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This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

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SOLID WASTE RETRIEVAL PHASE 1 OPERATIONAL BASIS

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SOLID WASTE RETRIEVAL PHASE 1 OPERATIONAL BASIS

I Introduction

This Document describes the operational requirements, procedures, and options for execution of the retrieval of the waste containers placed in buried storage in Burial Ground 218W-4C, Trench 04 as TRU waste or suspect TRU waste under the activity levels defining this waste in effect at the time of placement. Trench 04 in Burial Ground 218W-4C is totally dedicated to storage of retrievable TRU waste containers or retrievable suspect TRU waste containers and has not been used for any other purpose.

II Description of Phase 1 Retrieval Scope

Solid Waste Retrieval Phase 1, Project W-113, is a fiscal year 1994 line item. Phase 1 retrieves the waste stored in the first of some 25 trenches targeted for retrieval. The trench is located in burial ground 218W-4C and is designated as trench four (T-04). This trench contains about 9,900 of the 36,000 fifty-five gallon waste drums stored as TRU waste in the 25 trenches. The burial records show that in addition to 55 gallon drums there are 57 containers made up of two 55 gallon drums welded together end to end, 37 steel boxes, and one plywood box coated with fiberglass-reinforced polyester (FRP).

The burial ground records show drums were first placed in the trench at the east end during April of 1978 and the last drums were placed during March of 1985. During 1980 the specification for TRU waste drums was changed to galvanized steel. The type of drum material was not shown in the burial records and the changeover from painted steel drums to galvanized occurred slowly so an accurate count of each type of drum in the trench is not available. It is estimated that about 1/2 of the drums are galvanized.

The trench was constructed from west to east along Hanford Site coordinate N40070 (ft). The trench bottom is 25 feet wide and contains an asphalt floor, with curbs. The nominal depth below original grade is about twelve feet but varies with a minimum depth of about six feet at the east end of the trench. The floor is sloped to allow east to west drainage to the low point, where the ramp begins. The ramp slopes upward to Dayton Avenue which has North-South orientation. The sides of the trench were sloped 1-1/2 to 1. The waste was placed in modules nominally constructed of waste drums twelve across, twelve deep, and four high, although the first two modules are five high. During forming of the modules 4ft x 8ft sheets of plywood were laid on top of each layer (tier) of drums. The plywood sheets between drums are 1/4 inch thick and the top layer of plywood is 3/4 inch thick. As each module was completed it was draped with a reinforced polyvinyl tarp to effectively wrap the top and four sides. The tarps contain slits through which 2 inch PVC vent and inspection pipes were placed. The boxes and 110 gallon drums were fitted within the 12 by 12 drum array, but in some cases the boxes extend above the top of the upper layer of drums.

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The first module was started approximately at coordinate W77482 in May of 1978. At that time TRU waste was defined by transuranium nuclide activity of 10 nCi/g of waste. This was changed to the present 100 nCi/g in 1982.

As the modules were completed, another module was started immediately to the west. Separation between modules is expected to be minimal (the module dimension of 12 drums completely uses up the space between coordinates shown in burial records). When module construction was far enough along so that trench backfilling would not interfere with the module under construction, placement of backfill alongside the module and berm over the top could begin. The minimum berm is approximately four feet over the top of the module. The final row of drums in the final module (Module 19) is at about coordinate W77966. Dayton Avenue is at W78140 (centerline). Burial records indicate except for four drums put into the trench in March of 1975, the final module was completed during November of 1984.

III Project W-113 Preparation for Retrieval

During the site preparation phase of the project, excavation will begin from Dayton Avenue eastward down the ramp until overburden over Module 19 begins to sluff to the toe of the excavation. Berm will then be removed to within one to one-half foot of the tops of the modules. Because of the ready access using the existing ramp, the waste containers will be retrieved in a "last in-first out" manner. In the event it is determined by ground penetrating radar, or other non-intrusive mapping, that waste containers are stored on the trench floor outside of Module 19, the excavation will be stopped so that any such containers remain covered with soil until the start of retrieval operations.

The remainder of the excavation will be performed a module at a time as a part of retrieval operations by plant forces when construction is complete (including trench shoring structures if required), erection of the weather enclosure is complete, and the retrieval equipment is operational. The shoring concept will be determined during preliminary design and could consist of utilizing the angle of repose of the trench wall soil, some sort of structure, or a combination of both in order to provide for worker safety from cave-in during retrieval. The project will also provide and install utilities and the support buildings (office and change room modules) and any operations weather enclosures in addition to the enclosure over the trench.

