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**Department of Energy**

**PDC PROJECT**

**SOLID WASTE  
MANAGEMENT STUDY**



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## **1.0 PURPOSE**

The purpose of this study is to identify a path forward for the management of solid wastes generated from the Pit Disassembly and Conversion (PDC) project. The study should assist in the identification of design requirements and unit operations required to develop design documents in support of the development of a cost estimate for the PDC project. This study will also attempt to identify risk associated with PDC path forward discussed in this study.

## **2.0 INTRODUCTION**

The PDC Project includes the following: Direct Metal Oxidation (DMO) lines, Oxide Product Handling (OPH) lines, a Sanitization (SAN) line, a PIT Disassembly (PITD) line, a Special Recovery Line (SRL) line, HEUM HED lines, HEUM DMO lines, Hydride lines, Product Canning lines, an Internal Transport System (ITS), a NDA area, a Waste NDA area, a Waste Management area, and other support operations. The equipment and facilities associated with Stabilization & Packaging Project will be incorporated into the larger PDC footprint. The PDC project will connect the Internal Transport System (ITS) to the S&P DMO and Stabilization gloveboxes.

The PDC Project will process pits to plutonium oxide for feed for the MOX Fuel Fabrication Facility. The S&P Project will continue to combine the daughter products created in KIS back into a single item, stabilize it, then package into a 3013 compliant container. The S&P Project will also continue processing the 3.74 metric tons of Alternative Feed Stock-2 (AFS-2) materials. AFS-2 metals are split, oxidized and stabilized in the DMO furnace, and subsequently canned in 3013 inner and outer containers, packaged in 9975 and stored for future shipment to MFFF.

## **3.0 WASTE TYPES**

The solid waste types that are to be reviewed in this study are TRU, MTRU, LLW, and Green is Clean, and are defined as follows:

Transuranic (TRU) Waste – Solid waste that is contaminated with alpha-emitting transuranic radionuclides (atomic number > 92) with half lives > 20 years, and concentrations > 100 nCi/g of waste matrix at time of assay.

Mixed TRU (MTRU) Waste – TRU waste that is also hazardous, as defined by RCRA.

Low Level Waste (LLW) – Radioactive solid waste, which does not result from direct processing of spent nuclear fuel or byproducts material from uranium or thorium tailings, with a transuranic concentration of less than 100 nCi/g.

Green is Clean Waste – Non-hazardous waste as defined under the provisions of RCRA and is not radioactive.

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Mixed LLW, hazardous waste, and PCB waste are not expected to be generated from the PDC Project, and therefore are considered non-routine generated waste. These wastes will not be evaluated in this study.

Solid high level waste will not be generated from the PDC Project.

PDC solid waste may be Be contaminated. Concentrations of Be are expected to be trace to less than 1 gram, therefore no additional characterization is required. Solid waste will require Be labeling.

### 4.0 ASSUMPTIONS/REQUIREMENTS

The solid waste management system must provide the capabilities to collect, package, stage, assay, and store TRU, MTRU, LLW, and Green is Clean waste within drums/B-25s/waste packages in preparation for shipment. It must also provide the capability to characterize the waste generated from the PDC project. Following are assumptions/requirements for the PDC solid waste management system:

- Various containers/plastic bags must be supplied for the transport and packaging of solid waste. All levels of confinement of TRU waste must be vented/filtered. This includes plastic bags, convenience containers, 5-gallon pails, and 55-gallon drums.
- Process knowledge will be the primary factor in determining the waste type/TRUCON Code.
- Headspace gas sampling, real-time radiography, and NDA for isotopic analysis for WIPP certification of TRU waste drums will be performed by SRS at the E-Area.
- Gram estimation equipment must be provided for waste leaving the gloveboxes.
- Smear-to-curie will be used to determine the radionuclide content of most LLW waste.
- Bar code readers must be provided at critical locations.
- Bar codes must be provided for tracking the matrix and inventory of waste packages.
- A staging area for unassayed/assayed TRU/MTRU pails must be provided inside the MAA. Minimum spacing of 10-ft from array and 3-ft from another fissile item is required for unassayed waste pails (Ref. 6).
- A staging area for unassayed/assayed TRU/MTRU drums must be provided inside the MAA. A minimum of 2-ft from other fissile material and gloveboxes is required for unassayed drums (Ref. 6). LLW drums will also be staged here.
- A space must be provided for a 90-satellite accumulation area for MTRU waste.
- NDA Equipment must be provided that is capable of performing characterization and accountability measurements inside the MAA.
- Equipment must be provided that is capable of performing SNM diversion check on waste packages, pails, and drums.

