4. SEQUENTIAL PROCESS NARRATIVE

This section describes the sequential process steps that are shown in the process logic diagrams in Appendix C. Subsections contain step-by-step text for each general operations process and include prerequisites that should be completed before beginning the process steps. The prerequisites provided are partial lists that will be enlarged upon as operations' procedures are generated.

An overview of the OU 7-10 Glovebox Excavator Method Project process is provided in Figure 30. Initial activities will focus on removal of the overburden soil, which will result in overburden soil sacks being dispositioned at the INEEL CERCLA Disposal Facility or returned to the pit to be reused as overburden. Upon completion of overburden removal, waste retrieval and packaging will commence. During this portion of the process, waste materials will be segregated into two basic waste streams, those being "soil/sludge" and "combustibles/metal debris." As wastes are processed, samples will be taken to characterize the waste material being packaged (including biased sampling for suspected nitrate-contaminated waste). In addition, if retrieved waste exhibits visual characteristics of 743 sludge, biased samples will be taken and provided to the OU 7-13/14 program for testing and analysis. Once sufficient waste zone materials have been retrieved to uncover underburden soil, core soil samples will be taken of the underburden. Underburden sampling will occur a couple of times during the waste retrieval effort, as more underburden soil is uncovered. These samples will be tested and analyzed along with the characterization samples mentioned above. When soil/sludge or combustibles/metal debris retrieved waste drum has been filled, the drum will be closed and removed from the facility and a new drum will be installed in its place. Filled waste drums are then stored onsite pending a decision on the final disposition. Once OU 7-10 Glovebox Excavator Method Project site waste has been retrieved and packaged, and underburden core soil samples have been taken, the process transitions into a shutdown and D&D&D stage.

4.1 Overburden Removal and Packaging

The overburden removal and packaging process begins when construction of facilities and assembly of hardware are complete, the Operational Readiness Review has been completed, and the project has received authorization for startup of operations. In addition, a number of prerequisite activities must be completed before beginning overburden removal and packaging operations. These prerequisite activities are noted in this narrative immediately before the step-by-step description provided for each general process. Figure 3 shows the layout of the Weather Enclosure Structure (WES), including the RCS, laydown area, and packaging gloveboxes. Personnel within the confinement area (RCS) perform the initial tasks in this process flow. These personnel use anti-contamination suits and respirators.

Based on probing data, overburden is retrieved to a depth of approximately 3.5 ft unless any of three conditions are encountered: (1) the protective hard-pack zone of overburden, (2) material identifiable as waste, or (3) contamination that exceeds the radiological work procedure limits. If any of these restrictions are encountered, the condition may be mitigated and overburden removal continued on other portions of the retrieval area that have not reached any of the three conditions. A hold point for uncontained liquids exists during all excavation activities. If uncontained free liquid is encountered, excavation activities cease until absorbent is added and all free liquid is stabilized.

Sections 3.2, 3.3, and 3.4 contain a description of the overburden removal and waste retrieval approaches, including the handling of probes.

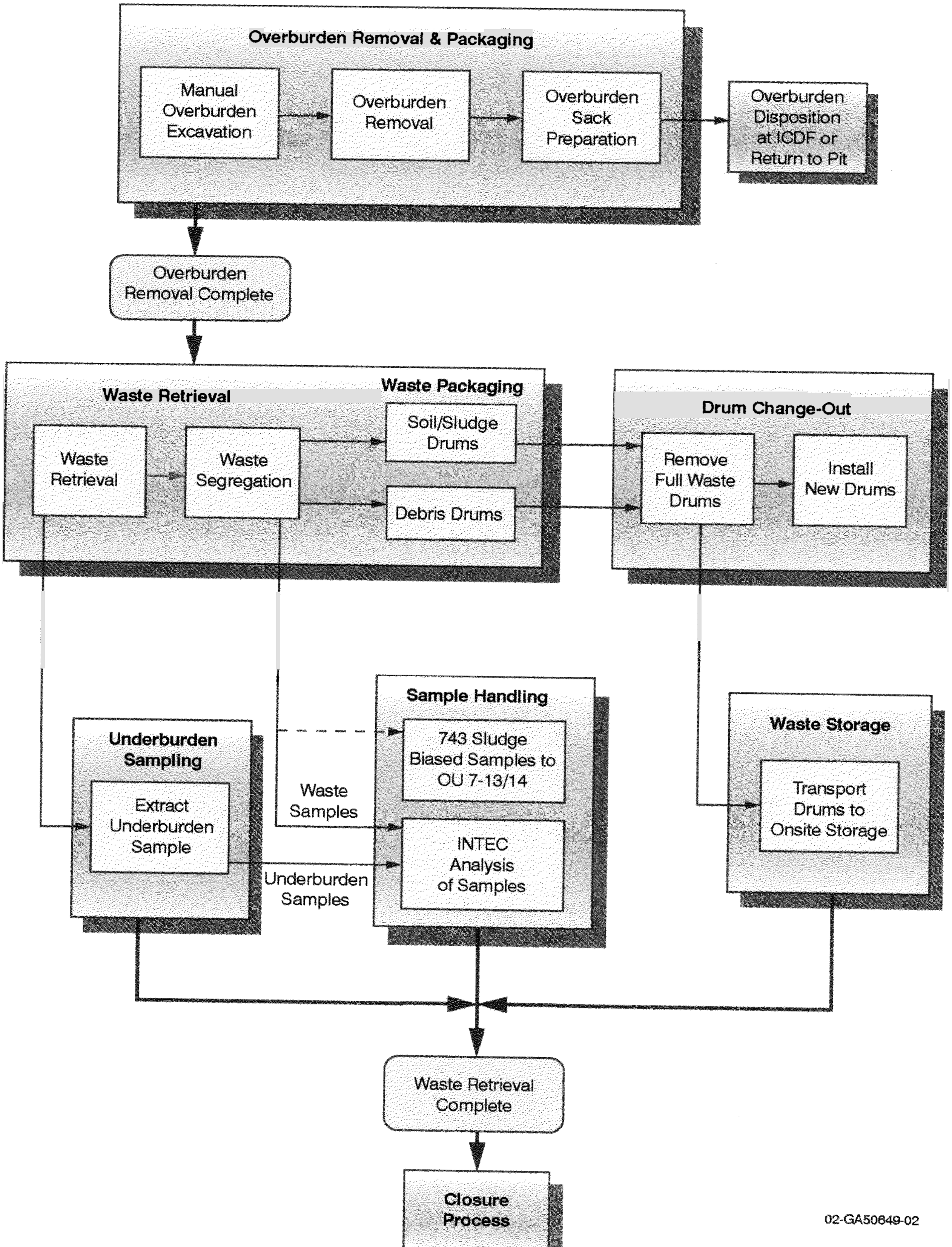

Figure 30. Operable Unit 7-10 Glovebox Excavator Method Project process overview.

4.1.1 Prerequisites to Overburden Removal

The following tasks and/or events are a partial list of what (listed in no particular order) must be completed before beginning overburden removal:

- Operational Readiness Review is completed and authorization to start operations is received.
- Probe ends are changed (one-time activity).
- All required materials and hardware are staged for operations: (1) in the RCS laydown area: soil sacks and boxes, motorized pallet jack, decontamination equipment, excavator end effector attached to excavator (clamshell bucket) and other end effectors staged on the RCS laydown area, RCT sampling equipment, chain railing, sand and absorbent; (2) in the vestibule: additional soil sacks, decontamination equipment, forklift or equivalent; (3) in the WES: RCT scalers, air monitor filters; and (4) other materials as identified (occurs with each shift change).
- Equipment pre-operation checklists are completed for the RCS heating, ventilation, and air conditioning (HVAC); excavator; RCS water supply for fire suppression and water spray systems; motorized pallet jack; forklift; and RCS closed-circuit television (CCTV)/video (occurs with each shift change). *Drivers: TFR 3.1.2.1-7, 3.2.2-3, 3.3.5-1, 3.3.7-2, and 3.3.7-3.*
- Water spray is applied to wet down the overburden soil and reduce the amount of dust generated during removal operations. NOTE: Water spray may be used intermittently during overburden removal.
- Radiological system input module (RSIM)/dosimetry checks for all personnel entering the WES are complete (occurs with each shift change). *Drivers: TFR 3.2.2-2, 3.2.5-2, and 3.3.1-2.*
- Personnel (RCTs, manual excavation crew, and soil sack support crew) are suited-up in appropriate PPE in preparation for entering the RCS (occurs with each crew change). *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.2.4-1.*
- CCTV and video recorders are turned on and functioning; change videotapes as required.
- Plan-of-the-day meeting is completed (occurs each day).
- Shift turnover is completed (occurs with each shift change).

4.1.2 Step-by-Step Descriptions

The following process steps are numbered the same as the process flow diagrams found in Appendix C, pages C-2 and C-3.

1.1 RCT Administrative Check of Air Inside the RCS. As part of the administrative checks preceding overburden excavation, a check is made of the air within the RCS. No air contamination issues are anticipated during overburden removal. To make this check, the RCT uses a portable fused filter head through the sample port in the RCS wall. The filter runs for 20 minutes collecting an adequate sample. The RCT then retrieves the filter and takes it to a "low background beta-alpha counter" (also known as a "scaler"). *Drivers: TFR 3.2.2-3, PDSA 2.4.1.1, and Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.2 Personnel Put on Appropriate PPE and Get Tools. Technicians and RCT personnel put on appropriate protective equipment, as determined by Radiological Control (RadCon) and Industrial Safety (e.g., two layers of anti-contamination suits and respirators), and gather the needed tools (e.g., shovels and picks) for use in performing manual excavation of the overburden. *Drivers: TFR 3.2.2-3, PDSA 2.4.1.1, and Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.3 Manual Excavation Crew Enters RCS with Tools. Technicians and RCT personnel, wearing appropriate PPE, enter the RCS area bringing with them appropriate tools for moving overburden soil from around the probe clusters and probes located near shoring walls. This soil cannot be reached by the excavator and therefore will be removed manually. An RCT enters the RCS as well, periodically monitoring the RCS for airborne contamination throughout the manual excavation process.
Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.2-3, 3.2.4-1, and 3.3.1-2.

1.4 Personnel Loosen Soil and Fill Bucket or Move Soil to Open Areas. Personnel loosen the overburden soil from around probes and move the soil to areas where the excavator can have access to it for removal. During this manual excavation process, a water spray system is used, as required, to minimize the amount of airborne dust. An RCT inside the RCS periodically monitors RCS air using a portable fused filter head. When an air sample is taken, the RCT hands the filter to another RCT in the personnel access room. The second RCT takes the filter to the "scaler" to get a contamination count while excavation continues. (Based on removal operation conditions, RCTs may pass filters out of the RCS via the bag-in/bag-out ports.) Depending on the duration of the manual excavation, personnel may leave the RCS dig area to rest, which would require removing and replacing PPE for reentry into the RCS dig area. Another crew may enter the RCS to continue the manual excavation, if deemed necessary by operations. *Driver: TFR 3.1.2.1-2.*

1.5 Manual Excavation Personnel Exit RCS. Once overburden soil has been moved from around the probes, materials and tools used to assist personnel in overburden movement are moved to the laydown area for decontamination and removal, and manual excavation personnel exit from the RCS. The RCT and soil sack support personnel remain in the RCS for excavation activities. Subsequent personnel exits and entries are not identified in the diagram, since these activities are not on the critical path and since they may occur anywhere in the process as deemed necessary by operations. (Task rotations will likely be made within the shift crew. Crewmembers may rotate from tasks inside the RCS to tasks within the WES.) *Drivers: TFR 3.2.4-1 and 3.3.1-2.*

1.6 Start/Restart Excavator. Operator completes excavator checkout and prepares for excavator startup. A checklist is completed to ensure that all personnel within the RCS (RCTs and the soil sack support crew) are in appropriate locations for the excavator to be started, along with other startup prerequisites. Once the checklist is completed, the operator starts the excavator and performs operating checks.
Drivers: TFR 3.1.2.1-2 and 3.2.4-1.

1.7 Excavator Prepares Soil and Takes Soil Scoop. Once all prerequisites have been completed, the excavator breaks up the overburden soil, as needed, and loads the excavator bucket (takes a scoop of soil). Working right to left (as viewed by the excavator operator), the excavator removes the overburden to a depth of about 2 ft across the entire dig area. Once the initial layer of overburden is removed, the excavator then returns to the right side of the pit and removes the last 1 to 1.5 ft of overburden across the entire dig area, subject to the same criteria as mentioned in the general process section above. During excavation, a water spray system is used, as required, to minimize the amount of airborne dust. Hold points exist throughout the excavation process to address abnormal materials and/or conditions (e.g., waste items, high contamination, and voids). Depending on the abnormal condition encountered, a recovery action will be developed and implemented. Excavation may continue, if deemed appropriate, using administrative controls. Finding abnormal items may indicate that the waste seam has been encountered and that overburden removal has been completed. If a void is uncovered during overburden removal, an evaluation will be made of its extent and a special procedure implemented to address the void. *Drivers: TFR 3.1.2.1-5, 3.1.2.1-6, and 3.1.2.1-7.*

1.8 Excavator Places Soil Scoop in Sack. The bucketful of overburden soil is loaded into a 4 × 4 × 4-ft soil sack. Loading is performed in the 35-degree wedge-shaped, laydown area next to the 145-degree fan-shaped digface (see Figure 3). The soil sack is draped inside a 4 × 4 × 4-ft box-shaped frame called a "cartridge assembly" and the sack handling straps are secured to tie-downs located along the cartridge base. The sack and cartridge are placed inside of a stainless-steel box, which is movable by a motorized pallet jack. Soil sack flaps are draped over the sides of the stainless-steel box to prevent soil from falling between the box and the soil sack, potentially contaminating the outside surface of the sack. The RCTs inside the RCS perform periodic surveys of the boxes to determine if contamination has been encountered in the overburden. Depending on circumstances, the RCT can guide removal location or may determine that waste has been encountered and that overburden removal is complete. More frequent surveys are expected to be performed as deeper layers of overburden are removed. Soil sack support personnel will be stationed inside the RCS to provide excavation support and to close and prepare soil sacks for removal. During this operation, the water spray system may be applied, as needed, to the digface to keep dust to a minimum. In addition, during the excavation process, the excavator operator will monitor the depth of excavation from a depth gauge on the excavator. (NOTE: A mark should be made on the shoring box at ground level to provide a calibration point should the excavator depth gauge require re-calibration.) Throughout this process, the industrial hygienist will monitor noise, VOCs, and dust levels as frequently as deemed necessary. *Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, 3.1.2.1-5, 3.1.2.1-6, 3.1.2.2-1, 3.1.2.5-2, 3.1.2.5-3, 3.2.2-1, and 3.2.4-1.*

1.9 Survey Bucket. After each scoop of soil has been loaded into a soil sack/box, an RCT may survey the soil that was just loaded and/or the excavator bucket for contamination. This survey reduces the risk of spreading contamination that may be encountered as overburden is removed. If contamination is noted, the RCT will stop excavation while RadCon and Operations management evaluate the contamination level and excavation conditions. (NOTE: Bucket surveys may be performed more frequently, as additional layers of overburden are removed.) *Drivers: TFR 3.1.2.1-2, 3.1.2.1-6, 3.1.2.5-2, 3.1.2.5-3, and 3.2.2-1.*

1.10 Dock Excavator Arm and Switch Off Ignition. When all of the soil sacks—which are staged in the laydown area—have been filled with overburden soil, the excavator arm is docked and the excavator ignition switched off. Excavator shutdown reduces the noise levels within the RCS and WES and reduces worker risk while the soil sacks are prepared for removal from the RCS. *Driver: TFR 3.2.4-1.*

1.11 RCT Checks Floor/Spillage for Contamination. The RCT within the RCS checks laydown floor and soil spillage for contamination around the soil sacks/boxes. If contamination is found, cleanup/decontamination activities are performed. *Driver: TFR 3.1.2.1-6.*

1.12 Clean around Boxes. Soil sack support crew personnel within the confinement area will clean/decontaminate around the soil sacks/boxes. This may include moving spilled soil from around the boxes and box removal paths in a non-aggressive manner to minimize dust (e.g., vacuum, horsetail). *Driver: TFR 3.1.2.1-6.*

1.13 Buckle Sack Straps for All Sacks. Technicians fold soil sack flaps over the overburden material within each sack and buckle the soil sack straps securing each sack. (A forklift, located in the vestibule, will use these straps to lift the soil sack out of the cartridge.) *Drivers: TFR 3.1.2.1-2, 3.1.2.5-2, and 3.1.2.5-3.*

1.14 RCT Checks RCS Air. Even through no air contamination issues are expected within the RCS, the RCT must check RCS air before allowing the RCS doors to be opened for soil sack removal. *Drivers: TFR 3.1.2.1-7 and 3.2.2-3; PDSA 2.4.1.1;and Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.15 Survey Boxes and Take Smears. The RCT scans the boxes and tops of the soil sacks and takes smears to check for surface contamination. The RCT takes these smears to another RCT in the personnel access room or passes them out through the bag-in/bag-out port. The second RCT takes the smears to a "scaler" to get a contamination count (two scalers are anticipated to be in the WES for this process). The RCT may clear the box for moving to the RCS door or direct that the soil sack and/or box be decontaminated, depending on the level of contamination found. If the sack remains contaminated after attempting to clean it, it will be placed in a second clean bag for removal from the RCS. *Drivers: TFR 3.1.2.1-6 and Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.16 Survey and Take Smears of RCS Door Area. The RCT takes approximately 10 smears of the area around the RCS doors (e.g., floors and doors) and again provides these smears to an RCT in the personnel access room who takes them to the "scaler" to get a contamination count. The RCT may clear the RCS door to be opened for removal of sacks/boxes from the RCS or may direct that the area be decontaminated, depending on the level of contamination. (NOTE: Under certain circumstances [i.e., during a weather inversion] radon monitoring may need to be performed, which will add time to this step.) *Drivers: TFR 3.2.2-3, 3.2.7-1, and 3.3.1-1; PDSA 2.4.1.1; and Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.17 Open RCS Door(s). The RCS confinement doors are opened into the vestibule area. *Driver: TFR 3.3.1-1.*

1.18 Move a Full Box to RCS Doors. A motorized pallet jack or similar device, which is staged within the RCS confinement, is used to move a full soil sack/box to the RCS confinement doors.