Figure 1 is a simplified flow diagram of the normal drum retrieval operations.

DRUM RETRIEVAL PROCESS FLOW

FIGURE 1

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IV Description of Retrieval Operations

The following are descriptions of the procedures for which work plans are assumed to be necessary.

A. Preparing the Module for Retrieval

1 Radiological and Hazardous Gas Survey

- a. Collect soil samples for HP bench top counting.
- b. Survey the vent and inspection pipes for hazardous gases and obtain a high volume air sample to determine the presence of any radioactive gas.

2 Vacuum soil from the tarpaulin cover

- a. Remove soil back far enough so that the vertical face of the module can be cleared of soil and the drum face shoring installed to prevent drums falling during earthquakes.
- b. Collect soil samples for analysis as required. The frequency of collecting samples will be based on the findings of the soils characterization to be performed by the Pilot Retrieval Characterization work and the initial findings of the analyses of the sampling during drum exhumation. Soil will be regularly sampled and the exhaust from the vacuum system monitored by equipment supplied with the vacuum system. If the soil is determined to be contaminated, vacuuming will be delayed until analyses are evaluated for a decision on how to handle the contaminated soil and proceed with disinterment and recovery of the waste.

3. With the module face shoring brace in place, position the manlift at the module face.

- a. Survey the tarp for radioactive contamination, slit the tarp and survey and test gas samples for radioactivity.
- b. Remove the vent and inspection pipes.

(1) In the event only trapped radioactive gases are present, it is highly likely to be radon daughter products, which will quickly decay on release. If the survey for gases indicates the presence of radioactive gas a sample will be acquired for gamma energy analysis to discriminate radon from uranic or transuranic alpha. This verification takes about ten

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minutes while work is suspended. If radon is not verified additional analyses will be performed to define a course of further action.

(2) In the unlikely event of surface contamination, the Personnel Protective Equipment requirement will be upgraded, decontaminate, if possible, or package in plastic the contaminated pieces, or contaminated portions from the tarps or pipes, for characterization, quantification, removal and disposal according to burial ground procedures appropriate for the type and level of contamination present.

c. Fold and/or roll back the tarp to expose the west face of the module and the plywood cover over the top of the first four rows of drums...rows L, K, J and I.

d. Survey and remove plywood sheets.

(1) Park forklift affixed with tynes or pallet to collect and remove plywood sheets.

(2) Place plywood on forklift with assistance of the drum hoist with appropriate attachment or other tools as applicable.

(3) Vacuum plywood, and tops of drums as necessary.

(4) Package in plastic any contaminated plywood sheets, or contaminated portions from the sheets, for characterization, quantification, removal and disposal according to burial ground procedures appropriate for the type and level of contamination present.

(5) Place non-contaminated scrap in temporary storage, secure from scattering by high winds, for timely removal and disposal.

B. Recovery of Drums from Module

1. Obtain SWITS report on module: Generator and ID-number by Tier/Row/Position. First to be retrieved is Module 19. Tiers are numbered from the bottom up, rows from east to west and position numbers from left to right facing east.

The records show that row F will be the first encountered in Module 19 and that module 19 has four tiers and that the rows have drums in all 12 positions.

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2. The first drums of a module to be recovered are the first row of the top tier, nominally Row L Tier 4 - except for the starting Module (see above). To begin retrieval of a module the sections of the module face shoring for the top tier are removed to allow minimal lifting to complete inspection during recovery of the containers from the modules, unless lack of module face stability requires leaving the top shoring section in place and lifting the drums over the shoring. Unless there are unstable drums after shoring removal that require retrieval first to minimize risk of the drums falling, the drums at the corners of the module should be retrieved first (the most likely to fall due to operating accidents or earthquakes). If there are no safety reasons and also no batching requirements to retrieve and process drums in a particular sequence, the recommended sequence is positions 12-1-2-3-4-5-6-7-8-9-10-11 or the reverse. This will minimize equipment movements.

3. Work zone access requirements will be based on the HWOP and procedures to be prepared for the waste container exhumation, recovery, and processing operations. These requirements cannot be finalized before the trench boundary that retrieval operating personnel must enter is exposed and available for the surveys and tests that Industrial Hygiene requires to make the determinations. For preliminary planning however, personal protection requirements are assumed to be no higher than Level C, with Level D in effect during normal conditions of operation.

