ERID-257846

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Date: JUL 0 2 2014
Symbol: ENV-DO-14-0145
LAUR: 14-24679, 14-24704, 14-24634, 14-24711, 14-24713, 14-24625, 14-24636, 14-24635, 14-24631
Locates Action No.: *N/A*

Mr. John E. Kieling
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Dear Mr. Kieling:

Subject: **Transmittal of Information Requested During New Mexico Environment Department/Los Alamos National Laboratory Daily Technical Phone Call- Technical Area 55 Cementation Procedures**

The purpose of this letter is to transmit information requested during the New Mexico Environment Department (NMED)/Los Alamos National Laboratory (LANL) daily technical phone calls that are currently being held as stipulated within the Administrative Order No. 5-19001 issued by the NMED. The enclosed information fulfills #6 of the *Requested Information / Pending Issues* table included as part of the written daily submission associated with each daily technical phone call.

LANL procedures and example records associated with post-1991 Technical Area (TA)-55 cementation process are included as follows:

- Enclosure 1: PMT2-DOP-CF-001, R1 Preparing Drum Assemblies for Cement Fixation (LA-UR-14-24679)
- Enclosure 2: PMT2-DOP-CF-002, R3 Drum-in/Drum-out Operations for Cement (LA-UR-14-24704)
- Enclosure 3: PMT2-DOP-CF-003, R1 Certifying, Transferring and Storing Evaporator Bottoms for Cement Fixation (LA-UR-14-24634)
- Enclosure 4: PMT2-DOP-CF-005, R1 Non-evaporator Solution Operations for Cement Fixation (LA-UR-14-24711)
- Enclosure 5: PMT2-DOP-CF-006, R1 pH Adjustment of Evaporator Bottoms for Cement Fixation (LA-UR-14-24713)

- Enclosure 6: PMT2-DOP-CF-007, R3 Cement Addition Operations for Cement Fixation (LA-UR-14-24625)
- Enclosure 7: PMT2-DOP-CF-008, R4 Particulate Waste Certification and Cementation (LA-UR-14-24636)
- Enclosure 8: PMT2-DOP-CF-009, R3 Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage (LA-UR-14-24635)
- Enclosure 9: Examples of data sheets associated with PMT2-DOP-CF-006 (LA-UR-14-24631)
    - The Cement Run Sheet is a data collection record and is used to augment the Waste Compliance and Tracking System
    - The Performance Checklist is used to document that the system operators are qualified to a specific procedure (e.g. PMT2-DOP-CF-006)

If you have comments or questions regarding this submittal, please contact Mark Haagenstad at (505) 665-2014 or Gene Turner at (505) 667-5794.

Sincerely,

Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Security LLC

Sincerely,

Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Field Office
U.S. Department of Energy

AMD:GET:MPH:LVH/lm

Enclosures:
(1) PMT2-DOP-CF-001, R1 Preparing Drum Assemblies for Cement Fixation
(2) PMT2-DOP-CF-002, R3 Drum-in/Drum-out Operations for Cement
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(8) PMT2-DOP-CF-009, R3 Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage
(9) Examples of data sheets filled out in accordance with PMT2-DOP-CF-006

Cy: Ryan Flynn, NMED, Santa Fe, NM, (E-File)
Tom Blaine, NMED, Santa Fe, NM, (E-File)
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JUL - 3 2014
NMED
Hazardous Waste Bureau

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ENCLOSURE 1

PMT2-DOP-CF-001, R1 Preparing Drum Assemblies for Cement Fixation

ENV-DO-14-0145

LA-UR-14-24679

Date: JUL 0 2 2014

Extended Until 6/24/15 per Memo MET-DO:13-08. Extension request was approved by Jeff Yarbrough on 06/24/13.

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-001, R1

Effective date: 10/12/11

Next review date: 10/12/13

Supersedes: N/A

Title: Preparing Drum Assemblies for Cement Fixation

Status:	Hazard:	For Document Control Use Only:
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☐ Use every Time	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
Operations: Georgette Ayers	NCO-2	10/5/11	SIGNATURE ON FILE
Authorized for Use By:			
Operations Responsible Line Manager: Thomas Ricketts	NCO-2	10/5/11	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	10/12/11	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
SME/Engineer: Gerald Veazey	MET-1	10/6/11	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader: Kent Abney	MET-1	10/7/11	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
N/A	***N/A***
Quality Assurance: ***Date***	***SME:*** ***Date***
Joseph Fresquez	***N/A***