1.19 Remove Box Side Panel. A side panel from the soil box is removed or opened to facilitate removal of the soil sack and cartridge from within the RCS. (This step and subsequent steps may be modified as Design Engineering determines the most effective box design approach to use.)

1.20 Rig Sack and Cartridge to Lift. The RCS technicians prepare and rig the sack and cartridge, using the sack straps, for removal from the RCS. Vestibule technicians prepare a forklift or similar device for removing the soil sack. No RCS confinement personnel leave the confinement area, nor do any vestibule personnel enter the RCS confinement. *Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, 3.1.2.1-6, and 3.3.1-1.*

1.21 Lift and Pull Soil Sack and Cartridge from Box. A forklift or similar device within the vestibule lifts the cartridge containing a full soil sack until it no longer is resting on the box. The motorized pallet jack within the RCS then pulls the box back from the RCS door, fully exposing the cartridge and soil sack. *Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, 3.1.2.1-6, and 3.3.1-1.*

Two independent sets of activities now take place. The cartridge and soil sack follow one sequence (Steps 1.22.1, "Scan and Take Smears of Soil Sack," through 1.22.9, "Return to 'Open RCS Doors' and Wait for Next Boxes"), while the box follows another (Steps 1.23.2, "Scan and Take Smears of Box," through 1.23.4, "Move Box Back to Edge of Laydown Area").

1.22 Soil Sack Sequence of Steps

1.22.1 Scan and Take Smears of Soil Sack. An RCT in the RCS laydown area scans the cartridge and soil sack and takes approximately 10 smears of this hardware. The smears are taken to a scaler for counting. *Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, and 3.2.2-3.*

1.22.2 Based on Scan Results, Place Soil Sack on Blotter Paper in Vestibule. Based on finding no contamination from the RCT scan of the cartridge and soil sack in the RCS doorway, the cartridge and soil sack are then moved out of confinement into the vestibule and placed on blotter paper. The cartridge and sack remain in the vestibule until smear count results are received. If the scan indicates contamination on the cartridge or sack surface, the cartridge and/or sack will be cleaned and decontaminated and another scan will be made. If all of the hardware is now clean, it is released into the vestibule contamination buffer area. If the contamination remains, the soil sack is removed from the cartridge and placed inside another larger, clean sack, which is then closed. This double-bagged soil sack is then placed in the vestibule and is ready for release from the vestibule and movement to the WES door. For the majority of the soil sacks (i.e., those that find no contamination on the initial sack surface scan), the sack is lifted out of the cartridge, placed in the vestibule, and is ready for release from the vestibule once results from smear counts indicate no contamination. *Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, and 3.2.2-3; Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.22.3 Place New Soil Sack in Cartridge. Vestibule technicians place a new soil sack into the cartridge, securing the straps to the tie-downs along the cartridge base. The cartridge and sack are then staged for placement back into a stainless-steel box within RCS confinement.

1.22.4 Transport Sack to WES Door. The forklift or other device moves the released soil sack to a WES door in preparation for removal from the facility and outdoor storage.

1.22.5 Survey Sack for Removal from WES. An RCT scans and/or obtains smears of the sack surface as a final check before releasing the soil sack from the WES for outdoor storage. If no contamination is found, the sack is released, while finding contamination requires sack cleaning/decontamination and re-measurement of the soil sack by an RCT. If double bagging is required due to surface contamination, the soil sack is placed inside another clean sack and closed. *Drivers: TFR 3.1.2.1-2, 3.1.2.5-2, 3.1.2.5-3, 3.2.2-3, and 3.3.1-1; Manual 15A, Radiological Protection—INEEL Radiological Control.*

1.22.6 Open WES Door. Before opening the WES doors, a check must be made to ensure that the RCS doors are closed. Once the RCS doors are closed and the sack is cleared for removal, the WES doors are opened. *Drivers: TFR 3.1.2.1-2, 3.1.2.1-6, 3.2.2-3, and 3.3.1-1.*

1.22.7 Transport Sack to Outdoor Surface Storage. The soil sack is moved outside of the weather enclosure by a forklift (different from the vestibule forklift) and taken to a staging or disposal area (e.g., INEEL CERCLA Disposal Facility). No grading or flooring is required for this temporary storage. *Driver: TFR 3.1.2.5-1.*

1.22.8 Close WES Door. Once the soil sacks have been removed from the WES, the WES doors are closed. If overburden removal is complete, the process diverts to the waste retrieval process. *Drivers: TFR 3.1.2.1-2, 3.1.2.1-6, 3.2.2-3, and 3.3.1-1.*

1.22.9 Return to "Open RCS Doors" and Wait for Next Boxes. At this point, the process returns to the "Open RCS Doors" step (1.17) and awaits the next cycle of box removal from the RCS confinement.

1.23 Box Sequence of Steps

1.23.1 Overburden Removal Complete? Overburden is removed to a depth of 3.5 ft unless any of three conditions are encountered: (1) the protective hard-pack zone of overburden, (2) material identifiable as waste, or (3) contamination that exceeds the radiological work procedure limits. If any of these conditions are encountered, a determination will be made regarding further overburden removal. If the condition poses no threat to the rest of the overburden material or if the condition may be mitigated, overburden removal may be continued on other portions of the retrieval area that have not reached any of the above conditions. When overburden removal criteria for all the overburden removal area have been reached, the overburden removal process is complete (proceed to Section 4.2 of this document).
Drivers: TFR 3.1.2.1-1, 3.1.2.1-2, 3.1.2.1-5, 3.1.2.1-6, 3.1.2.2-1, and 3.2.2-3.

1.23.2 Scan and Take Smears of Box. The side panel of the box is replaced or closed and an RCT within the RCS confinement scans the box and takes approximately 10 smears of the box, inside and out. The smears are taken to a scaler for counting. If the smear count results show contamination on the box, the box is cleaned/decontaminated before placing a new cartridge and sack into the box.
Drivers: TFR 3.1.2.5-2, 3.1.2.5-3, and 3.2.2-3.

1.23.3 Place New Cartridge and Sack in Box. Technicians within the RCS move an empty stainless-steel box back to the RCS door after the cartridge and soil sack have been moved to the vestibule floor. Vestibule technicians move a new, empty soil sack and cartridge to the RCS door and place it in the box. The RCS technicians then replace the side panel on the stainless-steel box. *Drivers: TFR 3.1.2.5-2, 3.1.2.5-3, and 3.2.2-3.*

1.23.4 Move Box Back to Edge of Laydown Area. The motorized pallet jack or similar device moves the empty sack/box back to the edge of the laydown area and positions it for excavator loading. If another full soil sack/box remains in the RCS confinement, it is moved to the RCS door and process steps beginning with "Move a Full Box to RCS Doors" (Steps 1.18 through 1.23) are repeated. If all full soil sacks/boxes are now empty and in place for further overburden excavation, then the motorized pallet jack or similar device is parked on the laydown area in the RCS and the process proceeds to "Close RCS Doors" (Step 1.24).

1.24 Close RCS Doors. Once all of the full boxes are removed and empty boxes are placed in the RCS, the RCS confinement doors are closed and the process returns to the "Start/Restart Excavator" step (1.6) to fill and handle the next set of sacks/boxes. *Drivers: TFR 3.2.2-3, 3.2.7-1, 3.2.7-2, and 3.3.1-1.*

With the completion of overburden removal, the Glovebox Excavator Method transitions to waste retrieval activities. In order to prepare the RCS and the rest of the facility for these retrieval activities, several tasks must be pursued. Some of the hardware used for removing overburden must be decontaminated, disassembled or broken down (as applicable), and removed from the RCS. This includes, but is not limited to, cartridge assemblies, soil boxes, any soil sacks that may remain, overburden soil support tools (e.g., shovels and brooms), radiological control instrumentation and supplies (e.g., smears), and decontamination supplies. In addition, pallet jacks and any associated hardware must be decontaminated and moved out of confinement. RadCon technicians survey these pieces of hardware to ensure that they can be released from the RCS for potential use elsewhere.

Once overburden removal hardware has been removed, construction of the PGS transfer cart support structure for PGS No. 1 must be completed. This will involve bringing a support beam and transfer cart protection structural hardware into the RCS that must be attached to the glovebox and attached to the RCS floor. Excavator end effector stands will also be attached to the RCS laydown area floor, and several excavator end effectors will be placed on or near the stands. Liquid absorbent and fire retardant material containers will also be replenished, as required, during this transition time. In addition, hardware to support underburden sampling must be staged in the confinement area near the RCS glove ports. A partial list of this hardware is included in the prerequisites for waste retrieval in Section 4.2.

After all necessary tasks for transitioning from overburden removal to waste retrieval have been completed within the RCS, the RCS doors to the transfer vestibule are closed and technicians seal/tape the door joints.

4.2 Waste Retrieval and Packaging

The waste retrieval and packaging process begins after all of the overburden soil has been removed to a depth of 3.5 ft or when any of the following three conditions are encountered: (1) the protective hard-pack zone of overburden, (2) material identifiable as waste, or (3) contamination that exceeds PPE protection factor limits. Remaining overburden soil is designated as interstitial soil and, along with the interstitial soil, is handled as waste. Probes remaining in the retrieval area from previous projects will not be retrieved from the pit, but will be moved away from waste retrieval activities as deemed necessary by Operations to safely and effectively retrieve waste. (If probes are moved, they will likely be stacked at an incline in the southwest corner of the pit.) Waste materials will be retrieved beginning from the southwest portion of the pit (the far right side of the pit as seen by the excavator operator) and will work right to left, removing waste down to the underburden interface across the dig area (see Section 3.3 for a description and figures of the retrieval approach). This would bring the average depth of the pit to about 11 ft. This depth will vary depending on the elevation of the underlying basalt, on the amount of waste placed in any one area, and on any waste migration that may have occurred.

4.2.1 Waste Retrieval

Three digface/excavator objectives are used to guide waste retrieval activities:

- Minimize additional work effort required in the glovebox (i.e., do as much waste preparation as practical in the pit before moving the waste to the transfer cart).

- Size waste as much as practical before placing it into the transfer cart.

- Eliminate "Prohibited" waste from entering the glovebox. ("Prohibited" items are those that the storage facility's waste acceptance criteria prohibit from being stored onsite.)

The excavator will only place waste loads that are less than 350 lb in the transfer cart.

4.2.1.1 Prerequisites to Waste Retrieval. The following tasks and/or events are a partial list (not in any particular order) of what must be completed before beginning waste retrieval:

- All required materials and hardware are staged for operations: (1) in the RCS laydown area, sand and absorbent are present, excavator end effector (clamshell) is attached to excavator, and other end effectors are staged on RCS laydown area; (2) in PGS area, glovebox transfer carts are out in RCS, drums are attached to glovebox drum ports or drum-out port covers are in place; (3) in the WES, additional 55-gal and 85-gal drums are staged in the WES; and (4) other materials, as identified, are present (occurs with each shift change). *Drivers: TFR 3.3.7-1 and 3.3.7-4; PDSA 3.3.2.2.16.4 Bullets 5 and 6, and 9.4.2.1.7.*

- Equipment checklists are completed for HVAC, excavator, transfer carts, stack (air) monitoring system, radiation area monitors, continuous air monitors, criticality alarm system operable, fire system operable, water supply for fire suppression and dust suppression systems in RCS and gloveboxes, forklift, standby generator, pre-use inspection of PGS hoists, and CCTV (occurs with each shift change). *Drivers: TFR 3.1.2.1-7, 3.2.2-3,3.2.5-4, 3.3.5-1, 3.3.7-2, 3.3.7-3, and 3.3.7-4; PDSA 3.3.2.2.16.4 Bullets 5 and 6; and the Physical Security Plan.*

- Ventilation system is checked for adequate pressure differentials. (Outside of WES to inside of WES as measured inside the WES, -0.1 in. of water [iwg]. Inside the WES to inside the RCS as measured in the RCS, -0.6 iwg [occurs with each shift change]). *Driver: TFR 3.2.2-3.*

- PGS No. 1 transfer cart structure assembly completed, including attachment of the support beam to the RCS floor.

- End-effector stands attached to RCS floor.

- RSIM/dosimetry checks for all personnel entering WES are complete (occurs with each shift change). *Drivers: TFR 3.2.2-2 and 3.2.5-2.*

- Personnel are suited-up in appropriate PPE in preparation for working at the glovebox and in the drum loadout enclosure under the glovebox. Spotters are in place to guide and warn the excavator operator during waste retrieval activities (occurs with each crew change). *Drivers: TFR 3.2.4-1, 3.2.2-1, and 3.2.2-3.*

- CCTV and video recorders are turned on and functioning.

- Plan-of-the-day meeting is completed (occurs each day).

- Shift turnover is completed (occurs with each shift change).

4.2.1.2 Step-by-Step Descriptions. The following process steps are numbered the same as the process flow diagrams found in Appendix C, pages C-4, C-4a, and C-4b.

2.1 Excavator Prepares Digface. The excavator positions waste materials and "cleans" around waste objects in preparation for moving/lifting waste into the transfer cart. The excavator may also size larger objects (including intact drums that weigh more than 350 lb), using a moveable sizing tray and excavator end effectors. Several end effectors will be available for use during retrieval activities. The first end effector is a standard 16-in.-wide excavation bucket that holds approximately 3.25 ft^3. It can be used to dig overburden or waste as a normal backhoe bucket. The second end effector will be a 13.5-ft^3 (1/2 cubic yard) pin-on jaw bucket. This is a bucket that is split in the middle and acts like a two-jaw clamshell bucket when opened to supply a grasping/gripping effect. When closed, it operates as a standard 24-in.-wide bucket for digging overburden or waste. The jaws give the ability to pick up waste and drums by the clamshell action (the jaws open to 51 in.). This will be the normal end effector for delivering waste and drums to the glovebox cart due to its larger volume capacity, better volume control, and its ability to perform multiple tasks. The jaw bucket will also be used to pull and handle the probes and any outliers that may be encountered in the pit. The third end effector is a hydraulic hammer. It, as well as all of these end effectors, will be fitted with an attachment yoke for remote changing. The end of the anvil can be used to break up solidified waste or drums, if necessary. The anvil could also be equipped with a chisel bit or spade for cutting drums in the pit that weigh in excess of 350 lb. Water spray may be applied, as needed, to the digface surface before and during excavation, to reduce dust generation and spread of contamination. The dust suppression system includes both water spray and fogging capabilities, which are used as required to reduce airborne contamination. When the dust suppression system is used, HVAC operations will be monitored to ensure that adequate airflow is maintained (e.g., prevent clogged or wetted filters). *Drivers: TFR 3.1.2.1-3, 3.1.2.1-4, 3.1.2.1-5, 3.1.2.2-3, and 3.1.3-1.*

2.2 Visual Monitoring of Digface. During digface activities, spotters watch excavation activities and assist the excavator operator in positioning the bucket, identifying outliers/prohibited items, spotting free liquids, and generally providing guidance regarding waste retrieval activity, as needed. Spotters and the excavator operator communicate via radio sets. Hold points exist throughout the process to address abnormal materials or conditions. Special (additional) procedures may be implemented when abnormal materials/items or conditions are encountered. In the case of free liquids, absorbent is applied to the liquid in the pit to stabilize it before placing it in the transfer cart. While the liquid is being absorbed and stabilized, other waste materials may be prepared and retrieved. *Drivers: TFR 3.1.2.1-5, 3.1.2.2-4, and 3.2.4-1; PDSA 2.5.2.2 and 2.5.2.3.*

2.3 Excavator Takes Waste Scoop or Grabs Waste Object. The excavator arm is deployed and the excavator bucket is filled with waste or grabs a waste object. The target batch size is 2–2.5 ft^3, weighing less than 350 lb (approximately two batches fit into each 55-gal drum). If a batch exceeds the 350-lb limit, the load is replaced in the pit and a smaller batch is taken or the load is sized. The excavator has an onboard weighing system to determine waste load weight. If an intact drum is within the weight limit, the excavator will be capable of delivering it to the glovebox transfer cart. If an intact drum is encountered, additional detailed steps provided in Steps 2.3.1 through 2.3.31 (see Section 4.2.1.2.2) are followed. Otherwise, continue to Step 2.4. As mentioned above, waste items will be sized as much as possible before placing them into the transfer cart to minimize sizing and handling activities in the glovebox. The end effectors mentioned above (e.g., clamshell bucket and hydraulic hammer) are the principal tools used for sizing. These end effectors are designed to be remotely changed (i.e., personnel are not required to enter the RCS to change end effectors), although they may require moving the end effector to a glove port in the RCS wall to make or break hydraulic connections. The general steps needed to change end effectors are provided below in Section 4.2.1.2.1. A record of the waste materials being excavated will be kept. (Record media are still being determined [e.g., audio, video, or written log].) *Drivers: TFR 3.1.2.1-3, 3.1.2.1-4, 3.1.2.1-5, 3.1.2.2-2, and 3.4.4-1.*

4.2.1.2.1 End Effector Exchange Process

4.2.1.2.1.1 Step-by-Step Descriptions. The following process steps are numbered the same as the process flow diagrams in Appendix C, pages C-4a and C-4b.