4. Drum NDE begins on the module by visual inspection of the surface visible to the operators in the man-lift, the soil vacuum operators, and the HPTs monitoring the drum recovery operation. In addition, an audible inspection can be performed using a drum "rapper" to find audible drum defects. Some drums may be found to be wrapped in plastic, which should be removed in place, surveyed, and placed in the appropriate waste collection container prior to beginning the drum recovery operation, unless there is reason to believe that the plastic had been used to contain contamination.

a. If the visual/audible inspection establishes the need, continue the in-place inspection by an ultrasonic survey with the hand held device furnished by the project.

(1) If the container is found to be of suspect integrity for normal lifting, a high-strength mesh sheet would be placed under the drum to enclose the drum for tying off and lifting with the drum hoist. This may require "walking" the drum onto the mesh. Surveys for radioactivity and toxic/ignitable gasses are conducted and results recorded during the drum recovery operation. If contaminated or if the

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risk for contamination appears high the drum would be wrapped in plastic.

(2) All visible markings and data from labels and tags are recorded, as available, along with a description of the inspection during the preparation to lift the drum. A barcode number is assigned, recorded, and placed on the drum, if possible.

(3) If the hoisting system rigging contains the load-cell for drum weights, the weight is recorded as the drum is lifted from the module.

(4) The drum would be hoisted from the module and placed in a retrieved drum overpack on the drum inspection stand which would have been obtained (without the lid) from overpack storage near the drum overpacking work station at the transition from the trench operations area to the ex-trench operations area. The overpack would be barcoded at this time and transferred to the assay module along with the hardcopy drum recovery and inspection package.

b. Entries to the pre-made inspection sheets and the retrieval data management system made at the workstation computer terminal include to the extent possible:

(1) Identification number determined from the drum (if discernable) and the SWITS data for the module and location from which the drum is recovered and the locator number. If there are discrepancies both numbers should be given.

(2) The new container identification number provided by bar-code on the overpack.

(3) Type of drum, if identified or determinable, and identification of contents from labels, stickers, and drum markings; including isotopics and quantities, dose rates, gross and net weights, waste matrix and quantities, hazardous and combustible ratings, packaging information, and observations on drum condition from inspections.

(4) Weight from load cell reading and weight of mesh if used for assuring drum intactness during the lift.

(5) Measured surface dose rates at the locations diagrammed on the inspection sheet. There will be a

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space for entering the highest reading and the location of any "hot spots" will be indicated on the drum diagram.

(6) Data from SWITS package for the drum with verifications and/or discrepancies noted.

(7) The hardcopy data package is placed in a folder to physically accompany the drum through the retrieval process and delivery to storage or WRAP module 1.

5. If, from the in-situ inspection, it is judged to be safe, the drum lifting device on the hoist is attached and the drum is lifted just enough to be able to turn the drum to complete the visual surface inspection and record the weight indicated by the load cell, after which the drum is hoisted to a position where initial radiological and hazardous gas surveys can be made prior to final vacuuming before delivery to the inspection stand.

6. On the inspection stand the surveys and recording of drum and drum label markings are completed and the barcode is applied to the drum. Entries to the retrieval data management system made at the workstation computer terminal include:

a. Identification number determined from the drum (if discernable) and the SWITS data for the module and location from which the drum is recovered and the locator number. If there are discrepancies both numbers should be given.

b. The new container identification number (CIN) provided by bar-code

c. Type of drum, if identified or determinable, and identification of contents from labels, stickers, and drum markings; including isotopics and quantities, dose rates, gross and net weights, waste matrix and quantities, hazardous and combustible ratings, packaging information, and observations on drum condition from inspections

d. Weight from load cell reading.

e. Measured dose rate.

f. Data from SWITS package for the drum with verifications and/or discrepancies noted.

g. The hardcopy data package is placed in a folder to physically accompany the drum through the retrieval process and delivery to storage or WRAP module 1.

7. A retrieval sequence for the entire module should be designed to create steps in the work face such as retrieving up to another three rows on the top tier after completing the first row (and lowering the face of the portable shoring structure one tier) to expose the top of four underlying rows, as necessary, for removal of plywood without cutting that may have been placed with the eight foot dimension in the east-west direction. When steps in the module face have been created to the top of the second tier it should be safe to remove and set aside the portable shoring until required by the next module. Job safety evaluations will be required, however, to determine if it is better to saw plywood as necessary in order to minimize the reach of tools that will be used in removal of drums from the modules.