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- Equipment must be provided for the transportation of waste packages, pails, and drums around the PDC process area and out of the MAA.
- Staging areas must be provided for 5-gallon pails, 55-gallon drums, and B-25s.
- Equipment must be provided for IQ3 assay for the threshold determination between LLW and TRU waste inside the MAA.
- Equipment must be provided for weighing waste packages, pails, and drums inside the MAA.
- PDC process must be able to process waste packages and drums, which fail SNM diversion check.
- PDC TRU waste will be packaged into WIPP-compliant DOT Type A, Specification 55-gallon drums.
- PDC LLW will be packaged into drums or B-25s with final packaging in B-25s.
- LLW will be collected once per shift, placed into plastic bags and eventually packaged into B-25s.
- Green is Clean waste is to be packaged into green translucent bags.

### 5.0 WASTE SOURCES

TRU solid waste will be generated from the PDC Project, and will include: non-Pu miscellaneous solids, swipes, gloves, maintenance waste, failed/empty cans, hydrogen process crucibles, HEU Decon Dewater pots, operation gloves, rags from HEU decon, SAN ingot/crucibles, getter bed, mol sieve, maintenance solid waste, empty inner/outer 3010 cans, empty convenience cans, failed inner 3013 cans, weld stubs, other glovebox waste, HEPA filter change-outs, etc.

MTRU waste generated from the PDC Project includes any TRU waste contaminated with hazardous constituents regulated under RCRA. The source of MTRU waste includes lead-lined gloves from gloveboxes that handle plutonium. Leaded glove waste is considered mixed LLW with high levels of alpha contamination (less than 100 nCi/g), and will be blended with and disposed of as MTRU to improve packaging and transport efficiencies.

LLW solid waste generated from the PDC Project originate from the process area, glovebox maintenance, room waste, GB exhaust filters, and sorted waste from the PDC Waste Management Area resulting from IQ3 assay.

Green is Clean waste is waste that the user believes is not contaminated and is not required to be evaluated or surveyed per Procedure Manual 5Q1.1, Procedure 517. This consists of personal items or items carried through an RBA, equipment/material sorted or used only in an RBA with no potential for contamination (Ref. 8).

### 6.0 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 in the HENC/GRAS for accountability

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values. TRU waste shipping drums 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 removed equipment and filters, are assayed with Waste Neutron Slab Counter and Waste Gamma Scanner to obtain accountability values.

LLW may be assayed for accountability values and diversion prior to being removed from the MAA, and being placed into B-25 containers. Room LLW will only require assay if it fails to pass the SNM diversion check. The same instruments as used by TRU waste may be utilized or the Waste Neutron Slab Counter and Waste Gamma Scanner will be used to obtain assay values if required.

Waste packages, pails, drums, and B-25s will require weighing. Inside the MAA, the waste packages, pails and drums will utilize the scales in the Waste NDA area and for waste inside glovebox lines, scales in the gloveboxes/airlocks will be used. Outside the MAA, an additional scale will be required in the Waste Staging Building to weigh B-25s.