☒ Unclassified ☐ Restricted Data	**Derivative Classifier:**
☐ Confidential ☐ Formerly Restricted Data	**Name: Darren Quintana**
☐ Secret ☐ National Security Information	**Title: MET-1 Date: 10-6-11**
☐ Unclassified Controlled Nuclear Information	
☐ Official Use Only	**Derived from: CG-SS-4 9/2000**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-001, R1	10/12/11	Major Revision	• Changed drum manufacturer. • Changed torque requirements for plug sizes. • Replaced WMS with WCATS. • Changed WES-FFS to Waste Services.
PMT2-DOP-CF-001, R0	12-11-2008	New	• Reformatted to IMP 300. • Supersedes: NMT2-WI-009-CF-901,R3 and NMT2-IWD-WI-009-CF-901,R3

Table of Contents

Table of Contents (continued)

1.0 INTRODUCTION

1.1 Purpose

This Detailed Operating Procedure (DOP) identifies how to inspect and prepare 55-gallon drums to be used for immobilizing transuranic (TRU) waste in cement, and after preparation, how to transport the drum assemblies into room 401 through an authorized 300/400 wing corridor door opening.

1.2 Scope and Applicability

This drum preparation section of this procedure is performed by PMT-2 personnel assigned to the Cement Fixation (CF) process in PF-185 at TA-55. It may also be performed by other personnel under the direction of certified CF personnel and in other locations.

1.3 Applicability

[1] This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled TRU waste.

[2] The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Nuclear Safety Management Quality Assurance.*

[3] This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment*.

[4] To prevent damage to the drum package due to a drop during transport, cement drums are produced to meet the Type A DOT container testing criteria in 49 CFR 173.465.

1.4 Technical Safety Requirements

Not Applicable

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

B. Hazards and Controls

Hazard	Controls
Manual lifting: The drum preparation process includes manually moving and lifting equipment or materials weighing over 75 pounds. The risk of back strains, pinches, contusions, and possibly more serious injuries is significant. Bodily injury may occur if these items are dropped.	• Use two people and proper lifting techniques to lift the liner-bag assembly into the drum. • Move drums assemblies by tipping and rolling them. A hand dolly or forklift with the drum handler attachment may also be used to move drums. • To avoid back strain, use caution when moving drums. • Wear hard-toed shoes. • Before carrying a heavy object, check the route to ensure that obstructions and slip and trip hazards are removed. If clearance is not adequate, choose an alternate route.
Rodents: Rodent-infested means that evidence of rodents is present (rodents, droppings, or nibbled food). This also applies to areas where rodents have been seen in the past, even if evidence of rodents is not currently present.	• Avoid contact with live or dead animals and animal waste. • Contact Pest Control (667-6111) to mitigate any pest concerns.

C. Unique Entry Conditions

Not Applicable

D. Sequence of Steps

The steps and Sections in the Performance Section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

Not Applicable

F. Required Permits

Not Applicable

G. Training and/or Qualifications

Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on Attachment B, *Performance Checklist*.

2.1 General (continued)

H. Cautions

Not Applicable

I. Material Control and Accountability

Not Applicable

2.2 Additional Requirements and Conditions (WR Use)

Not Applicable

3.0 PREREQUISITE ACTION

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre-Job Briefing and Post Job Review*.

[2] No technical Safety Requirement (TSR) or In-Service Inspection (ISI) surveillances are performed in this procedure.

[3] Ensure the work is scheduled on the TA55 Integrated Plan of the Day (IPOD).

[4] Ensure that tool, equipment, and material numbers in the work area match those specified.

[5] The purchase order #, lot # and serial # under which the drums were procured and the year of manufacture is required to certify the drums on the Waste Compliance and Tracking System (WCATS). This information is printed on the drum.

3.2 Performance Documents

- TA55-AP-547, *Opening and Closing of the External Security Doors and Confinement Doors in PF-4*

3.3 Special Tools, Equipment, Parts, and Supplies

- 55-gallon drum, UN/1A2, with lid, ring, and bolt
- bar code labels
- drum-out bag (ex. LANL-BAG-3-SPVC or equiv.), filtered, 12 mil-thick, 26 in. across, 96 in. long.
- vinyl bag skirt, 26-in. across, ~20 in. long
- air blower to leak test bag
- carbon composite filter (NucFil-019DS with 3/4" – 14 NPS threads)
- cap for 2-inch bung
- 125-mil thick rigid plastic drum liner
- yellow vinyl tape
- liner calibration template tool
- 1 ½ in. socket for torque wrench
- 15/16 in. open end wrench
- 15/16 in. socket for torque wrench
- hand dolly
- permanent black marker
- mallet
- torque wrench with current calibration by the Standards and Calibrations Lab
- retaining strip, 67-1/2 in. long
- crimping tool for bung hole cap
- forklift with drum handler
- cleaning solution and wipes if cleaning is needed
- Loctite

3.4 Field Preparation

[1] Obtain a sheet of identification bar code labels that all have the same number. These can be obtained from Waste Services at TA-55.