C. Recovery of Boxes from Modules

When a box is sufficiently exposed by drum removals to be removed from a module, drum retrieval will be suspended and the Diesel Forklift will be used to pick up the box from the module for delivery to the box overpack workstation. Judging from photographs taken during placement of the waste in the trench at least the largest box is oriented for forklift handling. If some boxes are not so oriented they will have to be "coaxed" into position using the tips of the tynes, the drum hoist (so as to not exceed it's capacity), or other devices such as come-alongs, rollers, etc. The boxes will be vacuumed as clean as possible during the removal operations.

D. Rate of Recovery

The number of workers and scheduling of the drum and box recovery operations will take into account the ability to support the retrieval processing rate of 16 drums per shift. This is the minimum recovery rate of uncontaminated drums without any limiting degradation while not recovering boxes. The minimum rate of recovery (the period of time the module is inaccessible for drum recovery) for one box is one day, with the exception of the largest box. When boxes are being removed from a module sequentially the retrieval processing (mainly overpacking) is also one day per box.

Planning for preliminary pre-recovery preparation of a new module and relocations of retrieval processing work stations will depend on the design of the relocatable modular bracing system, or shoring, for the vertical face of the module when first exposed. This is not expected to interrupt container recovery for more than three days.

E. Contingency Plan

If at any time during any of the exhumation and drum recovery operations there is detectable airborne or surface contamination, operations would be suspended and the level, extent, and source investigated. The source and any contaminated soil, material, or other items would be collected in appropriate containers for processing for disposal or storage for treatment at a WRAP facility. If there were airborne contamination or a risk of the contamination in the area to be cleaned up becoming airborne, a temporary containment structure would be erected for use as long as there is detectable loose contamination equal to or in excess of the summary of contamination values given in the Hanford Site Radiological Control Manual.

If only surface contamination should be detected and is equal to or exceeding the summary of contamination values given in the Hanford Site Radiological Control Manual a Special Radiological Work Permit would be prepared to replace the one in use, a contamination area and buffer area established, and, depending on the levels of contamination, appropriate protective clothing and temporary containment options selected.

If an accident occurs in which waste containers are breached, the release of radioactive particulates is assumed and emergency on-site evacuation procedures are instituted while air sampling and surveys are performed under an Emergency Response RWP to determine if airborne contamination has been released and the magnitude of any release. If warranted, the on-site emergency is called off and non-retrieval personnel may return to work; or depending on the severity of the potential consequences of the release, additional procedures would be put into effect for containment of the release, notification of off-site emergency response agencies for access controls to areas likely to receive radiologic dose, and to start personnel decontamination if required, and to begin contamination clean-up. Contingency planning must be complete prior to start of the retrieval operations.

F. Waste Drum Retrieval Processing

The sequence followed here is preliminary and subject to modification based on findings from preliminary design, especially of potential near term improvement to real time radiography for drum components' thickness determinations. Following retrieval of the drum and the initial inspection the drum is transferred to the NDA/NDE mobile unit.

1. Non-destructive Assay

- a. Enter weight recorded in Hard Copy data package for drum into retrieval data terminal at the assay controls.

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- b. Assay according to vendor supplied procedures
 - c. Data entry to retrieval data system
 - d. Add NDA data package to hardcopy data package for drum
2. Conveyor Transfer to Radiography Unit
3. Non-destructive Examination
- a. Perform radiography according to vendor supplied procedures
 - b. Data entry to retrieval data system
 - c. Add NDA data package to hardcopy data package for drum
4. Transfer to Headspace Gas Venting and Sampling mobile unit
5. Headspace Gas Sampling
- a. Screening
 - (1) Place drum in venting enclosure
 - (2) Inspect and clean top of drum for drill/punch penetration
 - (3) Clamp head penetration and sampling device to drum and check that seal is tight
 - (4) Verify sampling system is in total VOC and combustible gas (hydrogen, methane and butane) screening mode and test for operability
 - (5) Verify blast protection is in place and secure and that personnel are safely clear
 - (6) Penetrate drum head and sample for combustibility and total VOC
 - (7) If sample is less than 25% LEL and 500 ppm VOC go to 3.e., below (installation of filtered vent)
 - (8) If sample is more than 500 ppm and less than 600 ppm VOC and 25% LEL go to 3.b (flame test)
 - (9) If sample is more than 600 ppm or is between 500 and 600 ppm VOC and is determined to be ignitable by

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the flame test, go to 3.c (analysis for organics).

b. Flame test (if required)