The following assay instruments (Ref. 5) will be utilized in the PDC Waste Management System:

- Scale
  - 0-10 kg scale to weigh Waste Transfer Container (WTC) (located in the Waste NDA area)
  - 0-16 kg scale to weigh pails (located in the Waste NDA area)
  - 0-500 lb scale to weigh bags/drums (located in the Waste NDA area)
  - 0-6000 lb scale to weigh B-25s (located in Waste Staging Building outside the MAA)
- LLW/TRU Waste Assay System (IQ3 Low Level Waste Assay System)
  - Assay waste pails/drums for determination as LLW or TRU waste (located in the Waste NDA area within the MAA)
- High Efficiency Neutron Counter/Gamma Ray Assay System (HENC/GRAS)
  - Assay waste pails/drums for accountability values (located in the Waste NDA area within the MAA)
- Portable Waste Gamma Scanner
  - Assay removed equipment (items too large to fit in pail or drum), filters, drums, and other items as needed for accountability values (located within the MAA)
- Portable Waste Neutron Slab Counter
  - Assay large items/drums for SNM theft diversion (located within MAA)
- Shuffler System
  - Assay TRU waste shipping drums/LLW and Green is Clean waste packages for SNM theft diversion (located within MAA)
- Enhanced Fissile Material Detector (EFMD)
  - Assay of a waste package inside a WTC to provide criticality control by identifying the presence of fissile material and determining a mass amount to be used in calculating the glovebox inventory (located in airlocks within the MAA)

## **7.0 PDC SOLID WASTE MANAGEMENT SYSTEM AREA DESCRIPTION**

The PDC Solid Waste Management System consists of a TRU Waste Management Glovebox, Waste NDA Area, a Shuffler Area, and a Waste Staging Building.

- TRU Waste Management Glovebox – TRU waste placed in WTCs are received in the TRU Waste Management Glovebox via the ITS from the originating glovebox. The TRU Waste Management Glovebox will be used to segregate the waste and place it into 55-gallon shipping drums through a drumport. Two drumports will be available in this glovebox.
- Waste NDA Area –The Waste NDA area contains the HENC, GRAS, and scales. The Pail Staging Rack is located here for staging of assayed, unassayed and empty waste pails, and has room for five unassayed pails and five assayed pails. The Waste Drum Staging Rack is also located here for unassayed, and assayed waste shipping drums. Seven spaces have been allocated for unassayed drums, and 10 spaces have been allocated for assayed drums. TRU, MTRU, and LLW waste will use the Waste Drum Staging Rack. The placement of TRU waste pails and LLW waste packages into waste drums may also occur at this location. An IQ3 Low Level Waste Assay System will reside here and the instrument must be located in a shielded area to reduce background radiation levels.
- Shuffler Area – The Shuffler Area is located near the vault and houses the Shuffler System. TRU waste shipping drums, and LLW and Green is Clean waste packages and drums may undergo a SNM theft diversion in this area.
- Waste Staging Building – This covered building is to be located outside the main building, and used to stage TRU/MTRU waste shipping drums for shipment to the E-Area. The Waste Staging Building will also be used to stage B-25 containers, and load LLW waste packages into B-25s. A weigh scale and a B-25 Staging Rack with room for 10 B-25s are located inside the Waste Staging Building. In addition, Green is Clean waste will be collected in this building for shipment to a sanitary landfill.
- Other Areas –FMDs and EFMDs will be located in various airlocks to provide control of fissile material. A Portable Waste Gamma Assay System and a Portable Neutron Slab Detector will be available for SNM theft diversion and assay of TRU/MTRU/LLW/Green is Clean waste.

## **8.0 INVENTORY CONTROL**

For TRU waste in the originating glovebox, the mass present in each waste package is quantified by the FMD/EFMD at each airlock. The TRU waste is transferred by the ITS to the TRU Waste Management Glovebox. Once the fissile material is estimated in the TRU Waste Management Glovebox, the measurement is used as the basis for subtracting mass from the originating glovebox inventory as part of the reconciliation/adjustment protocol (Ref. 6).

## **9.0 CHARACTERIZATION OF WASTE**

Characterization of solid waste from PDC will involve many techniques. These include, but are not limited to, process knowledge, sample & analysis, smear-to-curie, and non-destructive assay.