2.3.Ex1 Move Excavator Arm and End Effector to RCS Wall Glove Ports. The excavator operator moves the excavator arm and end effector to the RCS wall glove ports to begin the end effector exchange process. This is done for those end effectors that have hydraulic connections that must be disconnected before the end effector can be removed. *Driver: TFR 3.2.6-1.*

2.3.Ex2 Shutdown Excavator Hydraulics and Vent Pressure. The excavator operator shuts down excavator hydraulics and vents hydraulic pressure prior to allowing technicians to work on the end effector. *Driver: TFR 3.2.6-1.*

2.3.Ex3 Disconnect Hydraulic Lines. The RCS glove port technicians disconnect the quick connect hydraulic lines for the end effector in use. *Driver: TFR 3.2.6-1.*

2.3.Ex4 Start Hydraulics and Move Arm and End Effector to RCS Laydown Area. The excavator operator starts the excavator hydraulics and moves the arm and end effector to the RCS laydown area.
Driver: TFR 3.2.6-1.

2.3.Ex5 Set End Effector Down and Unlatch Remotely. The excavator operator sets the end effector on the RCS laydown area (in an end-effector stand for some end effectors) and unlatches it remotely (i.e., from the excavator outside of the RCS). *Driver: TFR 3.2.6-1.*

2.3.Ex6 Move Arm to New End Effector and Latch Remotely. The excavator operator moves the excavator arm away from the unlatched end effector and moves it to the new end effort. After positioning the excavator arm at the new end effector, the excavator operator latches the new end effector remotely. *Driver: TFR 3.2.6-1.*

2.3.Ex7 Move Excavator Arm and End Effector to RCS Wall Glove Ports. The excavator operator moves the newly latched end effector and arm to the RCS wall glove ports for connection of hydraulic lines. If the new end effector does not have hydraulic lines to connect, the exchange process is complete and the new end effector may be used in excavation. *Driver: TFR 3.2.6-1.*

2.3.Ex8 Shut Down Excavator Hydraulics and Vent Pressure. The excavator operator shuts down excavator hydraulics and vents hydraulic pressure prior to allowing technicians to work on the end effector. *Driver: TFR 3.2.6-1.*

2.3.Ex9 Connect Hydraulic Lines. The RCS glove port technicians connect the quick-connect hydraulic lines for the new end effector. *Driver: TFR 3.2.6-1.*

2.3.Ex10 Start Hydraulics and Use New End Effector in Excavation. The excavator operator starts the excavator hydraulics and moves the arm and end effector to the excavation area for further retrieval activities. *Driver: TFR 3.2.6-1.*

4.2.1.2.2 Drum Breakup

Intact drums may be staged within the excavation area. This enables more effective processing of intact drums.

4.2.1.2.2.1 Step-by-Step Descriptions.

2.3.1 Excavator Encounters an Intact Drum. The excavator operator uncovers and identifies an intact drum.

2.3.2 Excavate around Intact Drum. The excavator operator removes materials from around the drum and prepares the area for grappling the drum. *Driver: TFR 3.3.1-3.*

2.3.3 16-Inch Bucket or Hammer in Use? If the excavator is using the 16-in. bucket or the hydraulic hammer, then the excavator operator must exchange either of these end effectors for the 24-in. jaw bucket (i.e., clamshell bucket). If the hammer is attached at this time, then the excavator arm must be moved to the RCS glove ports to disconnect hammer hydraulics. Once the hydraulics are disconnected, if the hammer is in use, then the excavator arm is moved to the RCS laydown area and the 16-in. bucket or the hammer is disconnected and the jaw is connected to the excavator arm. The excavator arm is then moved back to the RCS glove ports to connect the jaw hydraulics, after which it is ready for use.

2.3.4 Grab Puncture Tool from Laydown Area Using Jaw Bucket. After the jaw bucket is attached to the excavator, the operator moves the bucket to the RCS laydown area and grabs the drum puncture tool utilizing the clamshell operation of the Jaw Bucket. *Drivers: TFR 3.2.2-1 and 3.2.4-1.*

2.3.5 Excavator Punctures Intact Drum. Before handling the drum, the excavator operator moves the excavator arm and puncture tool to the intact drum and punctures the drum with the tool to release any gases that may have built up inside. *Drivers: TFR 3.2.2-1, 3.2.4-1, and 3.3.7-1.*

2.3.6 Replace Puncture Tool. The excavator operator moves the excavator arm back to the RCS laydown area and replaces the puncture tool in its storage sheath.

2.3.7 Excavator Picks up Drum with Jaw Bucket and Weighs Drum. The excavator arm moves back and grapples the intact drum. Once grappled, the excavator weighs the drum to determine whether sizing will be required before placement of the drum/waste into the PGS transfer cart. *Driver: TFR 3.3.1-3.*

2.3.8 Drum Weight >350 lb? If the drum weighs less than 350 lb, then it may be placed directly into the PGS transfer cart for packaging or may be sized before placing it into the transfer cart, as determined by the excavator operator. The process then moves to Step 2.9. If the drum weighs more than 350 lb, it will be sized and the process moves to Step 2.3.9. *Drivers: TFR 3.1.2.2-3, 3.3.1-3, and 3.3.1-4.*

2.3.9 Lay Drum within Excavation Site. If the drum weighs more than 350 lb, then it is placed back within the excavation site and the process for sizing is initiated. *Driver: TFR 3.1.2.2-3.*

2.3.10 Disconnect Jaw Bucket and Grapple DST. The excavator operator disconnects the jaw bucket (including hydraulics) and grapples the DST on the RCS laydown area.

2.3.11 Place DST in Excavation Site and Disconnect. The excavator operator moves the DST from the RCS laydown area to the excavation site in preparation for breaking up a drum or waste. After placing the DST on the excavation floor, the excavator operator disconnects the DST. *Driver: TFR 3.1.2.2-3.*

2.3.12 Reconnect Jaw Bucket. The excavator operator moves the arm back to the RCS laydown area and reconnects the jaw bucket (including hydraulics).

2.3.13 Grapple Drum and Place within DST. The excavator is moved to the excavation site and the operator uses the jaw bucket to grapple the intact drum and places it within the DST. *Driver: TFR 3.3.1-3.*

2.3.14 Attempt to Break Up Drum with Jaw. Once a drum has been placed into the DST, the excavator operator attempts to break up the drum using the jaw bucket. *Driver: TFR 3.1.2.2-3.*

2.3.15 Drum Broken Up? If the drum is broken up using the jaw bucket, the process jumps to Step 2.3.30, which saves processing time by not having to use the hydraulic hammer and spade. If, on the other hand, the jaw bucket is unable to break up the drum, the process proceeds to Step 2.3.16.

2.3.16 Disconnect Jaw Bucket and Connect Hammer and Spade. The excavator operator, with assistance from RCS glove port technicians, disconnects the jaw bucket and attaches the hydraulic hammer and spade tool. *Driver: TFR 3.1.2.2-3.*

2.3.17 Attempt to Break Up Drum with Hammer and Spade. With the spade attached to the hydraulic hammer, the excavator operator moves the hammer and spade to the DST and attempts to break up the drum. *Driver: TFR 3.1.2.2-3.*

2.3.18 Drum Broken Up? If the drum is broken apart sufficient to reduce excavator loads to less than 350 lb, the process moves to the next step for further handling and packaging. If the drum cannot be broken up using the hydraulic hammer and spade, then the drum is considered outside the performance baseline and is replaced in the excavation area. A record is made identifying the drum and the process proceeds to Step 2.3.29 to remove the DST from the excavation area.

2.3.19 Disconnect Hammer and Spade and Connect Jaw Bucket. The excavator operator, with the assistance of RCS glove port technicians, disconnects and removes the spade tool and hydraulic hammer. Then, the jaw bucket is reconnected to the excavator arm.

2.3.20 Grapple Drum and Empty Contents into DST. The excavator operator moves the excavator arm over the DST and grapples a drum shell fragment or portion of a broken up drum. The operator then manipulates the arm, jaw bucket, and drum so as to empty as much of the contents from within the drum shell fragment as possible. *Driver: TFR 3.1.2.2-3.*

2.3.21 Grapple Drum Shell and Place in PGS Transfer Cart. Once the drum shell fragment has been emptied of as much waste as possible, the excavator operator lifts the drum shell and weighs it to ensure that it is less than 350 lb, then places the drum shell into a PGS transfer cart. Movement of the drum shell to the transfer cart will be performed to avoid collision with RCS structures and to minimize cross contamination. If additional sizing is required, the process returns to Step 2.3.16. *Driver: TFR 3.1.2.2-2.*

2.3.22 Drum Fits through RCS/PGS Opening? If the drum or drum shell that has been placed into a PGS transfer cart fits through the RCS/PGS opening, then the process proceeds to Step 2.3.23 for further packaging. Otherwise, if the drum or drum shell does not fit into this opening, the excavator operator maneuvers the arm such that the drum or drum shell can be grappled and replaced in the excavation site floor. Additional sizing is performed on the drum using the jaw bucket to reduce the drum size and the drum is then placed back into the transfer cart for further processing. *Driver: TFR 3.1.2.2-3.*

2.3.23 Go to Step 2.9 for Waste Packaging. Once a waste load (i.e., drum, drum shell, or waste) fits into the PGS, the process moves to Step 2.9.

2.3.24 Free Liquids in DST? After placing a drum shell into the PGS transfer cart, the excavator operator returns to the DST and evaluates the drum contents. If there are free liquids in the DST, the process proceeds to the next step; otherwise, jump to Step 2.3.27. *Driver: TFR 3.1.2.2-4.*

2.3.25 Retrieve Absorbent with Jaw. If free liquids were found in the DST, the excavator operator moves the jaw bucket to the absorbent box and scoops absorbent material. *Driver: TFR 3.1.2.2-4.*

2.3.26 Apply Absorbent, Mix, and Stabilize. After scooping absorbent material, the excavator operator maneuvers the bucket over the DST and applies the absorbent to the free liquid. As needed, the absorbent is mixed into the liquid to stabilize it. *Driver: TFR 3.1.2.2-4.*

2.3.27 Scoop DST Waste Contents and Place in PGS Transfer Cart. After stabilizing any free liquids, if this was required, the excavator operator scoops/removes the waste from within the DST and places this waste load into a PGS transfer cart. *Driver: TFR 3.1.2.2-2.*

2.3.28 Go to Step 2.9 for Waste Packaging. Once a waste load (i.e., drum, drum shell, or waste) fits into the PGS, the process moves to Step 2.9.

2.3.29 Disconnect Jaw Bucket and Grapple DST. Once the waste has been removed from the DST, the excavator operator and technicians disconnect the jaw bucket and return the excavator arm to the excavation area where the DST is located. The excavator operator then grapples the DST.

2.3.30 Reconnect Jaw Bucket. The excavator operator lifts the DST and moves it back to the RCS laydown area for staging until it is needed again. The excavator operator and technicians reconnect the jaw bucket.

2.3.31 Go to Step 2.1 and Resume Waste Retrieval Operations. With the jaw bucket reattached to the excavator arm, the excavator is ready to resume waste retrieval operations (beginning at Step 2.1).

2.4 Prohibited or Outlier Items in Dig Area? If the storage facility's waste acceptance criteria prohibited items or other outliers are seen, the load may be replaced back in the pit and special procedures followed (absorbing and stabilizing liquids; leaving large, unsizeable objects in the pit; etc.). If such an item is encountered, operations may be impacted. Additional work required to recover from the situation is considered outside the project performance baseline. *Drivers: TFR 3.1.2.1-5, 3.2.2-3, and 3.2.4-1; PDSA 2.5.2-2 and 2.5.2-3.*

2.5 Position Bucket near Transfer Cart. The loaded bucket of waste is then moved toward the available transfer cart and the bucket is positioned over the transfer cart, but the load is not placed into the cart.

2.6 RCT Measures Waste Radiological Level. An RCT positioned on the outside of the RCS wall measures the waste load for radiological activity. This is a coarse screening for very high radiological materials. If a waste load is cleared by the RCT, it is ready to be loaded in a transfer cart. If the load has a high reading (RadCon practical operating limit based on the distance from the bucket and shielding provided by the bucket), it is replaced in the pit. The waste load's original location in the pit is recorded (radius, angle, and depth—see Step 2.7), as well as its new location. Recovery from this condition is beyond the project performance baseline. *Drivers: TFR 3.2.2-1 and 3.2.2-3.*

2.7 Spray Glovebox Cart. Localized dust suppression (e.g., water spray) is turned on to prevent or minimize the spread of contamination when the waste load is dumped into the transfer cart, if needed. The dust suppression system is turned off before moving the cart into the glovebox. *Drivers: TFR 3.1.2.1-7 and 3.3.1-4.*

2.8 Place Waste into Glovebox Cart. The excavator bucket is positioned at the appropriate height and then moved over the transfer cart, and the contents of the bucket are dumped into the transfer cart. The transfer cart is a moveable cart that can be passed into and out from the glovebox. The transfer cart has a removable liner to assist in emptying the cart while minimizing the spread of contamination within the glovebox. When a waste load is placed into a transfer cart, the general location from which the waste was retrieved in the pit is recorded. Waste location is noted using a coarse coordinate system, which identifies the distance from the excavator (radius), the excavator arm angle (horizontal), and the depth. *Driver: TFR 3.1.2.2-2.*

2.9 Move Cart into Glovebox. The transfer cart screw is activated, moving the cart and contents inside the glovebox. Glovebox operations personnel remove their arms from the gloves and pull the gloves out of the glovebox while the cart is entering. *Drivers: TFR 3.1.2.2-2 and 3.2.4-1.*

4.2.1.2.3 Probe Relocation

4.2.1.2.3.1 Prerequisites to Probe Relocation. The following tasks and/or events are a partial list (not in any particular order) of what must be completed before beginning probe removal (i.e., movement within the RCS). Also see Section 3.4 for a description of the probe relocation approach, including rationale for relocating or leaving specific probes.

- Equipment checklists are completed for the excavator and CCTV system (occurs with each shift change)
- Spotter(s) are in place to guide/warn excavator operator during movement of probes.

4.2.1.2.3.2 Step-by-Step Descriptions. Before overburden removal, using RCT support, all existing probe caps are replaced with caps that allow the clamshell bucket to grasp the probes more securely. During waste retrieval, operators may choose to prepare a probe for relocation within the pit because the probe is obstructing retrieval operations or because it is loose and might fall over, possibly damaging part of the RCS. If a probe needs to be relocated, the following general steps are followed.

<u>2.10.1 Excavator Prepares and Removes Soil/Waste around Probe</u>. As soil and waste retrieval processes continue, the excavator prepares and removes soil and waste from around probes. *Driver: TFR 3.2.8-1.*

<u>2.10.2 Excavator Grabs Probe</u>. When sufficient material has been removed from around probes, the excavator grabs the top portion of the probe and moves the probe back and forth, as needed, in order to loosen it from the remaining waste, underburden, and whatever basalt it may be driven in to. *Driver: TFR 3.2.8-1.*

<u>2.10.3 Excavator Pulls Probe from Waste</u>. When the excavator operator believes that the probe is sufficiently loosened/dislodged, the excavator lifts the probe out of the waste, underburden, and possibly basalt. Additional loosening and dislodging may be required, as judged by the excavator operator and spotters. Lift height is administratively controlled to mitigate risk to the RCS from inadvertently releasing a probe. *Driver: TFR 3.2.8-1.*

<u>2.10.4 Place Probe on Side of Pit</u>. Upon dislodging the probe and lifting it, the excavator moves the probe to an area of the pit away from waste retrieval operations (likely the southwest corner of the pit) and lays it at an incline on the soil surface. Again, movement is performed to avoid collisions with RCS structures. Ideally, the bottom of the probe should rest on the underburden surface and the top of the probe should lie near the bottom of the shoring box. The process proceeds with waste retrieval or retrieval of another probe. *Driver: TFR 3.2.8-1.*

Additional movement of probes may be required for D&D&D. If this occurs, Operations personnel will have to determine the appropriate location within the pit to place the probes. Probes will not be removed from the RCS. They should be left in the pit once project retrieval and underburden sampling objectives are completed (see Section 8, "Shutdown and D&D&D").