(1) Data Entry

(2) Hard Copy

c. Analysis for Organics (if required)

(1) Data Entry

(2) Hard Copy

d. Purge (if required)

e. Complete installation of vent with filter

6. Transfer to Overpack Work Station

7. Overpack

Controlled zone interface

a. Place drum in overpack and attach lid

b. Test

c. Survey and weigh

8. Prepare to Transport

a. Labels, tags and markings

b. Load van

G. Overpacking of Boxes

1. Transfer box from waste container module in the trench to the box overpacking workstation.

a. Inspect, clean, and survey box for release from the radiological control zone; apply bar code. At the box overpacking work station place the box on the baseplate of the overpack which will have been positioned on the flatbed trailer.

b. When the baseplate is loaded the box and any required dunnage and interior bracing is in place the remainder of

the overpack and seal will be bolted to the baseplate. The overpack "lid" will be placed on the baseplate with a crane. The trailer will be ready for transport to the storage facility.

H. Retrieval Processing Rate

The number of workers and scheduling of the drum and box retrieval processing will take into account the ability to support the output rate of 16 drums per shift while not recovering boxes and one box per shift to support the box recovery rate from the module of one per shift.

V Retrieval Operations Options

It is assumed the initial steps in the drum retrieval process; soil vacuuming, recovery of the containers from the storage module, and initial inspection, will be performed with plant forces (i.e., Solid Waste Management operators and supervisors) as will container handling between work stations and overpacking. Options are available, however, for the physical characterizations provided by non-destructive neutron assays, non-destructive radiography images, and head gas testing while placing filtered vents in the drums. The design and/or specifications for these systems was not included in the scope of definitive design by the Architect Engineer, but will be done by WHC.

A. NDA/NDE (These may be treated as individual systems or a combined system)

The neutron assay and radiography options are relatively clear cut:

1. Include the equipment procurement, ATP, set-up, calibration, and start-up support in the scope of work of the constructor.
 - a. Train new and/or present Hanford operators and maintenance personnel for system operation and maintenance, or
 - b. Train technicians for operation and maintenance of the assay and RTR systems with Hanford operators providing material handling support.
2. Same as in 1, except Hanford procure and startup the equipment.
3. Same as in 1 or 2, except maintenance provided by service contract with vendor.

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4. Privatize these activities through performance specifications and contract(s) for complete operations and maintenance services with vendor supplied equipment.

B. Drum Venting and Sampling

It appears that the lead for this set of operations should fall with the sampling function.

1. Using the Hanford developed design for drum venting, have the adapt the design specification package for the contractor to procure, accomplish the ATP's, set up, calibrate, and start-up.
 - a. Train Hanford operators for drum venting and filter installation with Hanford lab techs providing the sampling and analytical services. Train Hanford maintenance personnel for all maintenance.
 - b. Use technicians for the venting and filter installation with Hanford operators providing the material handling support.
2. As in 1 except Hanford procure and startup.
3. As in 1 or 2 except maintenance service contract with vendor.
5. Vendor turnkey contract for equipment and services.
6. "Contract" separately with WHC Analytical Services for the sampling and analytical portion with any of the above options.

VI. Other Work to be Generated prior to Start-up and Readiness Review.

A. Procedures (Operations and Maintenance)

1. Dust control
2. Portable shoring for module workface
3. Work platform (man lift)
4. Diesel box retriever
5. Drum retriever crane
6. Electric fork lift/drum handler
7. Weighing

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8. Ultrasonic inspection
 9. Neutron assay
 10. Headspace sampling and filter installation
 11. Gas analysis
 12. Drum purging
 13. Overpacks
 14. Radiography
- B. ALARA Team per WHC-CM-411
 - C. ALARA Checklist per WHC-CM-4-14
 - D. Soil Sampling Plan
 - E. HWOP
 - F. Radiation Work Permit (RWP)
 - G. Contingency Plans
 - H. Emergency Plan & Recovery Plan
 - I. Emergency Response RWP
 - J. Technology Applications
 1. HPT Radon Discrimination Counting
 2. Long Range Alpha Detection (LRAD)

Figure 2 shows the the pre-startup activities required by the retrieval startup organization.

VII. Organization

Figure 3 shows the proposed organization structure for Phase 1 Retrieval.

PHASE 1 RETRIEVAL STARTUP PRELIMINARY SCHEDULE

FIGURE 2

ORGANIZATION PHASE 1 RETRIEVAL OPERATIONS

Figure 3