## **10.0 SOLID WASTE MANAGEMENT ACTIVITY DESCRIPTION**

### **10.1 TRU Waste Management Summary**

TRU waste generated in the gloveboxes (except the HEU FSS gloveboxes) are placed in filtered bags inside a 2-liter Convenience Cans (CC), and then placed into a WTC. The WTC is transferred to an airlock, which provides a gram estimate of the waste with a EFMD. The WTC is transferred by the ITS and received at the TRU Waste Management Glovebox.

In the TRU Waste Management Glovebox, the CC is removed from the WTC, and an empty CC is then placed into the empty WTC, where it is sent back to its originating glovebox. The waste package is removed from the CC, and segregated and placed with other waste of same TRUCON Code. The empty CC is set aside waiting to be paired with an empty WTC to be sent back to its originating glovebox. If rejected waste has been received from a failed SNM diversion check, the rejected waste is paired with an empty WTC, and sent back to its originating glovebox. The waste packages of the same TRUCON Code are placed into a 55-gallon drum through one of two drumports in the glovebox. The TRU waste drum is removed from the drumport, the drum lid is secured, and a Tamper indicating Device (TID) is installed.

The TRU waste drum is staged in the Waste Drum Staging Rack. The TRU waste drum is removed from the Waste Drum Staging Rack, and is weighed and undergoes IQ3 and NDA with the HENC/GRAS. If the IQ3 determined that waste to be LLW waste, then the drum is staged in the Waste Drum Staging Rack for removal to a LLW drum or relabeling. If it is determined to be TRU, the waste is staged in the Waste Drum Staging Rack. The TRU Waste drum undergoes a SNM diversion check in the Shuffler. Drums failing SNM diversion check are returned to the TRU Waste Management Glovebox for disposition. If the TRU waste drum passes the SNM diversion check, the drum is transferred to the loading dock. The TRU waste drum is finally shipped from the loading dock and transported to the E-Area.

MTRU waste will be treated similarly to TRU waste with the exception that prior to shipment, MTRU waste may be stored for up to 90-days in a 90-day accumulation area without a permit or interim status. Any leaded gloves considered mixed LLW with high levels of alpha contamination (less than 100 nCi/g) would be blended with and disposed of as TRU to improve packaging and transport efficiencies.

TRU waste generated from the side of the HEU FSS glovebox is placed in a filtered bag, placed into a CC and bagged out. The bagged out waste is placed into a 5-gallon pail, a TID is installed, and then a gram estimate is provided with the Portable Waste Neutron

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Slab Counter and the Waste Gamma Scanner. Following gram estimation, the waste pail is staged in the Pail Staging Rack. The pail is weighed, undergoes IQ3 and NDA with the HENC/GRAS, and if the pail is determine to be TRU waste, it is staged in the Pail Storage Rack. If the IQ3 determines that the waste is LLW, then the waste is transferred to a LLW drum and staged. The TRU waste pails are transported from the rack and are sorted and loaded into 55-gallon drums sharing the same TRUCON Code. The TRU waste drum has a TID installed and is transported to the Waste Drum Staging Rack. It then undergoes NDA with the HENC/GRAS and SNM Diversion check with the Shuffler. Following a successful SNM diversion check, the drum is transferred to the Loading dock and shipped to the E-Area. Any drums failing SNM Diversion Check are transported to the TRU Waste Management Glovebox for disposition.

### **10.2 LLW Management Summary**

LLW will be collected, placed into bags, and if required, loaded into drums. Pails are received from LLW originating from the HEU FSS gloveboxes which were determined to be LLW from IQ3. The LLW waste package/pail/drum may be weighed, assayed with the Waste Neutron Slab Counter and Waste Gamma Scanner, and undergo SNM diversion check with the Shuffler, if required. Any LLW waste package/pail/drum failing the SNM diversion check will be returned to the TRU Waste Management Glovebox for reassessment and repackaging. Following successful SNM diversion check, if needed, the LLW waste package/pail/drum will be transferred to the Waste Staging Building. The waste packages/pails/waste packages from drums are loaded into a B-25. The B-25 will be sealed and then dispositioned at the E-area.

