manual.
4. 40 CFR 260-279, Hazardous Waste Management (Resource Conservation and Recovery Act) Regulations
5. MT-KL-2007-00026, Plutonium Disposition Project, K Area Complex, R. J. Bayer, June 2008.
6. WSRC-RP-2008-00468, Revision 0, Preliminary Safeguards Strategy for Plutonium Disposition Project, D. L. McClendis-Miller, May 2008.