[2] Obtain all other drum assembly components and tools to assemble the components as listed above in Section 3.3, *Special Tools, Equipment, Parts, and Supplies*.

[3] Perform the following notifications prior to performing the door opening in Section 5.6:

[a] Schedule the door opening on the TA-55 Integrated Plan of the Day (IPOD) at least 1 day prior to needing it in order to have RCT coverage.

[b] Notify the OC approximately one hour prior to needing the door opening so they can arrange for the security force to open the door.

[4] Prior to using the forklift to move drums in Section 5.6, inspect the forklift for proper condition using Forklift Operator's Daily Inspection Form or equivalent (ex., TA55-WI-002-FM2, *Inspection Checklist for Forklifts and Electrical-Powered Industrial Trucks*).

3.5 Approvals and Notifications

Not Applicable

4.0 ACCEPTANCE CRITERIA

The drum assembly is composed of the 55-gal drum, inner rigid plastic liner, bag-out bag, bag skirt and skirt retaining strip. The finished assembly must conform to the configuration described in this DOP.A quality assurance inspection is performed by QA-IQ prior to receipt of the drums.

5.0 PERFORMANCE

5.1 Inspection and Logging the Drum

WARNING

Hazard: Handling materials - Improper handling of drums can cause pinched or crushed fingers, broken bones if the drum falls on you, and strained back muscles and injured discs if drums are not moved properly.

Control: **Handle drums with caution, using the equipment specified in the procedure as needed or the tip and roll technique.**

[1] Obtain a UN/1A2 type A 55-gallon steel drum from the drum storage area.

[2] Inspect drum for the following damage:

- dents
- chips in the paint
- gouges
- damage to top lip of the drum (chime)
- damage to the lid and gasket
- damage to the lid ring, bolt or nut

[3] IF the drum is defective,
THEN reject it by marking the damaged area with a 3-in.-high "X" using a black permanent marker.

[4] IF any part of the drum other than the drum itself is defective (such as the lid, rim, or bolt),
THEN contact QA for guidance on replacing the defective part with a part from another inspected and approved drum from the same lot and purchase order only.

NOTE 1 Performance of Step 5.1[5] may be performed at a later time.

NOTE 2 Information needed for entering data in WCATS is printed on the drum and filter.

[5] Enter the following data in WCATS via the mobile hand-held device:

- certification date
- year of manufacture
- container type
- purchase order #
- Lot #
- Serial #
- carbon filter type, serial # and date of manufacture

5.2 Installing the Lid Components

WARNING

Hazard: Use of hand tools - A torque wrench is used to tighten the bung-hole caps in the drum lid. Improper use of hand tools can result in injury.

Control: Inspect tools to ensure they are in good condition and maintain them so. Use the tool in accordance with the manufacturer's operating rules or safe practices.
Use Caution

[1] Verify that the torque wrench is within its calibration date.

[2] Remove the small bung-hole cap on the lid AND discard.

[3] Obtain a carbon composite filter (NucFil-019DS with 3/4" – 14 NPS threads)

[4] IF the carbon composite filter comes with a flat gasket,
THEN discard the flat gasket,
AND replace with an o-ring gasket.

[5] Apply Loctite to the threads of the filter.

[6] Replace the small bung hole cap with the carbon composite filter fitted with an o-ring gasket.

[7] Using the calibrated torque wrench fitted with the 15/16-in socket, tighten the carbon filter to the specified torque (see Appendix A, *Fitting Installations for UN, Type A, 55-gallon Drums).*

[8] Remove the 2-in. bung plug from the drum lid.

[9] Inspect the gasket for wear,
AND replace any faulty gasket.

[10] Install the 2-in. bung plug in the 2-in. bung hole.

[11] Using the calibrated torque wrench with the 1 1/2–inch socket, tighten the bung-hole plug to its specified torque (see Appendix A, *Fitting Installations for UN, Type A, 55-gallon Drums).*

[12] Place a cap over the large bung hole,
AND use the crimping tool to crimp the cap in place.

5.3 Applying Bar Codes

NOTE Attachment A, *Drum Label Placement*, provides written instructions and a graphic depiction of the proper placement of the five large drum labels.

[1] Obtain a sheet of identification bar code labels, that all have the same number, from Waste Services at TA-55.

[2] If necessary, clean the label placement areas on the drum, as shown in the diagram in Attachment A, *Drum Label Placement*.

[3] Apply five large labels to the drum in accordance with Attachment A, *Drum Label Placement*.

5.4 Marking the Liner and Attaching the Bag Skirt

WARNING

Hazard: Ergonomic - Marking the inside of the drum liner involves bending over at an awkward angle, thus creating a potential ergonomic hazard.

Control: Use care to support body weight properly during this task. Performing this task while sitting down and tilting the liner toward you reduces the ergonomic hazard.