4.2.2 Waste Packaging

A waste batch that is brought into the glovebox may be one of several types, in one of several conditions. The batch may be an intact empty drum, an intact waste-filled drum, a partially decayed/broken drum in any state of decay, waste objects mixed with drum remnants, or waste objects with no apparent drum remnants. The batch may also be waste objects and/or drum remnants mixed with soils and/or sludges, or the batch may be soils and/or sludges with or without apparent waste objects or drum remnants. Waste processing and packaging steps are dependent on the waste type. Hold points exist throughout the process including, but not limited to, encountering suspect HEPA filter material (fissile measurement), project outliers, and items requiring special handling. Special procedures will be in place to direct activities when these hold points are encountered. It should be noted that combustible materials that are not suspected HEPA filter materials will be separated from soils and sludges and will be packaged with metal debris.

In addition, operations procedures will include administrative steps to increase the efficiency of drum loading. One of those steps addresses transfer cart liners. Transfer cart liners are designed and constructed with a cylindrical bottom, which holds 2.5 ft^3 of material. When filled, two of these cylindrical loads fill a 55-gal drum. When PGS operators lift a transfer cart liner, they will make a visual assessment as to whether the waste load is over the 2.5-ft^3 fill line. If there is more than 2.5 ft^3 in a liner and it is the first load being placed into a drum, the waste will be placed into the drum and PGS operators will communicate with the excavator operator, requesting that a slightly smaller load be placed into that PGS transfer cart the next time it is loaded. If PGS operators have already loaded a drum with one liner of waste and the next liner has more than 2.5 ft^3 of waste, the load will be placed back on the transfer cart and part of the load moved to the second cart. Once enough material is removed such that there is 2.5 ft^3 of waste or less in the liner, it is lifted and placed in the drum. The PGS operators again communicate with the excavator operator to place a slightly smaller load into the PGS transfer cart, and the extra materials in the second cart are then combined with this next load and placed in a new drum. By monitoring the waste load size as described above, PGS operators increase drum loading efficiency and avoid time-consuming repackaging steps that would be required if a drum was overfilled.

4.2.2.1 Prerequisites to Waste Packaging. The following tasks and/or events are a partial list (not listed in any particular order) of what must be completed before beginning waste packaging:

- All required materials and hardware are staged for operations: (1) in the PGS, glovebox tools, transfer cart liners, sampling materials, gloves, magnesium oxide sand, an absorbent material, drum-out port covers, and drums attached to drum-out ports are present; (2) in the WES, 55-gal and 85-gal drums with liners and bags staged within the WES, associated drum lids and filters, sampling materials, and gloves are present; (3) in the drum loadout enclosure (DLE), bag clamps and tape are present; and (4) other materials, as identified, are present (occurs with each shift change). *Drivers: TFR 3.1.2.4-1 and 3.2.4-1.*

- Equipment checklists are completed for the glovebox HVAC, glovebox water supply for fire suppression and dust suppression systems, transfer cart, stack (air) monitoring system, standby generator, criticality alarm system operable, fire system operable, fissile monitor (NOTE: Fissile monitor requires an ~24-hour lead time before being used for making measurements.), radiation area monitors, continuous air monitors, and glovebox CCTV and video recorders (occurs with each shift change). *Drivers: TFR 3.2.2-1, 3.2.3-4, 3.2.4-1, 3.2.5-4, 3.3.5-1, 3.3.5-2, 3.3.6-1, 3.3.7-1, 3.3.7-2, 3.3.7-3, and 3.3.7-4.*

- Ventilation system is checked for adequate pressure differentials. (Outside of WES to inside of WES as measured inside the WES, -0.1 iwg. Inside the WES to inside the RCS as measured in the RCS, -0.6 iwg.) (occurs with each shift change). *Drivers: TFR 3.1.1.2-3, 3.2.2-3, 3.2.7-1, and 3.2.7-2.*

- RSIM/dosimetry checks for all personnel entering WES are complete (occurs with each shift change). *Drivers: TFR 3.2.2-2 and 3.2.5-2.*

- Personnel are suited-up in appropriate PPE (occurs with each crew change). *Drivers: TFR 3.2.4-1 and 3.2.2-1.*

- Glovebox CCTV and video recorders are turned on and functioning (occurs with each shift change). *Drivers: TFR 3.3.6-1 and 3.5.1-2.*

- Plan-of-the-day meeting is completed (occurs each day).

- Shift turnover is completed (occurs with each shift change).

4.2.2.2 Step-by-Step Descriptions. The following process steps are numbered the same as the process flow diagrams found in Appendix C, page C-5 and C-6.

2.11 Perform Radiological Survey throughout PGS Ops. Once the soil/waste load is moved into the glovebox, an RCT monitors radiological levels throughout the packaging process within the glovebox. This is performed from outside of the glovebox confinement boundary near the window personnel are working at and is performed as frequently as is deemed necessary by the RCT. If the soil/waste load has a high reading (i.e., >200 mR/hr contact reading; see *Manual 15A, Radiological Protection—INEEL Radiological Control*), the cart is moved back out of the glovebox and a hold point will be implemented. Recovery is outside the project performance baseline and will be handled on a case-by-case basis. *Drivers: TFR 3.2.1-1, 3.2.2-1, and 3.2.2-3.*

2.12 Intact Drum or Large Metal Pieces? At this point in the process, several questions are asked to identify the type of waste material that is being processed. Based on visual observation, Operations determines whether the waste load is a punctured, intact drum or contains large metal pieces. If the load fits this description, then the process flow diverts to "Handle Metal Items and/or Open Drum" processes (Steps 2.12.1 through 2.12.6, which are described in the waste packaging diversion section located after Step 2.31). Otherwise, the process flow proceeds to "Rake through Cart Contents and Visually Examine Contents." *Driver: TFR 3.1.2.1-4.*

2.13 Rake through Cart Contents and Visually Examine Contents. The waste contents of the lined transfer cart are visually examined. If necessary, tools (e.g., long-reach trowel, fork, cultivator, hoe, and metal snips) are used to move, search among, and identify the contents. Items of particular interest, requiring unique handling steps, include metal objects (to include drum remnants in various stages of decay), predefined outliers and applicable storage facility WAC prohibited items, unidentifiable combustibles, and uncontained free liquids. A record must be kept of the waste that is processed and packaged through the glovebox (a combination of audio, video, and written records may be used). The function of the visual examination is to verify and provide written documentation that no prohibited items are placed in waste drums and to document the general description of the waste matrix (i.e., soil/gravel versus debris). Two visual examination inspectors (one inspector verifies the observations of the other) are required for each packaging operation. Waste materials will be tracked to the drum they were placed in.
Drivers: TFR 3.1.2.2-4, 3.2.6-1, 3.3.1-5, 3.5.1-2, 3.5.5-1, and 3.5.5-4; Conceptual Design Report 3.1.4 Paragraphs 3 and 7; Data Quality Objectives.

2.14 Metal Debris Present? If metal debris is present, then the process flow diverts to "Handle Metal Items and/or Open Drum" (Step 2.12.1, which is described in the waste packaging diversion section located after Step 2.31). Otherwise, the waste material handling process continues to another decision point, "Combustible Non-HEPA Materials Present?" (Step 2.15). Only large metal pieces (i.e., metal debris) and drum remnants will be placed in 85-gal overpack drums. All other materials are placed in standard 55-gal drums. *Drivers: TFR 3.1.2.1-4, 3.1.2.2-2, and 3.1.2.4-2;PDSA.*

2.15 Combustible Non-HEPA Materials Present? If combustible, non-HEPA filter materials are present, then the operators remove these materials from the transfer cart and place them in the drum (55 or 85 gal) designated for debris (metal or combustible). Combustible, non-HEPA filter materials are thereby separated from soils and sludges. If there are no combustible, non-HEPA filter materials, the waste material handling process continues to another decision point ("Outliers Present?").

2.16 Outliers Present? Any materials beyond the "expected" wastes are considered outliers. The expected waste streams for this project are combustible waste, non-combustible waste, Series 741 through 745 sludge, graphite, empty drums, beryllium-contaminated waste, liquid polychlorinated biphenyls, and pyrophoric materials. If PGS operators determine that the waste in the cart contains an outlier(s), then the process flow diverts to Step 2.17 ("Special Handling to Mitigate Items?"). Otherwise, the process continues to Step 2.21, "Bag In Sampling and Decontamination Materials." *Drivers: PDSA and the Project Execution Plan.*

2.17 Special Handling to Mitigate Items? If PGS operators identify the outlier waste as being free liquid, suspect HEPA filter material, or items that can be segregated and packaged for separate onsite storage, then the process flow moves to the appropriate process block (i.e., "Free Liquids," "Suspect HEPA Filter Material," or "Segregate and Package Materials"). Materials so identified are within the project performance baseline and can be handled/processed. If the outlier waste does not fit one of these categories, then it is considered to be beyond the project baseline. Materials that are included in the "Segregate and Package" category are elemental mercury and pressurized aerosol canisters. *Drivers: PDSA and the Project Execution Plan.*

2.18 Uncontained, Free Liquids. If uncontained/unabsorbed free liquids are present in the cart liner, then the process flow diverts to "Sample Free Liquid" (Step 2.18.1, which is described in the waste packaging diversion section located after Step 2.31). When technicians have dealt with the free liquids, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.1.2.2-2 and 3.1.2.2-4.*

2.19 Suspect HEPA Materials. If an object is suspected of containing fissile material (e.g., HEPA filter material and graphite chunk) or if combustible material is found (i.e., fibrous material that cannot be readily identified as booties, gloves, other PPE, or other combustible material that is not HEPA material), then the process flow diverts to "Monitor for Fissile Content" (Step 2.19.1, which is described in the waste packaging diversion section located after Step 2.31). Operators will have an operator-aid binder containing pictures/descriptions of these kinds of items in addition to the training to learn how to visually identify these items. When technicians have addressed the suspect HEPA material, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.2.3-1 and 3.2.3-2, PDSA 2.4.1.2, and the Conceptual Design Report 3.1.2 Paragraph 7 Bullet 3.*

2.20 Segregate and Separately Package. Of the materials that are "possible waste materials," uncontainerized mercury in concentrations greater than 1,000 ppm and pressurized aerosol cans or canisters, if found in the transfer cart, may be processed by PGS technicians, but must be segregated and identified. These materials are sent directly to onsite storage and are not included in the standard waste drums. When technicians have dealt with these materials, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.2.3-1, PDSA 2.4.1.2, and the Conceptual Design Report 3.1.2 Paragraph 7 Bullet 3.*

2.21 Bag-In Sampling and Decontamination Materials. Materials needed for collecting and packaging samples are brought into the glovebox via new drums (and may also be placed into the glovebox through a bag-in/bag-out port). Materials may include sample bottles and a sampling spoon. Decontamination materials are also bagged in at this time. (See the "Field Sampling Plan for the OU 7-10 Glovebox Excavator Method Project [Draft]" [Salomon et al. 2002] for additional details.) *Driver: TFR 3.1.2.3-1.*

2.22 Sample Waste for Drum Characterization. A PGS operator will take waste samples for general characterization of the cart waste. The Field Sampling Plan will define the number of and method for taking waste samples and will identify which waste loads are to be sampled. In general, aliquots from as many as 10 carts will be drawn and sequentially placed in a 250-ml wide-mouth sample container. Additional details regarding this activity may be found in the Field Sampling Plan (Salomon et al. 2002). *Drivers: TFR 3.1.2.3-1 and 3.1.1.3-1, PDSA 9.4.2.1.2 and 9.4.2.1.7, and the Field Sampling Plan.*

Steps 2.23 and 2.25, sample handling, can be performed while Step 2.27, waste handling, is being accomplished.

2.23 Load Characterization Sample Bottle. Before being bagged into the PGS, technicians will label waste characterization sample bottles and make all required annotations on the bottle, as determined in the Field Sampling Plan (Salomon et al. 2002) and the Transportation Plan. Sampling technicians place aliquots sequentially in a 250-ml wide-mouth sample container, creating a composite sample. This compositing of subsamples will occur in the glovebox and will probably occur over the course of several hours. The sample jar will be kept closed and only opened when an addition is to be made, thereby maintaining a level of sample integrity. Once 10 aliquots have been composited in the jar, the jar is closed and designated as a sample. The carts from which the subsamples are taken are recorded, as well as the drums into which the sampled waste material is placed and any other information required in the project Field Sampling Plan (Salomon et al. 2002). A technician gets an empty French can (i.e., a device for transferring material into or out of the PGS) from refrigerated storage and attaches it to the PGS on the French can mount that is located immediately to the left of the PGS glove ports. The PGS technician removes his/her hands from the glove ports, surveys them, and then places his/her right hand into the left-hand glove port. The PGS technician opens the French can door from inside the glovebox and places the sample bottle into the French can. Once the sample bottle is in the French can, the PGS technician closes and latches the French can door and removes their hand from the glove port, surveys their hand, and returns to glovebox operations. The can and glovebox port are then surveyed by the RCT.
Drivers: TFR 3.1.2.3-1, 3.1.2.3-2, and 3.1.1.3-1; Field Sampling Plan.

2.24 Biased Sample Waste for Nitrates and/or 743 Sludge, If Observed. If PGS operators suspect that the cart waste load contains nitrates (i.e., white or yellow crystalline granules) or 743 sludge (i.e., brown/green, grease-like material), then the PGS operator takes a sample aliquot from the cart, as defined in the Field Sampling Plan (Salomon et al. 2002). Whenever nitrate or 743 sludge biased sampling is performed, samples from the two cartloads that fill the waste drum will constitute a complete biased sample. *Drivers: TFR 3.1.2.3-1 and 3.1.1.3-1, PDSA 9.4.2.1.2 and 9.4.2.1.7, and the Field Sampling Plan.*

2.25 Load Nitrate or 743 Sludge Sample Bottle. Before being bagged into the PGS, technicians will label nitrate or 743 sludge sample bottles and make all required annotations on the bottle, as determined in the Field Sampling Plan and the Transportation Plan (as applicable). Sampling technicians place nitrate or 743 sludge sample aliquots in a wide-mouth sample container creating a composite nitrate or 743 sludge sample. Samples from two carts, those making up one drum load of waste, will be placed into the same sample container (i.e., nitrate or 743 sludge samples representing the waste material within a single drum). This compositing of samples occurs in the glovebox. The sample containers will be kept closed and only opened when an addition is to be made, thereby maintaining a level of sample integrity. The carts from which the samples are taken are recorded, as well as the drum into which the sampled waste material is placed and any other information required in the project Field Sampling Plan. Nitrate and 743 sludge sample containers will be staged within the PGS until the RCT and sample management personnel are ready to place them in the French can for removal from the PGS. When it is determined that a sample bottle(s) is to be removed from the PGS, a technician gets an empty French can from refrigerated storage and attaches it to the PGS on the French can mount that is located immediately to the left of the PGS technician glove ports. A PGS technician removes his/her hands from the glove ports, surveys them, and then places his/her right hand into the left-hand glove port (this is done so that the technician can reach the French can that is mounted in the PGS wall immediately to the left of the glove ports). The technician opens the French can door from inside the glovebox and takes a sample bottle from its staging location and places it into the French can. Depending on the number of sample bottles to be removed and on the type of samples that are being removed (i.e., general waste characterization sample, nitrate biased sample, or 743 biased sample), the RCT will attach a French can on the PGS that holds one, two, or three sample containers. The 743 sludge samples must not be combined with general waste characterization or nitrate samples, in that they will be turned over to the OU 7-13/14 program for testing and analysis. General waste characterization and nitrate sample bottles may be combined in the same French can for transportation to the Idaho Nuclear Technology and Engineering Center (INTEC). Once the sample bottle(s) is in the French can, the PGS technician closes and latches the French can door (from inside the PGS) and removes their hand from the glove port, surveys their hand, and is then able to return to other tasks. It should be noted that the RCT who removes the French can containing the sample bottle(s) from the PGS wall will require a contamination area within which no other activities can be performed (see Step 2.26). *Drivers: TFR 3.1.2.3-1, 3.1.2.3-2, and 3.1.1.3-1; PDSA 9.4.2.1.2 and 9.4.2.1.7; and the Field Sampling Plan.*

<u>2.26 Decontaminate and Remove Sample or Set Aside</u>. Sample handling personnel prepare a chain-of-custody form (e.g., Forms 435.20 and 450.06), which must be completed before beginning the sample handling process. This form will follow the sample and will be used to transfer sample responsibility throughout the sample handling process. An RCT, suited in appropriate PPE, sets up a contamination area around the "alpha" or French can port and places a catch basin (i.e., a large poly bag supported such that the top remained open) underneath it. Removing samples can also be accomplished via the bag-in/bag-out port, but steps are identified here for the French can system.
Drivers: TFR 3.1.2.3-1 and 3.1.1.3-1.