### **10.3 Green Is Clean Waste Summary**

Green is Clean waste will be collected and put into green translucent bags (Ref. 9). If required, a SNM diversion check may be provided for the Green is Clean waste package with the Waste Neutron Slab Counter and Waste Gamma Scanner/Shuffler. Any Green is Clean waste package failing the SNM diversion check will be taken to the TRU Waste Management Glovebox for reassessment and repackaging. The Green is Clean waste bags will be hand carried to the Waste Staging Building for staging. When a sufficient amount of Green is Clean waste accumulates for a shipment, the waste will be transferred to a sanitary landfill.

### **10.4 Detailed Description of TRU Waste Management Process**

Below are the activities required for the management of solid waste. Figure 1 provides a block diagram of the same steps described below for PDC solid waste management. In general, Steps 1 through 28 cover TRU waste management, steps 29 through 38 cover LLW management, and steps 39 through 44 cover Green is Clean waste management.

**Step 1** – TRU waste is generated from the HEU FSS gloveboxes. TRU waste generated in this glovebox consists of gloves, pH probes, dewater pots, wipes, and filters.

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**Step 2** – Waste is placed inside a CC which has a bar coded filtered plastic bag placed inside the CC, and waste accumulates in the CC until it is full. The bagged waste is secured, the bar code is read, and the lid is placed on the CC. The bar code is read on the full CC. The waste is bagged-out.

**Step 3** – An empty 5-gallon pail is received. A TRU waste package is received from the HEU FSS Glovebox. The TRU waste package is placed into a 5-gallon pail. Barcode on pail is read, and associated with the CC and waste package. The lid of the pail is secured with a lever-lock ring, and a tamper indicator device (TID) is installed.

**Step 4** – The TRU waste pail is gram estimated with the Portable Waste Neutron Slab Counter and Waste Gamma Scanner.

**Step 5** - The TRU waste pail is manually transported by shielded cart to the Waste NDA area. The pail is staged to the Pail Staging Rack with spacing requirements of 10 feet from array and 3 feet surface-to-surface spacing. Unassayed and assayed waste pails share space on the Pail Staging Rack.

**Step 6** - The TRU waste pail is received from the Pail Staging Rack. The TRU waste pails containing TRU waste will be weighed with a weigh scale, undergo screening for TRU threshold levels using an IQ3 assay system to determine if the waste is TRU or LLW, and assayed with the HENC/GRAS to determine the fissile mass in the waste. The measurement from NDA is used as the basis for subtracting the mass from the glovebox inventory as part of the mass reconciliation/adjustment protocol. (Ref. 6).

**Step 7** - Empty barcoded metal 5-gallon pails are received from shipping and receiving by use of a hand cart.

**Step 8** - An empty pail is staged near the HEU FSS Gloveboxes by use of a handcart.

**Step 9** – TRU and LLW waste pails as determined by IQ3 assay are staged in the Pail Staging Rack

**Step 10** – TRU waste pails are received from the Pail Staging Rack. A 55-gallon shipping drum is received from staging. The TRU waste shipping drum will be loaded with TRU waste pails of the same TRUCON Code. A maximum of three pails will be loaded in each shipping drum. Each pail loaded into the drum is associated with the identification code of the drum being loaded. Once the TRU waste shipping drum is full, the lid is secured, and a tamper indicator device (TID) is installed.

**Step 11** - TRU solid waste is generated from the PDC Project. TRU waste consists of items from glovebox operations, glovebox maintenance activities, and job control waste such as paper, coveralls, protective clothing, cardboard boxes, etc. TRU waste may also include rejected waste from a failed SNM diversion check.

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**Step 12** - TRU solid waste is segregated by TRUCON Code, placed inside a CC which has a bar coded plastic bag placed inside the CC, waste accumulates in the CC until it is full, and then the waste is weighed. The bagged waste is secured, the bar code is read, and the lid is placed on the CC. The CC is placed inside a WTC. The WTC bar code is read. The bar code is used to track the waste packages from the time it is transferred out of the process box, into the waste system, and subsequently into the drum for disposal and inventory purposes.