Technicians detach the French can containing the general waste characterization, nitrate biased, or 743 sludge biased sample bottle(s) by rotating the can 120 degrees, ensuring that device doors close properly. The RCT surveys the French can surface and determines whether cleaning/decontamination is required, which is performed if needed. Likewise, the RCT surveys the French can to determine radiation levels (e.g., surface contact levels). The RCT labels the French can, showing its radiation levels, and these radiation levels are also recorded in the project logs. Finally, the RCT transfers the French can containing the waste sample(s) to a cold storage container (e.g., refrigerator, cooler with ice). Samples must be kept at ~4°C to maintain a valid sample for VOC analysis. The RCT then transfers sample chain-of-custody responsibility to the shift supervisor, signing the appropriate forms. The 743 sludge biased samples are transferred to the OU 7-13/14 program for further testing and analysis, while the general waste characterization and nitrate biased samples continue through the OU 7-10 Glovebox Excavator Method Project sample handling process.

The primary path for the waste retrieval and packaging process proceeds forward to "Handle Waste and Place in Drum," while the sample bottle is handed off to the "Sample Handling and Transportation Process" (see Section 4.5 in the document). Decontamination materials used on the sample bottle(s) are placed in the same drum as the waste. *Drivers: TFR 3.1.2.3-2 and 3.2.2-1; Transportation Plan.*

<u>2.27 Segregate Waste and Place in Drums</u>. Using the tools available, glovebox operators handle waste materials, as appropriate, for placement in drums. As mentioned at the beginning of this section (Section 4.2.3), glovebox operators and the excavator operator will communicate to efficiently load the

transfer carts and subsequently the waste drums. Glovebox handling can include moving waste by hand or tool directly into drums or by rigging waste or cart liners to transfer waste to drums. Operators segregate waste materials into two waste streams. Combustible materials and metal debris constitute one waste stream and soils and sludges constitute the other. Each waste stream will be placed in separate drums. The PGS operators will use both the primary cart and the secondary cart/tray to assist in segregating waste materials. The primary cart that brings the waste into the glovebox will have a lip on one end that interfaces with the secondary cart. This lip will span the gap between the carts so that no waste will fall in the space between the carts. Small items will normally be placed in the appropriate drums directly from the primary cart without being transferred to the secondary cart. The primary cart liner will normally be used to lift and place soil and sludge directly in a 55-gal drum. Large items that are segregated from soil and sludges will be placed on the secondary cart or placed directly into a 55-gal drum. To the maximum extent practical, organics on one cart will be segregated from nitrates by placing them in separate drums. Throughout this operation, care is taken by technicians to operate in a safe and effective manner, thereby avoiding excessive dust generation. *Drivers: TFR 3.1.2.4-1, 3.1.2.4-2, 3.2.4-1, and 3.3.1-5.*

2.28 Clean Up Equipment. The glovebox, transfer cart, chain hoist and hook, and any tools used during waste handling and packaging are cleaned, as needed, to avoid cross-contamination with the next batch of waste. General housekeeping functions are performed in the glovebox to prepare for the next waste load. All of the materials (e.g., wipes) used to clean up both the equipment and the sample bottle are placed in the appropriate drum (e.g., wipes with soil/sludge on them will go into the soil/sludge drum), where the waste and liner were placed previously. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.4.4-1.*

2.29 Install New Cart Liner. In parallel with the cleanup/housekeeping work being performed on the glovebox, the transfer cart is cleaned and a new cart liner is installed in the transfer cart, if the old liner was placed into a drum. Operators ensure that the liner straps are properly attached to the transfer cart. Use of cart liners is at the discretion of PGS operators, depending on the waste being processed.

2.30 Send Transfer Cart Out of Glovebox to RCS. The transfer cart is passed back to the entrance of the glovebox. The PGS personnel will remove their arms from the gloves and pull the gloves out of the glovebox. The transfer cart screw drive is activated and the cart is removed from the glovebox, and it is positioned to receive the next batch of waste. *Driver: TFR 3.2.4-1.*

2.31 Waste Drum Full? If the 55-gal waste drum is not yet full and can accept more waste, the process is repeated until the drum is full. If the drum is full, then the process flow is passed to the "Drum Change-Out Process" (Section 4.3).

4.2.2.3 Waste Packaging Diversions. Diversions from the primary flow path, within the Waste Retrieval and Packaging Process, are described next. Decision points leading to the diversions, which were already described above, are repeated here for clarity to link the diversions to their point of departure.

4.2.2.3.1 Intact Drums or Large Metal Pieces

2.12 Intact Drum or Large Metal Pieces? At this point in the process, several questions are asked to identify the type of waste material that is being processed. Based on visual observation, a determination is made as to whether the waste load is an intact drum or contains large metal pieces. If the load fits this description, then the process flow diverts to "Handle Metal Items and/or Open Drum" processes (Steps 2.12.1 through 2.12.6, which are described in the waste packaging diversion section located after Step 2.31). Otherwise, the process flow proceeds to "Rake through Cart Contents and Visually Examine Contents" (Step 2.13). *Driver: TFR 3.1.2.1-4.*

2.12.1 Handle Metal Items and/or Open Drum. Depending on the condition of the metal item(s) and the amount of sizing that was accomplished at the digface, glovebox operators determine what, if any, additional sizing is required. If objects are present in the transfer cart that must be reduced in size to be packaged, operators will use an assortment of tools available in the glovebox for sizing operations. Examples of these tools are a Sawzall, shears, and a nibbler. This activity may also include opening an intact drum. Intact drums will be opened on the primary cart and their contents will be removed (a portion at a time) and placed onto a liner on the secondary cart. As necessary, the secondary cart liner and waste will then be placed into a 55-gal drum or large items will be placed by hand into the drum. Metal debris, including drum remnants, may be separated from soil and sludges for packaging. The empty drum will then be placed in the 85-gal drum or be cut up and placed in a 55- or 85-gal drum. Glovebox operators will have a variety of tools available for sizing or opening drums, which they will use on a case-by-case basis. These may include power tools such as a Sawzall, shears, and a nibbler. In addition, they will have other tools (e.g., long-reach trowels, forks, cultivators, hoes, and metal snips) for handling the metal items. Operators may also use the hoist within the glovebox to handle, lift, and move these items. Process flow for handling of metal debris, either removed from waste batches or from intact drums, also merges at this point, from the "Metal Debris Present?" decision point (Step 2.15). *Drivers: TFR 3.1.2.2-3, 3.1.2.4-1, 3.1.2.4-2, 3.2.4-1, and 3.3.1-5.*

2.12.2 Empty Drum or Metal Debris? If operators determine that an intact drum is empty or that large metal debris is ready to be loaded into a drum, the process flow continues to "Transfer Empty Drum or Metal Debris to 55-gal or 85-gal Drum." Operators may also choose to size empty drums and large metal debris and load these items into 55-gal drums. Likewise, if this is an intact drum or a large drum remnant that is not empty, operators may choose to open the drum further and process the waste or to empty the contents and process the empty drum or drum remnant. The primary objective of handling these contents is to separate as much debris from soil and sludge, as practical. The process flow diverts to Step 2.12. 3, "Empty Drum Contents into Lined Transfer Cart," as appropriate. *Drivers: TFR 3.1.2.4-1 and 3.1.2.4-2.*

2.12.3 Empty Drum Contents into Lined Transfer Cart. If the drum is not empty, the contents are emptied into a lined transfer cart. At this point, the process flow splits into two paths. Handling of the now-empty waste drum continues to "Transfer Empty Drum or Metal Debris to 55-gal or 85-gal Drum" or the operators may choose to size the now-empty waste drum and place it in a 55-gal drum. Handling of the waste, in the transfer cart, merges back into the primary process flow at "Rake through Cart Contents and Visually Examine Contents" (Step 2.13). *Drivers: TFR 3.1.2.2-2 and 3.3.1-4.*

2.12.4 Transfer Empty Drum or Metal Debris to 55- or 85-gal Drum. The empty drum or large metal debris is moved over to the 85-gal drum port and lowered into the drum. Movement of the large debris or empty drum may include transfer to the second cart within the glovebox. *Drivers: TFR 3.1.2.2-2, 3.1.2.4-1, and 3.1.2.4-2.*

2.12.5 Debris Drum Full? If the 85-gal drum is full, then the process flow splits into two paths. One path supports the full drum, and the process passes to the "Drum Change-Out Process" (Steps 3.1 through 3.24). The other path supports handling any waste that may still be present in the transfer cart, continuing to the decision point, "Waste Still Present in Cart?" (Step 2.12.6). If the 85-gal drum is not full, then the process flow just continues to Step 2.12.6 ("Waste Still Present in Cart?").

2.12.6 Waste Still Present in Cart? If, after handling any intact full drums and/or metal debris, there is still waste present in the cart, then the process flow merges back into the primary flow at the decision point, "Outliers Present?" (Step 2.16). Otherwise, if there is no waste in the transfer cart (for example, an empty drum was just handled and there was no waste associated with it), then the process flow returns to receive the next waste batch. (If a new liner is needed, then the process moves to Step 2.28a, the cart is cleaned, a new liner is placed in the transfer cart, and the cart is returned to the RCS.)

4.2.2.3.2 Suspect Fissile Materials

2.19 Suspect Fissile Materials. If an object is suspected of containing fissile material (e.g., HEPA filter material, graphite chunk) or if combustible material is found (i.e., fibrous material that cannot be readily identified as booties, gloves, other PPE, or other combustible material that is not HEPA material), then the process flow diverts to "Monitor for Fissile Content" (Step 2.19.1, which is described in the waste packaging diversion section located after Step 2.31). Operators will have an operator-aid binder containing pictures/descriptions of these kinds of items in addition to the training to learn how to visually identify these items. When technicians have addressed the suspect HEPA material, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.2.3-1 and 3.2.3-2, PDSA 2.4.1.2, and the Conceptual Design Report 3.1.2 Paragraph 7 Bullet 3.*

2.19.1 Monitor for Fissile Content. When suspect HEPA materials or unidentifiable combustible materials are found in the transfer cart, they will be transferred to the back of the glovebox via the secondary cart to the fissile material monitor (FMM) area. The fissile monitor is calibrated before placing the suspect material in front of the fissile monitor near the glovebox wall. The material is placed on a load cell in the counting area/specimen chamber, which is surrounded by a shield. (The maximum size object the FMM is designed for is a cylinder 12 in. in diameter and 14 in. long; if the suspect material is larger than this, some preliminary sizing will be performed.) A volume estimate is made of the suspect material and a fissile count is performed by the FMM. (See SPC-355, "Fissile Material Monitor for the OU 7-10 Glovebox Excavator Method Project.") NOTE: The FMM has a 24-hour lead time to be ready to make fissile measurements. If power is lost to the FMM, then a warm-up and cool-down period will be required, which requires approximately 2 days to perform. This is a project (schedule) risk identified in the Risk Management Plan. A dedicated uninterruptible power supply, with a minimum backup duration of 15 minutes, is connected to the FMM, thereby mitigating the risk of power loss. In addition, a generator that has a 0.5-minute response time backs up power to the WES for essential loads (e.g., FMM). *Drivers: TFR 3.2.3-1 and 3.2.3-2; PDSA 2.5.2.5, 6.4.3 Paragraph 5, 9.4.2.3, and Table 12.*

2.19.2 High Fissile Content? If the fissile count exceeds a predetermined threshold (Criticality Safety Evaluation), then the process flow passes to Step 2.19.3, "Subdivide Material." If the count is below the threshold, the operator determines whether the specimen must be rotated (required if the specimen is large, has a high density, or has an odd shape) in order to get a more accurate count. Once a count has been determined for the material, then it will be handled and packaged in accordance with project criticality safety guidelines. If there is no fissile content, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.2.3-1 and 3.2.3-2.*

2.19.3 Subdivide Material. The suspect waste materials are subdivided into smaller portions to reduce the total fissile count in each portion to below threshold limits. *Drivers: TFR 3.2.3-1 and 3.2.3-2.*

2.19.4 Document Fissile Content to be placed in Each Drum. The fissile count or content of each portion of the waste is documented, noting which drum it is placed in and ensuring that the fissile mass limit (Criticality Safety Evaluation) is not exceeded in any drum. The individual waste masses are checked again to ensure that they are below the threshold limit, after which (if they pass the fissile check) the waste is staged for packaging. Once the fissile material has been appropriately packaged, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.2.3-1, 3.2.3-2, and 3.4.2-3.*

4.2.2.3.3 Uncontained Free Liquids

2.20 Uncontained, Free Liquids? If uncontained/unabsorbed free liquids are present in the cart liner, then the process flow diverts to "Sample Free Liquid" (Step 2.20.1, which is described in the waste packaging diversion section located after Step 2.31). Otherwise, the process flow continues to Step 2.21, "Bag-In Sampling and Decontamination Materials." *Drivers: TFR 3.1.2.2-2 and 3.1.2.2-4.*

2.20.1 Sample Free Liquid. When free liquids are found in the transfer cart waste load, a sample must be taken before use of absorbent. Sampling will be made per steps defined in the Field Sampling Plan (Salomon et al. 2002). *Drivers: TFR 3.1.2.2.2, 3.1.2.3-1, and 3.1.1.3-1; Toxic Substances Control Act.*

2.20.2 Bag-In Stabilizer Material. Absorbents/stabilizer will be stored in plastic sacks on the side of the FMM enclosure, within the glovebox. As additional absorbent/stabilizer material is needed, it will be passed through the bag-in/bag-out port or brought in with an empty drum when it is exchanged for a full drum. *Driver: TFR 3.1.2.2-4.*

2.20.3 Add Stabilizer. Sacks containing the absorbent material are opened and the absorbent material is placed in the liquid to absorb and stabilize it. After allowing time for absorption to occur, the process flow merges back into the primary process flow at "Bag-In Sampling and Decontamination Materials" (Step 2.21). *Driver: TFR 3.1.2.2-4.*

4.3 Drum Change-Out

As described in the other processes, soil, waste, metal debris, and drum remnants may be packaged in 55- or 85-gal drums. Drums are placed in a drum loadout enclosure, under the glovebox. Change-out operations occur within the drum loadout enclosure. Waste will be packaged in 55-gal drums with liners and bags. The bag has an in-wall HEPA filter and is attached to the drum port to maintain a primary confinement seal. A 90-mil polyethylene liner is placed inside the bag to protect the bag against punctures. The liner does not have a separate lid. The drum lid has a filter or a semi-permeable lid seal. Metal debris and drum remnants will be packaged in 55- or 85-gal drums with liners and bags. The 85-gal drums will be used for larger metal objects to minimize sizing activities. At the gloveboxes, when a waste drum is full, process activities pass to the "Drum Change-Out Process."

4.3.1 Prerequisites to Drum Change-Out

The following tasks and/or events are a partial list (not in any particular order) of what must be completed before beginning drum change-out:

- All required materials and hardware are staged for operations: (1) in the DLE, drum change-out tools, bag clamps and tape are present, and the airborne radiation area (ARA) sign is posted; (2) in the PGS, drum-out port cover is present; (3) in the WES, 55-gal and 85-gal drums with liners and bags (any items that are to be brought into the glovebox via "new" drums), associated drum lids and filters, and additional transfer cart liners are present; and (4) other items, as identified, are present (occurs with each shift change). *Drivers: TFR 3.1.2.4-1 and 3.1.2.4-2; PDSA 3.3.2.2.16.4 Bullets 5 and 6, and 9.4.2.1.7.*

- Equipment checklists are completed for items unique to the drum change-out process (e.g., drum loadout enclosure ventilation, exhaust trunk, scissors lift) (occurs with each shift change). *Drivers: TFR 3.2.2-1 and 3.2.4-1.*

- Shift turnover checklists are completed (occurs with each shift change). *Driver: Conduct of Ops.*

- Ventilation system is checked for adequate pressure differentials. (Outside of WES to inside of WES as measured inside the WES, -0.1 iwg. Inside the WES to inside the RCS as measured in the RCS, -0.6 iwg.) (occurs with each shift change). *Drivers: TFR 3.1.1.2-3, 3.2.2-3, 3.2.7-1, and 3.2.7-2.*

- RSIM/dosimetry checks for all personnel entering drum loadout enclosure are complete. Personnel are suited-up in appropriate PPE, especially for personnel entering glovebox tent for drum change-out (occurs with each crew change). *Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.4-1, and 3.2.5-2.*

4.3.2 Step-by-Step Descriptions

The following process steps are numbered the same as the process flow diagrams found in Appendix C, page C-7.