The empty CC is removed from the empty WTC and staged in glovebox for reuse.

The CC containing the rejected waste is removed from the WTC. The rejected waste is removed from the CC and repackaged. The rejected waste is dissociated from the CC and the WTC

**Step 13** - The WTC is transferred to the airlock with an EFMD and a scale. The EFMD will be used on the waste package to identify the presence of fissile material and determine a mass amount to be used in calculating the glovebox inventory. The WTC with the CC and waste package is weighed, and the presence and mass of fissile material is determined with the information recorded.

An empty WTC/rejected waste in WTC is transferred from the airlock to the originating glovebox.

**Step 14** - The waste package in the WTC leaves the airlock and enters the ITS, and is transferred to the TRU Waste Management Glovebox airlock.

An empty WTC/rejected waste in WTC is transferred via the ITS from the TRU Waste Management Glovebox airlock to the originating airlock.

**Step 15** – The WTC is received at the TRU Waste Management Glovebox from the airlock. The TRU Waste Management Airlock EFMD will be used on the waste package to determine the fissile mass in the waste. The measurement from the EFMD is used as the basis for subtracting the mass from glovebox inventory as part of the reconciliation/adjustment protocol. (Ref. 6)

An empty WTC/rejected waste in WTC is transferred to the airlock from the TRU Waste Management Glovebox.

**Step 16** – The CC is removed from the WTC. The barcodes are read and the CC is dissociated from the WTC.

A drum of rejected waste is received from a failed SNM diversion check and introduced into the TRU Waste Management Glovebox. Waste packages are removed from the rejected drum.

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An empty CC with an empty vented plastic bag is placed inside the empty WTC or rejected waste is placed inside an empty CC and placed inside an empty WTC

**Step 17** - The TRU waste packages are removed from the CC and segregated by TRUCON Code. The CC bar code is read and disassociated from the TRU waste package

**Step 18** – TRU waste packages are placed into a shipping drum of the same TRUCON Code through the drumport. As each waste package is loaded into the drum, the barcode is read and associated with the shipping drum. Once the shipping drum is full, the drum bag is secured, the drum is removed from the drumport, the lid is secured, and a TID is installed.

**Step 19** – Full TRU waste shipping drums originating from the FSS Gloveboxes and the TRU Waste Management Glovebox are staged in the Waste Drum Staging Rack.

**Step 20** - The TRU waste shipping drum is received from the Waste Drum Staging Rack. The TRU waste shipping drum will be weighed with a weigh scale, undergo screening for TRU threshold levels using an IQ3 Assay to determine if the waste is TRU or LLW, and assayed with the HENC/GRAS to determine the fissile mass in the waste.

**Step 21** - Empty 55-gallon drums are received from shipping and receiving by using a forklift or drum handler.

**Step 22** - An empty 55-gallon drum is staged in the Waste Drum Staging Rack in the Waste NDA area by using a manual drum cart. Space is needed for a minimum of 17 drums in the Waste Drum Staging Rack.

**Step 23** - The assayed TRU waste shipping drum is stored in the Waste Drum Staging Rack until ready for SNM diversion check. Mixed TRU (MTRU) waste drums may be stored for up to 90-days in a 90-day accumulation area.

**Step 24** - The TRU waste shipping drum is transported using a manual drum cart to the Shuffler where a SNM diversion check is performed prior to release of the drum from the Material Access Area (MAA).

**Step 25** - TRU and LLW drums failing SNM diversion check will be returned to the TRU Waste Management Glovebox.

**Step 26** - Using a manual drum cart, the TRU waste shipping drum is transported to the loading dock.

**Step 27** – The TRU waste shipping drum leaves the MAA and is shipped to the Waste Staging Building. The TRU waste shipping drum is staged here until ready for shipment.

**Step 28** – TRU waste shipping drums are shipped to the E-Area via on-site transport vehicles for final certification and packaging for shipment to WIPP.