<u>3.1 Cover Drum Port Hole</u>. The PGS personnel place the porthole cover over the porthole opening and twist it to latch the cover to the port. The top edge of the port should be free of dirt or small debris that might inhibit the cover from latching. The overhead hoist is used to lift and position the cover (the port covers weigh about 25 lb and will normally be lifted by the hoist). The port cover will normally be locked down over one of the two 55-gal drum ports. At those times that both 55-gal drums are to remain open (not anticipated), the covers will be placed on the floor of the glovebox under the carts. A third port cover will be placed over the 85-gal drum port. This will normally be in place and latched down unless drum remnants that will not fit in a 55-gal drum port are encountered. *Driver: TFR 3.2.3-2.*

<u>3.2 Personnel Enter Drum Loadout Enclosure</u>. Personnel in appropriate PPE enter the drum loadout enclosure and bring a new drum into the enclosure, which is placed in the corner. This new drum has had a bag placed inside, and a 90-mil polyethylene hard liner has been placed inside the bag to protect the bag against punctures. If glovebox transfer cart liners or other glovebox materials are to be transferred to the glovebox via the new drum, these were placed into the new drum as well. The contamination confinement drum loadout enclosure is closed and inspected to verify closure. Technicians ensure that an ARA sign is posted before beginning activities. The RCT continuously monitors for airborne contamination throughout the drum change-out effort within the drum loadout enclosure. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.3.1-1.*

<u>3.3 Lower Drum</u>. With the porthole cover in place, the drum is lowered. The bag liner is still attached to the port, preventing escape of any contamination from the drum. An RCT inspects the bag sleeve integrity as the drum is lowered. If a tear is found in the bag, the tear will be taped, depending on its size, and a survey made of the drum and enclosure. Decontamination will occur as required based on RadCon surveys. If a large tear is found, work will be stopped, the drum waste contained, and a recovery plan developed. *Drivers: TFR 3.2.2-3 and 3.2.7-2.*

<u>3.4 Rotate Drum</u>. The drum is rotated, twisting the bag liner until tight. *Driver: TFR 3.2.2-1.*

<u>3.5 Seal Bag</u>. Technicians place clamps in two places on the bag liner. *Driver: TFR 3.2.2-1.*

<u>3.6 Deploy Local HEPA Vacuum</u>. A localized air sweep HEPA vacuum is placed right next to the location where the bag will be cut. Technicians ensure that the vacuum is on and stage pieces of tape for sealing the cut ends of the bag. *Drivers: TFR 3.1.1.2-3, 3.2.2-3, 3.2.4-1, and 3.2.7-2.*

<u>3.7 Cut Bag and Tape Cut Ends of Bag</u>. The bag is then cut between the two clamps and tape is placed over the ends, sealing the bag ends. An RCT scans the bag ends and the technicians for contamination. If

contamination is noted, technicians tape over and/or decontaminate the appropriate area(s). *Drivers: TFR 3.2.2-3, 3.2.4-1, and 3.2.7-2; PDSA 3.3.2.2.9 and 9.4.2.1.7.*

3.8 Place Lid on Drum and Secure Locking Ring. The lid is placed on the waste drum and a locking ring is fastened. The locking ringbolt is fastened to a torque value of approximately 50 ft • lb. *Driver: TFR 3.1.2.4-1.*

3.9 Perform Drum Survey and Smear. The drum is surveyed for contamination before releasing the drum from the drum loadout enclosure area. Approximately 10 smears are taken of the drum and drum loadout enclosure area near the drum. These are passed out of the enclosure to an RCT who takes the smear to a "scaler" for counting. *Drivers: TFR 3.2.1-1, 3.2.2-1, and 3.2.2-3.*

At this point in the change-out process, some parallel activities occur. Steps from 3.11, "Move Full Drum to Enclosure Door," to 3.18, "Remove Drum Contents, If Any," can be performed while the drum smears are counted, "Perform Count on Drum and Enclosure Smears."

3.10 Perform Count on Drum and Enclosure Smears. The smears are counted in a scaler. *Drivers: TFR 3.2.1-1, 3.2.2-1, and 3.2.2-3.*

3.10.1 Decontaminate Drum and/or Enclosure, If Needed. This activity begins when drum smear counts return, if contamination is detected. The drum and drum loadout enclosure contamination control area are cleaned/decontaminated before opening the enclosure door. While this activity is performed, the parallel processes noted below (Step 3.11, "Move Full Drum to Enclosure Door," to Step 3.16, "Raise Drum") are paused. When this activity is completed, the parallel activities resume. *Drivers: TFR 3.2.2-1, 3.2.2-3, 3.3.1-1, and 3.2.7-2.*

3.11 Move Full Drum to Enclosure Door. At the same time as the smears are being counted, the full drum is moved from underneath the drumout port, based on an RCT scan, and placed near the drum loadout enclosure door. *Driver: TFR 3.1.2.2-2.*

3.12 Move New Drum to Lift. A new drum—which was brought into the drumout port enclosure as personnel entered—is moved to and mounted on the scissors lift underneath the drumout port. (The drum has already had a liner and bag placed in it, along with any items to be passed into the glovebox.) *Driver: TFR 3.1.2.2-2.*

3.13 Begin Bag Attachment to Drum Port. The upper drumout port ring clamp is removed and the liner sleeve is pulled down past the upper drumout port ring groove. An RCT surveys the newly exposed area for contamination. Cleaning/decontamination is performed, if required. The lower drumout port ring clamp is then removed. A new bag liner and elastic band are then pulled up and over the old liner (bag stub) and positioned on the drumout port ring. The elastic band is placed into the upper ring groove and the clamp is reattached around the elastic band. *Drivers: TFR 3.2.2-3 and 3.2.7-2.*

3.14 Remove Old Bag Stub and Place in Drum. Technicians reach into the new bag, via bag gloves, and pull the old bag stub (or pigtail) off of the drumout port ring and drop it into the new drum. The RCT then surveys the technician's hands. *Driver: TFR 3.2.2-3.*

3.15 Complete Bag Attachment to Drum Port. A second elastic band is pulled up onto the drumout port ring and placed into the lower drumout port ring groove. Finally, the second clamp is placed over the lower elastic band. The RCT inspects the sleeve to ensure that a sealed environment has been established. *Drivers: TFR 3.2.2-3 and 3.2.7-2.*

3.16 Raise Drum. The drum is raised up to the glovebox drumout port with the lift. Technicians ensure that excess bag liner is draped against the outside of the drum.

The next two activities are performed in the glovebox and are independent of and can be performed at the same time as the activities starting with Step 3.19, "Open Drum Loadout Enclosure," and continuing through Step 3.24, "Stage Drum for Transfer."

3.17 Open Drum Port Cover. From inside the glovebox, PGS operators twist the port cover and use the overhead hoist to lift the porthole cover, thereby opening the drumout port.

3.18 Remove Drum Contents, If Any. Glovebox operators remove any transfer cart liners or glovebox materials placed in the drum and stage them in the glovebox. The drum is ready for use. The process flow returns to Step 2.31 ("Waste Drum Full?) in the waste packaging process. *Drivers: TFR 3.2.6-1 and 3.4.4-1.*

3.19 Open Drum Loadout Enclosure. Once the drum and enclosure contamination control area have passed RadCon surveys, the enclosure door is opened. The DLE personnel remove the ARA sign. If a long delay has occurred between the time the drum was surveyed and opening the DLE door, a second survey should be performed on the drum and DLE door area. *Drivers: TFR 3.2.2-1, 3.2.2-3, 3.3.1-1, and 3.2.7-2.*

3.20 Attach Drum Handler to Drum. A drum handler is moved into place, attached to the drum, and the drum is removed from the drum loadout enclosure area under the glovebox. *Drivers: TFR 3.1.2.2-2 and 3.3.1-1.*

3.21 Label Drum. A label is attached to the drum and annotated with at least the following pertinent information: (1) unique bar code (i.e., serial number); (2) radiological survey levels; (3) asbestos labeling, if appropriate; (4) polychlorinated biphenyl labeling (40 CFR 761), if appropriate; (5) "Hazardous Waste" label, as required; and (6) hazardous waste code. This information is recorded and tied to drum visual inspection information as well as sample information. *Drivers: TFR 3.1.2.4-4 and 3.5.5-1; PSDA 6.3 and 9.4.2.1.1.*

3.22 Stage Drum for Transfer. The drum is then moved to the WES full drum staging area to await transportation. In the staging area, drums are spaced for criticality control. Handling of the drum passes to the "Transportation and Storage" process (Section 4.4). *Driver: TFR 3.1.2.2-2.*

4.4 Waste Transportation and Storage

Once drums are placed in the WES drum storage area, they are ready to be transported to the assay trailer and eventually to onsite storage. General process steps associated with weighing and assaying the waste drums are included in the process logic diagrams and in this document.

4.4.1 Prerequisites to Transportation and Storage

The following tasks and/or events are a partial list (not in any particular order) of what must be completed before beginning waste transportation and storage:

- All required materials and hardware are staged for operations: (1) in the WES, filled 55-gal and 85-gal drums are staged at the drum storage station, and drum moving devices and decontamination materials are present; (2) outside the WES, forklift or equivalent device for moving drums, flatbed truck (if required), and assay system temporary storage are available (if required); and (3) other items, as identified, are present (occurs with each shift change). *Drivers: TFR 3.1.2.2-2, 3.1.2.5-4, and 3.2.4-1.*

- Equipment checklists are completed for items unique to the transportation and storage process (e.g., forklift and truck) (occurs with each shift change). *Drivers: TFR 3.2.4-1 and 3.2.2-1.*

- Shift turnover checklists are completed, as applicable (occurs with each shift change). *Driver: Conduct of Ops.*

- Ventilation system is checked for adequate pressure differentials (outside of WES to inside of WES as measured inside the WES, -0.1 iwg (occurs with each shift change). *Drivers: TFR 3.1.1.2-3, 3.2.2-3, 3.2.7-1, and 3.2.7-2.*

- RSIM/dosimetry checks for all personnel entering the WES are complete. Personnel are suited-up in appropriate PPE, as required for transporting waste drums (occurs with each crew change). *Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.4-1, and 3.2.5-2.*

4.4.2 Step-by-Step Descriptions

The following process steps are numbered the same as the process flow diagrams found in Appendix C, page C-8.

<u>4.1 Prepare Documentation for Transport of Drum.</u> Information needed for the transportation of each drum is assembled, including any additional information required by the applicable storage facility's WAC. *Drivers: TFR 3.5.5-1 and Applicable Storage Facility WAC.*

<u>4.2 Gather Visual Examination Records for Drum.</u> Visual Examination records generated as the drum was loaded are gathered and copied for inclusion with the drum Transfer Sheet. *Drivers: TFR 3.3.6-1, 3.5.5-1, and 3.5.5-4.*

<u>4.3 RCT Survey of Drum(s) to Move to WES Door.</u> An RCT surveys the drums to be removed from the WES full drum staging area. Required cleaning and decontamination are performed before releasing the drum for movement out of the WES. *Driver: TFR 3.2.2-1.*

<u>4.4 Forklift or Equivalent Moves Drum(s) to WES Door.</u> Before opening the transfer vestibule rollup door into the drum staging area of the WES, a check is made to ensure that the RCS door is closed and that all WES doors to the exterior are also closed. A forklift or equivalent (e.g., motorized pallet jack) then enters the WES from the vestibule and takes the identified drums to the WES door. *Driver: TFR 3.1.2.2-2.*

<u>4.5 Survey Drum(s), If Required.</u> If the drum(s) are not to be transferred out of the WES immediately (i.e., the drum[s] wait by the WES door), an RCT must survey the drum(s) before opening the WES door and releasing the drum(s). *Driver: TFR 3.2.2-1.*

<u>4.6 Verify RCS Doors Closed and Open WES Door.</u> A check is made to ensure that the RCS doors, personnel monitoring door, and transfer vestibule rollup door are all closed before opening the WES exterior doors. This step maintains the differential air pressures that are required between confinement boundaries. *Driver: TFR 3.2.7-2.*

<u>4.7 Forklift Transports Drum to the Assay Staging Area</u>. An equipment operator brings a forklift to the WES door and transports the waste drum to the Interim Storage Area. *Driver: TFR 3.1.2.2-2.*

4.8 Forklift Places Drum in Assay Trailer. When assay trailer personnel are ready to assay a waste drum, an equipment operator transports a waste drum from the Interim Storage Building to the assay trailer and places the waste drum in the trail for assay. *Driver: TFR 3.1.2.2-2.*

4.9 Assay Drum for Transuranic Content. Assay trailer personnel assay the waste drum, determining its transuranic content. *Drivers: TFR 3.2.3-3 and Data Quality Objectives.*

4.10 >200 FGE? If a drum measures greater than 200 FGE, then the drum may be returned to the WES for reprocessing. (See Step 4.18.). This condition is outside the project baseline and will be addressed if it occurs.

4.11 Forklift Removes Drum from Assay Trailer. After drum assay is complete, an equipment operator removes the waste drum from the assay trailer. All appropriate controls will be followed to address criticality spacing, incompatibles, or other issues that drive drum storage. *Drivers: TFR 3.1.2.2-2, Criticality Safety Evaluation, and Toxic Substances Control Act.*

4.12 Weigh Drum. If the drum weight is not determined during assay, then the drum must be weighed and labeled appropriately.

4.13 Label Drum. Once drum assay and drum weight have been completed, the appropriate drum contents information is noted on a drum label. This label is affixed to the drum.

4.14 Forklift Palletizes Drum. Forklift places the labeled drum onto a storage pallet in preparation for onsite storage.

4.15 Pallet Full? If the pallet is fully loaded, then the drums and pallet are prepared for storage. If the pallet is not fully loaded, then the forklift returns to either the WES (for transporting a drum from the WES to the assay staging area) or the assay staging area (for transporting a drum from the assay staging area to the assay trailer).

4.16 Bind Drums Together. Upon accumulation of a sufficient number of palletized drums, all of the palletized drums are bound together.

4.17 Forklift Transports Drum Pallet to Storage Location. Forklift (or truck) transports the drum pallet to the storage location when all of the appropriate documentation has been completed.

The assay data will be merged with the data generated and gathered during the waste retrieval and packaging process.

4.4.2.1 Return Drum Scenarios

NOTE: It should be noted that a returned drum is outside the project baseline. The following steps are provided as general guidance that may be used should this scenario occur.

4.18.1 Waste Drum Rejected. If drum assay indicates greater than 200 FGE or a drum is identified as containing classified materials, then the drum is rejected and returned to the WES for repackaging.

4.18.2 Decision Point. Several conditions were identified that would cause a "returned drum." These included chemical incompatibility (as identified from sample analysis results), high fissile content (assay), or security issue (as identified by Security review of packaging videos). Screening and packaging procedures used in the glovebox help to avoid such conditions. Depending on the item(s) causing the drum to be returned and its location within the drum, Operations will determine the appropriate "scenario" to follow. This decision will be based on cost and worker health and safety.

4.4.2.1.1 Scenario 1 (Re-packaging in the Packaging Glovebox System; Drum <350 lb)

4.18.S1.1 Transfer 55-gal Waste Drum to WES. The returned waste drum is transferred through the WES transfer vestibule and to one of the packaging gloveboxes. *Driver: TFR 3.3.1-1.*

4.18.S1.2 Package Drum in 85-gal Overpack. The waste drum is placed within a lined 85-gal overpack. Operators may choose to place blocks within the bottom of the 85-gal drum to elevate the interior 55-gal drum. This configuration simplifies the subsequent removal of the 55-gal drum during Step 4.18.S1.7. *Driver: TFR 3.1.2.4-1.*

4.18.S1.3 Move Overpack into the DLE. The filled 85-gal overpack is transferred into the DLE underneath the selected packaging glovebox.

4.18.S1.4 Close DLE. The DLE is then closed and all appropriate administrative controls are completed. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.3.1-1.*

4.18.S1.5 Open Drum Lid. The filled 85-gal overpack lid is removed and the bag liner is prepared for attachment to the packaging glovebox drum out port. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.3.1-1.*

4.18.S1.6 Lift and Attach Overpack to Glovebox. The prepared 85-gal overpack is positioned on the appropriate lift table, elevated, and the drum liner is attached to the drum out port.

4.18.S1.7 Lift the 55-gal Drum Out of the Overpack. The glovebox crane hoist is attached to the waste drum (within the overpack) and the drum is lifted up and into the glovebox. *Drivers: TFR 3.1.2.2-2 and 3.2.4-1.*

4.18.S1.8 Remove and Segregate Waste from 55-gal Drum. Glovebox technicians remove and segregate the waste materials contained within the waste drum. The segregation and handling activities will be determined on a case-by-case basis.

4.18.S1.9 Repackage "Rejected" Waste in Separate Drum or Bag-out. Repackaging of "rejected" waste will be performed, as appropriate, based on the course of action determined in the previous step.

4.18.S1.10 Sample Acceptable Waste. A sample is taken of the acceptable waste and the resulting sample is transferred out of the glovebox. This sample follows the sample handling and transportation process. *Drivers: TFR 3.1.1.3-1, 3.1.2.3-1, 3.1.2.3-2, 3.1.2.4-1, and 3.2.4-1; Field Sampling Plan.*

4.18.S1.11 Repackage Waste in New Drum. The segregated acceptable waste is placed within a new drum. The newly filled drum then follows the drum change-out process.

4.18.S1.12 Return to "Drum Change-Out" Process (Step 3.1). Both the newly packaged drum and the 85-gal overpack follow the drum change-out process.