### **10.5 Detailed Description of LLW Waste Management Process**

**Step 29** – Solid LLW is generated and collected from process areas, glovebox maintenance, job control and room waste (wipes, protective clothing, tools, equipment, etc.), and glovebox HEPA filters. Solid LLW will be collected once a shift and bagged into plastic bags. In general, characterization of LLW waste will occur through the use of smear-to-curie.

**Step 30** – Solid LLW is generated from the clean side of the HEU FSS gloveboxes.

**Step 31** – LLW is placed into bags and bagged out.

**Step 32** – LLW waste package/pail is removed from the TRU shipping drum due to IQ3 determining that the waste is LLW.

**Step 33** - LLW packages from LLW generation areas are received. LLW packages determined to be LLW from IQ3 assay originating from various gloveboxes are received. A 55-gallon empty drum is received from drum staging. LLW pails from IQ3 assay originating from the HEU FSS gloveboxes are hand carried and loaded into a drum, if required, the lid is secured, and a TID is installed. Other LLW may be placed into drums, if required. Radionuclide content of LLW will occur through the use of smear-to-curie conversion or from a previous assay.

**Step 34** – If required, the LLW waste package/pail/drum undergoes a gram estimation/SNM diversion check with the Waste Neutron Slab Counter and the Waste Gamma Scanner or Shuffler prior to release from the Material Access Area (MAA). LLW waste package/drum is weighed with a weigh scale.

**Step 35** – The LLW waste package is hand carried through the ECF Metal and SNM detectors, out of the building, and to the Waste Staging Building.

**Step 36** – The LLW waste drum/pail is transported to the Waste Staging Building.

**Step 37** – The LLW waste package is placed into a B-25 or the contents of the LLW waste drum is transferred into a B-25. LLW waste packages accumulate in the B-25 until it is full. Once full, the B-25 lid is replaced manually or by use of a forklift, and a TID is installed. The B-25 is weighed with the weigh scale and staged in the B-25 Storage Rack. The B-25 Storage Rack holds 10 B-25s. Any B-25 with a dose rate greater than five mrem/hr at 30 cm shall be stored in a barricaded area.

**Step 38** – The LLW B-25 is shipped to the E-Area for final certification and packaging for shipment.

## **10.6 Detailed Description of Green Is Clean Waste Management Process**

**Step 39)** – Green is Clean is generated.

**Step 40)** – Green is Clean waste is collected and placed into green translucent bags

**Step 41)** – If required, provide SNM diversion check of Green is Clean waste with the Waste Neutron Slab Counter and Waste Gamma Scanner/Shuffler.

**Step 42)** - Green is Clean waste is hand carried through the ECF Metal and SNM detectors, out of the building, and to the Waste Staging Building.

**Step 43)** – Stage Green is Clean waste until a sufficient amount of Green is Clean waste accumulates for a shipment.

**Step 44)** – The Green as Clean waste is shipped to a sanitary landfill.

## **11.0 ISSUES/RISKS REQUIRING FURTHER INVESTIGATION/SOLUTION**

As part of this study, a summary review of issues/risks that would be applicable to PDC waste management was performed. The following issues/risks were identified and may be important to decision makers in the design of the PDC Project. The significance of the risk identified was not discussed, only that the risk may have some impact on the project.

- The process is still maturing. The layout of the PDC project is still in progress. The flow of waste through the process discussed in this study is preliminary and subject to change.
- The footprint may not be available for the required PDC Waste Management activities. The risk in the waste management path forward discussed in this study is that the facility may not have floor space for:
  - PDC Waste Management area in the Waste NDA area (with the HENC and GRAS)
  - The Pail and Drum Staging Rack in the Waste NDA area
  - IQ3 Low Level Waste Assay System in the Waste NDA area
- A Waste Staging Building outside of the main building must be available due to inadequate space inside the PDC Project area to load LLW into B-25s and staging of TRU/MTRU/LLW/Green is Clean waste.