4.4.2.1.2 Scenario 2 (Re-packaging in the Packaging Glovebox System; Drum >350 lb)

4.18.S2.1 Transfer 55-gal Waste Drum to WES. The returned waste drum is transferred through the WES transfer vestibule and to one of the packaging gloveboxes. *Driver: TFR 3.3.1-1.*

4.18.S2.2 Package Drum in 85-gal Overpack. The waste drum is placed within a lined 85-gal overpack. *Driver: TFR 3.1.2.4-1.*

4.18.S2.3 Move Overpack into the DLE. The filled 85-gal overpack is transferred into the DLE underneath the selected packaging glovebox.

4.18.S2.4 Close DLE. The DLE is then closed and all appropriate administrative controls are completed. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.3.1-1.*

4.18.S2.5 Open Drum Lid. The exterior 85-gal overpack lid is removed and the bag liner is prepared for attachment to the packaging glovebox drum out port. The lid of the interior 55-gal drum (within the 85-gal overpack) is also removed. *Drivers: TFR 3.2.2-1, 3.2.2-3, and 3.3.1-1.*

4.18.S2.6 Lift and Attach Overpack to Glovebox. The prepared 85-gal overpack is positioned on the appropriate lift table, elevated, and the drum liner is attached to the drum out port.

4.18.S2.7 Lift Individual Liners Out of 55-gal Drum. The glovebox crane hoist is attached to the individual waste liners (within the 55-gal drum within an overpack) and the liners are lifted up and into the glovebox. *Drivers: TFR 3.1.2.2-2 and 3.2.4-1.*

4.18.S2.8 Remove and Segregate Waste from Liner. Glovebox technicians remove and segregate the waste materials contained within each liner. The segregation and handling activities will be determined on a case-by-case basis.

4.18.S2.9 Repackage "Rejected" Waste in Separate Drum or Bag-out. Repackaging of "rejected" waste will be performed, as appropriate, based on the course of action determined in the previous step.

4.18.S2.10 Sample Acceptable Waste. A sample is taken of the acceptable waste and the resulting sample is transferred out of the glovebox. This sample follows the sample handling and transportation process. *Drivers: TFR 3.1.1.3-1, 3.1.2.3-1, 3.1.2.3-2, 3.1.2.4-1, and 3.2.4-1; Field Sampling Plan.*

4.18.S2.11 Repackage Waste in New Drum. The segregated acceptable waste is placed within a new drum. The newly filled drum then follows the drum change-out process.

4.18.S2.12 Return to "Drum Change-Out" Process (Step 3.1). Both the newly packaged drum and the 85-gal overpack follow the drum change-out process.

4.4.2.1.3 Scenario 3 (Excavator Opens Drum, Segregates and Places Waste in Transfer Cart)

4.18.S3.1 Transfer 55-gal Waste Drum to WES. The returned waste drum is transferred into the WES transfer vestibule.

4.18.S3.2 Prepare for Entry in RCS. Technicians assemble appropriate hardware and tools needed for handling the drum within the RCS. In addition, technicians put on appropriate PPE before entering the

RCS. A check is made to ensure that all WES exterior doors are closed and that the facility ventilation system is functioning properly before opening the RCS doors. *Drivers: TFR 3.2.4-1 and 3.3.1-1.*

4.18.S3.3 Open RCS Doors. Technicians open the RCS doors leading from the transfer vestibule into the RCS. *Driver: TFR 3.3.1-1.*

4.18.S3.4 Place 55-gal Waste Drum in RCS and Remove Lid. Technicians transfer the waste drum into the RCS and place it on the laydown area or within the excavation site where the excavator can reach it. The technicians then remove the locking ring and lid from the drum.

4.18.S3.5 Close RCS Doors. All personnel leave the RCS and the RCS doors are closed. *Drivers: TFR 3.2.2-3 and 3.3.1-1.*

4.18.S3.6 Excavator Segregates Waste. The excavator is used to handle and segregate the waste (as determined appropriate). The specific handling approach will be determined on a case-by-case basis. *Driver: TFR 3.1.2.2-3.*

4.18.S3.7 Excavator Scoops Acceptable Waste. Once the "rejected" material has been segregated and handled, the excavator takes a scoop of acceptable waste and places it near the PGS transfer cart. The waste then follows the waste packaging process. *Driver: TFR 3.1.2.2-2.*

4.18.S3.8 Return to Waste Packaging Process (Step 2.5).

4.4.2.1.4 Scenario 4 (Manual Repackaging in the Retrieval Confinement Structure)

4.18.S4.1 Transfer 55-gal Waste Drum to WES. The returned waste drum is transferred into the WES transfer vestibule.

4.18.S4.2 Prepare for Entry in RCS. Technicians assemble appropriate hardware and tools needed for handling the drum within the RCS. This includes appropriate tools for opening the drum and handling the waste within it. Sampling materials may also be needed depending on the approach taken for the specific waste drum. A check is made to ensure that all WES exterior doors are closed and that the facility ventilation system is functioning properly before opening the RCS doors. *Drivers: TFR 3.2.4-1 and 3.3.1-1.*

4.18.S4.3 Open RCS Doors. Technicians open the RCS doors leading from the transfer vestibule into the RCS. *Driver: TFR 3.3.1-1.*

4.18.S4.4 Place 55-gal Waste Drum in RCS and New Drums for Repackaging. Technicians transfer the waste drum and one or more new drums into the RCS and place them on the laydown area. The new drums will be used for repackaging wastes as determined during evaluation of the rejected drum. *Drivers: TFR 3.1.2.4-1 and 3.3.1-1.*

4.18.S4.5 Personnel Put on Appropriate PPE and Enter the RCS. Personnel necessary for handling and repackaging the waste drum (e.g., technicians and RCT) put on appropriate PPE and enter the RCS. *Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.2-3, and 3.2.4-1.*

4.18.S4.6 Close RCS Doors. All doors into the RCS are closed (e.g., personnel access door and transfer vestibule door). *Drivers: TFR 3.2.2-3 and 3.3.1-1.*

4.18.S4.7 Personnel Open Drum and Segregate Waste. Technicians open the rejected waste drum and remove drum contents. Specific procedures and steps to be followed by technicians will be generated on a case-by-case basis depending on the reason for returning the drum.

4.18.S4.8 Repackage "Rejected" Waste in Separate Drum or Bag-out. Technicians handle and repackage the rejected waste material, as determined appropriate for the waste material (e.g., subdividing materials and breaking up items). Technicians may then place this material in a separate drum, bag out the materials, or repackage the materials in the original drum (specific steps determined for each situation). *Drivers: Applicable Storage Facility WAC; TFR 3.1.2.4-1 and 3.2.4-1.*

4.18.S4.9 Repackage Acceptable Waste. The segregated acceptable waste is placed within a new drum or may be repackaged within the original drum. If it is determined that a sample should be taken of the "acceptable waste," a sample is taken of the waste and the resulting sample is transferred out of the RCS. This sample follows the sample handling and transportation process. *Drivers: TFR 3.1.1.3-1, 3.1.2.3-1, 3.1.2.3-2, 3.1.2.4-1, and 3.2.4-1; Field Sampling Plan.*

4.18.S4.10 Place Lid on Drum and Secure Locking Ring. Once technicians have performed all of the tasks associated with handling and repackaging of the rejected waste (including, as required, sampling of waste materials, closing and tapping the bag liner), a drum lid is placed on each waste drum and the locking ring is secured. *Driver: TFR 3.1.2.4-1.*

4.18.S4.11 Perform Drum Survey and Smear. An RCT performs contamination and radiation surveys of the drum. The RCT scans the drum(s) and takes smears to check for surface contamination. The RCT takes these smears to another RCT in the personnel access room or passes them out through the bag-in/bag-out port. The second RCT takes the smears to a "scaler" to get a contamination count (two scalers are anticipated to be in the WES for this process). The RCT may clear the drum(s) for removal from the RCS or direct that the drum(s) be decontaminated, depending on the level of contamination found. *Drivers: TFR 3.1.2.1-6 and Manual 15A, Radiological Protection—INEEL Radiological Control.*

4.18.S4.12 Contaminated? If a drum surface is contaminated, the process proceeds to the next step ("Decontaminate Drum"). Otherwise, the drum(s) is moved to the RCS door.

4.18.S4.13 Decontaminate Drum (As Required). If the drum surface is contaminated, the RCT and/or the technicians clean and decontaminate the drum surface. After which, the RCT checks the drum(s) again to ensure that the drum can be released from the RCS. This process is repeated, as necessary, prior to releasing the drum(s).

4.18.S4.14 Open RCS Doors. Before opening the RCS doors, the RCT takes approximately 10 smears of the area around the RCS doors (e.g., floors and doors) and provides these smears to an RCT in the personnel access room, who then takes them to the "scaler" to get a contamination count. Depending on the level of contamination found, the RCT may clear the RCS door to be opened for removal of the waste drum(s) from the RCS or may direct that the area be decontaminated. Once the RCT has cleared the RCS doors to be opened, they are opened into the transfer vestibule area. *Drivers: TFR 3.2.2-3, 3.2.7-1, and 3.3.1-1; PDSA 2.4.1.1; and Manual 15A, Radiological Protection—INEEL Radiological Control.*

4.18.S4.15 Attach Drum Handler to Drum and Remove from RCS. Technicians move a drum handler into the RCS, attach it to a waste drum, and remove it from the RCS. Drums are placed in the transfer vestibule near the WES door and are prepared for removal from the WES. All appropriate documentation is updated based on the repackaging that has occurred, such that the drum is ready for transfer to the assay trailer staging area. *Drivers: TFR 3.3.6-1, 3.5.5-1, and 3.5.5-4.*

4.18.S4.16 Return to Waste Transportation and Storage Process (Step 4.6). The process returns to the normal waste transportation and storage process steps at Step 4.6.

4.5 Sample Handling and Transportation

The sampling process begins when waste zone material is excavated and placed in the transfer carts in the gloveboxes. Waste zone material will be sampled to characterize it and to ensure safe storage of the retrieved waste zone material. In addition, samples will be taken of the underburden to determine if contamination has migrated into the underburden. The OU 7-10 Glovebox Excavator Method Project Field Sampling Plan and associated documents (e.g., INTEC Sampling and Characterization Interface Agreement) contain detailed information regarding the sampling approach taken by the project, along with the tests and analyses to be performed on the samples. These documents are still being developed; therefore, portions of the sampling process may be modified as these documents are completed. The process steps described below address the general sequence of steps needed to handle and transport these waste and underburden samples. Waste samples follow all of the steps described below, while underburden core samples join the process flow at Step 5.8 (see Section 4.7 for a description of underburden sampling). In addition, underburden samples, being 5 ft long, must be sectioned by INTEC as part of the sample handling process.

4.5.1 Prerequisites to Sample Handling and Transportation

The following tasks and/or events are a partial list (not listed in any particular order) of what must be completed before beginning waste sample handling:

- All required materials and hardware are staged for operations: (1) in the PGS, sample containers, sampling tools, decontamination materials, bag-in/bag-out port sleeve or alpha/French can, and associated hardware are present; (2) in the WES, additional sampling materials, sample containers, bag-in/bag-out port sleeves or alpha/French cans, radiation control catch basin materials (i.e., all materials needed to create a contamination area), and cold storage for samples (e.g., refrigerator) are present; and (3) other items, as identified, are present (occurs with each shift change). *Drivers: TFR 3.1.2.3-1, Field Sampling Plan, and Manual 15A, Radiological Protection—INEEL Radiological Control.*

- Equipment checklists are completed for items unique to the sample handling process (e.g., French or alpha can) (occurs with each shift change). *Drivers: TFR 3.1.2.3-1, Field Sampling Plan, and Manual 15A, Radiological Protection—INEEL Radiological Control.*

- RSIM/dosimetry checks are performed for personnel performing sample handling and transportation functions. Sample handling personnel are suited-up in appropriate PPE (occurs with each crew change). *Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.4-1, and 3.2.5-2.*

- Chain-of-custody form is completed for French can/samples. *Drivers: TFR 3.1.2.3-2 and the Transportation Plan.*

- French can and sample(s) are staged in a cold storage container. *Drivers: TFR 3.1.2.3-1 and the Transportation Plan.*

4.5.1.1 Step-by-Step Descriptions. The following process steps are numbered the same as the process flow diagrams found in Appendix C, page C-9.

5.1 Get Sample Transportation Container. The RCT gets an approved transportation container, which is defined in the Transportation Plan for project sample transportation. *Drivers: TFR 3.2.2-1 and the Transportation Plan.*

5.2 Perform Contamination Survey of Transportation Container. The RCT surveys the transportation container and determines whether cleaning/decontamination is required, which is performed if needed. This is also performed before placing the can into the transportation container. *Driver: TFR 3.2.2-1.*

5.3 Perform Radiation Survey of Transportation Container. The RCT then surveys the transportation container to determine radiation levels (e.g., surface contact levels) before placement of the can into the transportation container. *Driver: TFR 3.2.2-1.*

5.4 Remove Can from Cold Storage. The RCT transfers the French can containing the waste sample from a cold storage container to a transportation container. The RCT then assumes sample chain-of-custody responsibility from the shift supervisor, signing the appropriate forms. *Driver: TFR 3.1.2.3-2.*

5.5 Perform Contamination Survey of Can Surface. The RCT again surveys the French can surface and determines whether cleaning/decontamination is required, which is performed if needed. This is performed before placing the can into the transportation container. *Driver: TFR 3.2.2-1.*

5.6 Perform Radiation Survey of Can. The RCT, likewise, surveys the French can to determine radiation levels (e.g., surface contact levels) before placement into the transportation container. *Driver: TFR 3.2.2-1.*

5.7 Place Can(s) into Transportation Container and Close. The RCT then places the French can (and sample) into the transportation container. Ice is packed around the cans for transportation to the sample analysis laboratory. If additional cans are to be placed into the transportation container, then Steps 5.4 through 5.7 are repeated. *Drivers: TFR 3.2.2-1 and the Transportation Plan.*

5.8 Perform Contamination Survey of Transportation Container Surface. The RCT now surveys the transportation container's exterior surface and determines whether cleaning/decontamination is required, which is performed if needed. *Driver: TFR 3.2.2-1.*

5.9 Perform Radiation Survey of Transportation Container Surface. The RCT, likewise, surveys the transportation container surface to determine radiation levels (e.g., surface contact levels). *Driver: TFR 3.2.2-1.*

5.10 Complete Form 461.01A (RAD Material Shipment). Form 461.01A, "Request for Radioactive Material Shipment," is completed and any additional forms/documentation are also completed as required (e.g., Form 461.02, "Radioactive Material Packaging Quality Control Inspection") per the procedures called out in the Transportation Plan. *Drivers: TFR 3.1.2.3-2 and the Transportation Plan.*

5.11 Equipment Operator Transports Container to INTEC. An equipment operator assumes custody of the samples (signs chain-of-custody form) and transports the sample transportation container to INTEC. *Drivers: TFR 3.1.2.3-2 and the Transportation Plan.*

5.12 INTEC Takes Custody of Samples. The INTEC assumes custody of the samples (signs chain-of-custody form). *Drivers: TFR 3.1.2.3-2 and the Transportation Plan.*

5.13 INTEC Testing and Analysis. The INTEC performs tests and analysis on the samples per the Field Sampling Plan. Results, as defined in the Field Sampling Plan, are provided to the project as agreed to in the INTEC Sampling and Characterization Interface Agreement. *Drivers: TFR 3.1.2.3-1 and 3.1.1.3-1, Field Sampling Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.14 INTEC Packages Unaltered Samples. The INTEC packages the unaltered samples (i.e., the unused sample materials) for return to the project. The INTEC may choose to send these materials back in the French cans or in their own containers as long as it is documented in the Transportation Plan. *Drivers: TFR 3.1.2.3-2, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.15 INTEC Performs Contamination and Radiation Surveys. The INTEC performs a contamination survey, cleaning/decontaminating as needed, and a radiation survey of the packaged unaltered samples. *Drivers: TFR 3.2.2-1, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.16 INTEC Completes Form 461.01A (RAD Material Shipment). The INTEC completes Form 461.01A, "Request for Radioactive Material Shipment," and any additional forms/documentation as required (e.g., Form 461.02, "Radioactive Material Packaging Quality Control Inspection") per the procedures called out in the Transportation Plan. *Drivers: TFR 3.1.2.3-2, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.17 INTEC Completes Chain-of-Custody Form. The INTEC prepares a chain-of-custody form (e.g., Form 435.20 and Form 450.06) for the unaltered samples. This form will follow these samples and will be used to transfer sample responsibility throughout during the return trip to the project. *Drivers: TFR 3.1.2.3-2, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.18 INTEC Passes Transportation Container to Equipment Operator. An equipment operator from the project assumes custody for the unaltered samples, signing the chain-of-custody form. *Drivers: TFR 3.1.2.3-2, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.19 Equipment Operator Transports Container to WES. An equipment operator transports the unaltered samples from INTEC to the WES facility and passes custody on to the shift supervisor who signs the chain-of-custody form. *Drivers: TFR 3.1.2.3-2, Transportation Plan, and INTEC Sampling and Characterization Interface Agreement.*

5.20 Unaltered Samples Placed in Waste Drum. The unaltered sample materials are placed in a waste drum and become part of the project waste stream. *Drivers: Field Sampling Plan and INTEC Sampling and Characterization Interface Agreement.*

The process logic flow for the waste now joins the regular waste packaging process (at Step 2.23) and continues through the normal packaging, drum change-out, and transportation and storage processes.