## **12.0 SUMMARY**

TRU waste generated in the gloveboxes (except the HEU FSS gloveboxes) are placed in filtered bags, placed into CC, and placed into a WTC. The WTC is transferred to the TRU Waste Management Glovebox.

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In the TRU Waste Management Glovebox, the CC is removed from the WTC, and the TU waste package is removed from the CC. The TRU waste packages are segregated and placed with other waste of same TRUCON Code. The empty CC and WTC are returned to its originating glovebox. If rejected waste has been received from a failed SNM diversion check, the rejected waste is paired with an empty WTC, and sent back to its originating glovebox. The waste packages of the same TRUCON Code are placed into a drum through one of two drumports in the glovebox. The TRU waste drum is removed from the drumport, the drum lid is secured, and TID is installed.

The TRU waste drum is staged in the Waste Drum Staging Rack. The TRU waste drum is removed from the Waste Drum Staging Rack, and is weighed and undergoes TRU/LLW determination and NDA. Any TRU waste determined from TRU/LLW determination to be LLW will be segregated from TRU waste. The TRU Waste drum undergoes a SNM diversion check. Drums failing SNM diversion check are returned to the TRU Waste Management Glovebox for disposition. The TRU waste shipping drums will be transferred to the Waste Staging Building and then shipped to the E-Area.

TRU waste generated in the FSS is placed in a filtered bag in a CC, and bagged out into a pail. The pail is weighed, assayed, and undergoes IQ3. If the IQ3 determines that the waste is LLW, then the waste is transferred to a LLW drum and staged. The TRU waste pails are loaded into drums, assayed, and undergo SNM Diversion check. The drum is transferred to the Loading dock, transported to the Waste Staging Building, and shipped to the E-Area.

LLW will be collected, placed into bag, and if required, loaded into drums. Waste packages/pails which were determined to be LLW from IQ3 are received. If required, the LLW waste package/pails/drum will be weighed, assayed, and undergo SNM diversion check. Any LLW waste package/pail/drum failing the SNM diversion check will be returned to the TRU Waste Management Glovebox for reassessment and repackaging. The LLW waste package/pail/drum will be transferred to the Waste Staging Building. LLW waste packages/pails will be loaded into a B-25. Any LLW waste drums will be opened and their contents placed inside a B-25. The B-25 will be sealed, TID installed, and then shipped and dispositioned at E-Area.

Green is Clean waste will be collected and put into green translucent bags (Ref. 9). A SNM diversion check may be provided for the Green is Clean waste package, if required. The Green is Clean waste packages will be hand carried to the Waste Staging Building for staging. When a sufficient amount of Green is Clean waste accumulates for a shipment, the waste will be transferred to a sanitary landfill.

### 13.0 REFERENCES

- 1) G-FDD-K-00003, Rev. 0, Plutonium Preparation Facility, Facility Design Description for: Plutonium Preparation Facility, 2/24/09
- 2) SRR-354-99-001, Rev. 0, Pit Disassembly & Conversion Facility, Waste Management Study, 2/2002
- 3) Y-AES-K-00002, Rev. 0, NNSA, Refinement Study of the K-Area (KAC) Combination Project which provides Pit Disassembly and Conversion Capability and Plutonium Preparation Project Capability, 9/29/09 (UCNI)
- 4) M-SYD-K-0011, Rev. 0, Plutonium Preparation Facility, System Design Description for: Waste Management System (12) (WM), 2/25/09
- 5) SK-DA-WM-0007, Rev. A, Waste Management Strategy for the Plutonium Preparation Project in the K-Area Complex, 7/22/08
- 6) PDCF/PuP Design Transition Planning, Develop Criticality Safety Plan for Management of Waste Bag-out in KAC, 2/5/10
- 7) Q-PRP-F-00001, Rev. 1, Pit Disassembly and Conversion Facility, Waste Management Plan, 6/30/05
- 8) 1S, Savannah River Site Waste Acceptance Criteria Manual

PDC Solid Waste Management Block Flow Diagram - Figure 1