4.6 Special Handling

Special handling processes will be developed, as needed, to handle waste materials, including processes developed through the Unreviewed Safety Question process. Special handling processes apply to items that may be found in the excavation area waste that are considered project "outliers" (i.e., an item that is not included in the expected waste—see Section 2). Lessons learned from mockup testing may also yield information to be applied to special procedures.

4.7 Underburden Sampling

Waste retrieval and packaging operations are to be performed in a series of campaigns; that is, a section of the waste site will be retrieved and packaged after which the uncovered underburden will be sampled. Then another section of the waste site will be retrieved and packaged and another underburden sampling will occur (see Section 3.3 for a description of the waste site campaigns). This process describes the steps to take and package underburden core samples.

4.7.1 Prerequisites to Underburden Sampling

The following tasks and/or events are a partial list (not listed in any particular order) of what must be completed before beginning underburden sampling:

- An area of underburden is clearly exposed, which will allow sampling without going through any waste zone material.

- All required materials and hardware are staged for operations: (1) in the RCS laydown area, a hydraulic jackhammer end effector is present; (2) in the RCS by the glove port, two wrenches (for assembling and disassembling core soil sample (CSS) body and drive tip hardware), multiple CSS body sections, multiple CSS liner caps for capping the core samples, a safety knife and/or scissors, tape, bags for trash, a bag of clean muslin wipes, multiple sets of gloves, two transition adaptors (anvil to CSS body), two transition adaptors (anvil to spade tool), two spade tools, a spade wrench, and an "umbrella" stand to stage the CSS liners and other associated hardware are present; (3) in the WES excavator area, bag-in/bag-out port sleeves, core soil sampler drive tips, core soil sampler liners, decontamination materials, localized ventilation system, RCT tools, custody seals, caps and tape, and cold storage for samples (e.g., refrigerator) are present; and (4) other items, as identified, are present (occurs with each shift change). *Drivers: TFR 3.1.2.3-3 and 3.1.2.3-5, Field Sampling Plan, and Manual 15A, Radiological Protection—INEEL Radiological Control.*

- Equipment checklists completed for items unique to the underburden sample handling process (e.g., excavator, hydraulic jackhammer end effector, and localized ventilation system) (occurs with each shift change). *Drivers: TFR 3.1.2.3-5, 3.2.2-1, 3.2.2-3, and 3.2.4-1.*

- Ventilation system check for adequate pressure differentials. (Outside of WES to inside of WES as measured inside the WES, -0.1 iwg. Inside the WES to inside the RCS as measured in the RCS, -0.6 iwg) (occurs with each shift change). *Drivers: TFR 3.1.1.2-3, 3.2.2-3, 3.2.7-1, and 3.2.7-2.*

- RSIM/dosimetry checks for all underburden sample handling and transportation personnel are complete. Personnel are suited-up in appropriate PPE (occurs with each crew change). *Drivers: TFR 3.2.2-1, 3.2.2-2, 3.2.4-1, and 3.2.5-2.*

4.7.2 Step-by-Step Descriptions

The following process steps are numbered the same as the process flow diagrams found in Appendix C, page C-10.

7.1 Move Bucket to RCS Wall Glove Port and Disconnect Hydraulics. The excavator operator moves the excavator bucket to the RCS wall glove port where the hydraulics are shut down and the pressure is vented. The operator at the RCS wall disconnects hydraulic lines. *Drivers: TFR 3.1.2.3-5 and 3.2.6-1.*

7.2 Move Bucket to RCS Laydown Area and Remove Bucket. The excavator arm is powered up and moved to the laydown area where the bucket end effector is set down and unlatched remotely. *Driver: TFR 3.1.2.3-5.*

7.3 Grapple Hydraulic Jackhammer. The excavator operator moves the excavator arm to the hydraulic jackhammer end effector on the RCS laydown area and latches it remotely.

7.4 Move Jackhammer to Glove Port. The excavator operator moves the arm with end effector to the RCS wall glove ports. The excavator hydraulics are again shut down and vented.

7.5 Install Jackhammer Hydraulics. An operator connects the jackhammer hydraulic lines once the lines are connected and a check of the hydraulic jackhammer is made. *Driver: TFR 3.1.2.3-5.*

7.6 Thread CSS Body Sections onto Jackhammer Anvil. An operator threads a transition adaptor and a CSS body section (20 in. length) onto the hydraulic jackhammer anvil. (The transition adaptor, CSS body sections, and sampling support materials were previously staged in the RCS near the glove ports.) Once the adaptor and body section are in place, two more CSS body sections are consecutively attached, each connected to the previous body section, which when fully assembled creates a 5-ft-long CSS body assembly. The excavator operator may need to start up the excavator and position the excavator arm to assist the glovebox operator in assembling the CSS body. *Driver: TFR 3.1.2.3-5.*

7.7 Bag In CSS Liner and Drive Tip. An RCT bags in a CSS liner and drive tip into the RCS area via the RCS wall bag-in/bag-out port. The liner has a cap with a pressure relief check valve attached to one end and the drive tip attached to the other end. Once the CSS liner and drive tip have been transferred into the RCS, a new bag-in/bag-out sleeve must be installed before any other items can be transferred in to or out of the RCS. This part of the step can occur any time before the next use of the bag-in/bag-out port. *Drivers: TFR 3.1.1.2-2 and 3.1.2.3-5.*

7.8 Install CSS Liner and Drive Tip. An operator un-bags the CSS liner and drive tip and installs them into the CSS body, threading the drive tip onto the body (the drive tip may be tightened with a wrench, if required). The excavator operator may need to start up the excavator and position the excavator arm to assist the glovebox operator in installing the CSS liner and drive tip. Once installed, the CSS assembly is ready to take a sample. *Driver: TFR 3.1.2.3-5.*

7.9 Move CSS Assembly to Sampling Location. The excavator operator positions the excavator arm over the pit location where an underburden core sample is to be taken. The Field Sampling Plan (Salomon et al. 2002) should be referenced for specific coring locations. Underburden samples will only be taken from areas where waste zone materials have been removed and an area of underburden is clearly exposed. Section 3.3 of this document also addresses underburden coring. *Drivers: TFR 3.1.2.3-5 and Field Sampling Plan.*

7.10 Insert CSS Assembly into Underburden and Extract Sample. The excavator operator then inserts the CSS assembly into the underburden, using the hydraulic hammer as needed, to take a core sample. *Driver: TFR 3.1.2.3-5.*

7.11 Move CSS to RCS Glove Port and Position for Drive Tip Removal. The excavator operator moves the CSS assembly to the RCS wall glove ports and positions the excavator arm such that the glove port operators will be able to remove the drive tip. *Driver: TFR 3.1.2.3-5.*

7.12 Survey/Smear CSS Body. Sample handling personnel follow sample-handling procedures (e.g., MCP-9363 and MCP-9364) and prepare a chain-of-custody form (e.g., Form 450.06 and Form 435.20), which must be ready before beginning the sample handling process. This form will follow the sample and will be used to transfer sample responsibility throughout the sample handling process. An RCT sets up a contamination area around the bag-in/bag-out port and positions a localized ventilation system (e.g., vacuum) for bagging out the core sample. An operator then cleans the exterior surface of the CSS body, removing soil and surface materials. Then, the RCT surveys and takes smears of the CSS body's exterior surface to minimize the amount of contamination present before removing the CSS liner. *Drivers: TFR 3.1.2.3-3, 3.1.2.3-5, and 3.2.2-1; Transportation Plan.*

7.13 Unthread CSS Drive Tip and Remove CSS Liner. An RCT unthreads the CSS drive tip from the CSS body, which then allows the CSS liner to be removed. The drive tip is placed in a container for disposal during D&D&D activities. The liner, which can be up to 5 ft in length and have a diameter of approximately 2.75 in., is then removed from the CSS body. *Drivers: TFR 3.1.1.2-2 and 3.1.2.3-5.*

7.14 Cap and Tape End(s) of CSS Liner. An RCT caps and tapes both ends of the CSS liner (if a pressure relief cap was not previously placed on one end of the liner), which contains the core soil sample. (Care will need to be taken by operators so as not to lose sample material during these handling activities.) *Drivers: TFR 3.1.1.2-2 and 3.1.2.3-5.*

7.15 Decontaminate CSS Liner. An RCT cleans off dust and debris that may be around the liner exterior and re-cleans, as required, to reduce surface contamination levels. *Drivers: TFR 3.1.2.3-5 and 3.2.2.1.*

7.16 Survey/Smear CSS Liner and RAD Survey. After cleaning the CSS liner, an RCT surveys the CSS liner and smears are taken of the liner exterior surface. These smears are passed out of the bag-in/bag-out port and counts are made. If additional decontamination is required, then an RCT re-cleans the liner surface and another smear is taken. In addition to the contamination survey and smears, a radiation survey is also made by the RCT, and the associated activity levels are recorded. *Drivers: TFR 3.1.2.3-5 and 3.2.2-1.*

7.17 Bag Out CSS Liner. An RCT bags out the CSS liner from within the RCS. Personnel within the WES excavator area assist the RCT in moving the liner through the bag-in/bag-out port, given its 5 ft length. *Drivers: TFR 3.1.1.2-2 and 3.1.2.3-5.*

7.18 Install New Bag on Bag-Out Port. Once the CSS liner has been transferred out of the RCS, a new bag-in/bag-out sleeve must be installed before any other items can be transferred into or out of the RCS. This step can occur any time before the next use of the bag-in/bag-out port. *Driver: TFR 3.1.2.3-5.*

7.19 Contamination and RAD Survey of Bag. Once the CSS liner has been bagged out of RCS confinement, an RCT performs a contamination survey of the bag in which the CSS liner was placed and smears are taken of the bag. The smears are taken and counts are made to ensure that the bag surface is appropriate for handling and transportation. In addition, a radiation survey is also made of the bagged liner and the activity levels are recorded. *Drivers: TFR 3.1.2.3-5 and 3.2.2-1.*

7.20 Custody-Seal Bag. An RCT places a custody seal on the bag containing the core soil sample. *Drivers: TFR 3.1.1.2-2, 3.1.2.3-2, and 3.1.2.3-5; Manual 15A, Radiological Protection—INEEL Radiological Control.*

7.21 Place Bagged CSS Liner in Container for Transportation. An RCT places the bagged CSS liner in a transportation container. The container used for transporting the samples complies with the Transportation Plan and has already undergone contamination and radiation surveys and is ready for sample loading. Ice is packed around the core samples for transportation to the analytical laboratory to maintain a valid sample for VOC analysis. *Drivers: TFR 3.1.1.2-2, 3.1.2.3-5, and 3.2.2-1; Transportation Plan; and INTEC Sampling and Characterization Interface Agreement.*

7.22 Container Full? If the transportation container is fully loaded with CSS liners, then the process diverts into two paths. The transportation container follows the "Underburden Sample Handling and Transportation" path after which, the operator assesses whether local area core sampling is complete (Step 7.23). If the transportation container is not full, the process continues directly to assess whether local area coring is complete (Step 7.23). NOTE: The transportation container passes to the handling and transportation process, which moves the container to INTEC for testing and analysis of the core samples. Underburden core samples follow a similar process flow to the waste samples, with only one additional step (core sample sectioning). Underburden core sample transportation containers join the Waste Sample Handling and Transportation process at Step 5.8, "Perform Contamination Survey of Transportation Container Surface," and continues through that process. The one additional step noted above for underburden core samples, which are up to 5 ft long and approximately 2.25 in. in diameter, is that INTEC sections the cores, creating approximately 1-ft-long samples. The INTEC then performs tests and analysis on these subsamples of the original core sample per the Field Sampling Plan (Salomon et al. 2002). Results, as defined in the Field Sampling Plan (Salomon et al. 2002), are provided to the project as agreed to in the INTEC Sampling and Characterization Interface Agreement. *Drivers: TFR 3.1.1.2-2, 3.1.2.3-1, 3.1.2.3-3, and 3.1.2.3-5; Field Sampling Plan; and INTEC Sampling and Characterization Interface Agreement.*

7.23 Local Area Coring Complete? Where underburden sampling will be performed at least twice during the waste retrieval process, a check is made to identify whether underburden sampling has been completed in the desired areas (see the Field Sampling Plan [Salomon et al. 2002] for specific sampling locations). If underburden core sampling is complete in the desired area, the process flow passes to another decision point ("Waste Retrieval Complete?"). Otherwise, if additional underburden core samples are to be taken, then the process moves to bagging in a new CSS liner and drive tip (see Step 7.7). *Drivers: TFR 3.1.2.3-3 and 3.1.2.3-5.*

7.24 Waste Retrieval Complete? If all underburden sample cores have been taken in the desired area, then a check is made to determine if the waste retrieval process is complete. If waste retrieval is complete including all underburden samples having been taken, then the process passes to the "Shutdown and D&D&D" process (see Section 4.8), which is the next phase of the project where shutdown and D&D&D activities will be performed. If, on the other hand, additional waste retrieval is required, the process passes back to the "Waste Retrieval" process (see Section 2). *Driver: TFR 3.1.1.1-4.*

4.8 Shutdown and Deactivation, Decontamination, and Decommissioning

Upon completion of the seven tasks listed below, the project moves to shutdown and D&D&D activities. The project Facility Shutdown and Deactivation, Decontamination, and Dismantlement Pre-Plan should be referred to for all shutdown activities. *Drivers: TFR 3.5.6-1, 3.5.6-2, 3.5.6-3, 3.5.6-4, and 3.5.6-5.*

1. A minimum 75 yd^3 of waste zone material has been excavated within the retrieval area
2. The retrieved waste zone material has been assayed, determined to be less than 200 FGE per drum, and sent to temporary storage (onsite)
3. The retrieved waste zone material has been sampled
4. The exposed underburden below the retrieval area has been sampled
5. Security has reviewed the last of the glovebox record of handling videotapes and all suspect security items have been dispositioned
6. The U.S. DOE has provided a Notification of Completion of Stage II Excavation to the Agencies, and the agencies agree that excavation is complete.
7. All waste items and outliers have been evaluated to identify the need for returning the material to the pit or processing in the glovebox, and no further need to perform these activities exists.

5. REFERENCES

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*, December 11, 1980.

40 CFR 761, 2002, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations*, Office of the Federal Register, February 2002.

Anderson, Danny, 2002, *OU 7-10 Glovebox Excavator Method Process Model,* EDF-2158, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, July 2002.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory,* U.S. Department of Energy, Idaho Field Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Health and Welfare, December 4, 1991.

DOE-ID, 1993, *Record of Decision: Declaration of Pit 9 at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory, Idaho Falls, Idaho*, Administrative Record No. 5569, U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency Region 10; and State of Idaho Department of Health and Welfare, October 1993.

Einerson, J. J. and R. W. Thomas, 1999, *Pit 9 Estimated Inventory of Radiological and Nonradiological Constituents*, INEEL/EXT-99-00602, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, October 1999.

Huntley, R. M. and D. E. Burns, 1995, *Scope of Work for Operable Unit 7-13/14 Waste Area Group 7 Comprehensive Remedial Investigation/Feasibility Study*, INEL-95/0253, Rev. 0, Idaho National Engineering and Environmental Laboratory, Lockheed Martin Idaho Technologies Company, Idaho Falls, Idaho, August 1995.

INEEL, 2001, *Waste Area Group 7 Analysis of OU 7-10 Stage II Modifications*, INEEL/EXT-01-01105, Rev. 0, Idaho National Engineering Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, October 2001.

INEEL, 2002a, *OU 7-10 Glovebox Excavator Method Project Execution Plan for Critical Decision 1*, INEEL/EXT-01-01513, PLN-1016, Rev. 0, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT, LLC, Idaho Falls, Idaho, January 2002.

INEEL, 2002b, "Final Preliminary Documented Safety Analysis for the OU 7-10 Glovebox Excavator Method Project (Draft)," Rev. C, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

INEEL, 2002c, *OU 7-10 Glovebox Excavator Method Technical and Functional Requirements,* INEEL/EXT-98-00444, TFR-2527, Rev. 2, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, January 2002.

MCP-9363, 2001, "Labeling Samples and Maintaining Chain of Custody," Rev. 2, *Waste Generator Services Program Handbook*, May 2001.

MCP-9364, 2001, "Handling, Storing, and Shipping Samples," Rev. 2, *Waste Generator Services Program Handbook*, May 2001.

PRD-183, 2000, "Radiation Protection—INEEL Radiological Control," Rev. 6, *Manual 15A, Radiation Protection—INEEL Radiological Control,* July 2000.

Salomon, Hopi, et al., 2002, "Field Sampling Plan for the OU 7-10 Glovebox Excavator Method Project," INEEL/EXT-02-00542, Rev. A, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.

SPC-355, 2002, "Fissile Material Monitor for the OU 7-10 Glovebox Excavator Method Project," Rev. 1, September 2002.