NOTE 1 The maximum fill line for cement is 3 inches below the lip of the liner.

NOTE 2 The volume at 16 inches from the bottom is ~99 liters and each vertical inch equals 6 liters.

[1] Using a permanent black marker and the liner calibration template tool, mark the inside of the liner at the maximum fill volume (3 inches down), and at 1-in. increments.

NOTE The purpose of the bag skirt is two-fold:

- To keep the splatter of cement paste off the bagout bag so that when the bagout bag is cut during the drum-out process in PMT2-DOP-CF-002, *Drum-in/Drum-out Operations for Cement Fixation*, no cemented waste particulate is present on the bag to increase contamination release during drum-out.
- To keep the glovebox negativity from pulling in the bagout bag too much for adequate access to the drum.

[2] Perform the following to install the bag skirt on the liner:

CAUTION

Leaving an excessive amount of skirt on the inside of the liner under the retaining strip can result in not having adequate skirt length with which to attach to the drum to the glovebox drum port in PMT2-DOP-CF-002, *Drum-in/Drum-out Operations for Cement Fixation.*

[a] Pull the skirt's elastic cord down around the outside of the liner to the extent that the other end of the skirt hangs over the inside of the lip by about ½ – 1 inch, or enough to be caught by the retainer strip.

5.4 Marking the Liner and Attaching the Bag Skirt (continued)

WARNING

Hazard: Sharp objects: Sharp edges that can cut the skin and bag may exist on the retaining strip.

Control: **Use caution to avoid contacting the sharp edges of the retaining strip.**

Wear heavy work gloves to perform this procedure.

Trim off protruding sharp edges.

[b] Start pushing the retainer strip down over the edge of the liner, catching the bag skirt between the liner and the retainer strip.

[c] Continue installing the retainer strip around the circumference of the liner, folding the excess bag material in several places.

WARNING

Hazard: Use of hand tools: A mallet is used to install the bag to the liner with the retaining strip. Misuse can result in injury from inadvertent contact with the body.

Control: **Avoid hitting hand when using the mallet to install the retaining strip.**

[d] Using a mallet,
hammer the retainer strip completely down over the lip of the liner to secure the bag skirt between it and the liner.

[e] Trim off any excess retainer strip so that the ends of the strip do not overlap where they meet.

[f] Pull up the end of the skirt having the elastic cord,
AND fold that end into the liner.

[g] Using two layers of tape,
tape the folded-over edge of the bag skirt to the liner around the outside circumference of the liner.

5.5 Installing the Bag on the Liner

WARNING 1

Hazard: **Use of power tools - An air blower or compressed air line is used to partially inflate the bag to test for leaks. Faulty equipment or improper use can result in injury.**

Control: **Inspect tools to ensure that they are in good condition, and maintain them in good condition.**
Use the tool in accordance with the manufacturer's operating rules or safe practices.
Wear personal protective equipment (PPE) as needed.
Use caution.

WARNING 2

Hazard: **Noise: Use of the air blower or compressed air can result in elevated noise levels.**

Control: **Wear hearing protection as needed.**

NOTE A leaf blower may be used to test the drum-out bag for leaks.

[1] Test the drum-out bag for leaks by trapping air inside the bag.

[a] IF any leaks are found,
THEN discard the drum-out bag.

[b] Obtain another drum-out bag,
AND repeat Step 5.5[1].

[2] Place the liner inside the leak-tested drum-out bag.

[3] Pull the drum-out bag up so that the liner is at the bottom and center of the bag.

[4] Tighten the bag on the liner by making two 3-inch folds on opposite sides of the bag from the two bottom corners of the bag up to the top of the liner.

[5] Use yellow vinyl tape to secure the bag to the liner as follows:

[a] Place 3 roughly equally spaced strips of tape perpendicular to each fold line.

[b] Starting at the top of the liner, apply tape down one fold, pinning down the corners of the bag, and up the fold on the opposite side to the top of the liner.

[c] Apply tape where necessary to tape flat all excess bag on the bottom.

[d] Apply tape around the circumference of the bag along the bottom edge of the liner.

[e] Apply vinyl tape around the circumference of the bag at the top edge of the liner.

5.5 Installing the Bag on the Liner (continued)

[6] Have an inspected empty drum in the drum assembly work place.

[7] Place the liner/bag assembly in the drum and push it to the bottom of the drum.

[8] Place the drum lid on the drum,
AND install the drum lid ring assembly with the bolt holes pointing downward.

[9] Thread the ring bolt into both bolt holes,
AND tighten the ring nut with the 15/16 in. open end wrench.

5.6 Moving Drum Assemblies into PF-4

NOTE The procedure for conducting a corridor door opening is detailed in *TA55-AP-547, Opening and Closing of the External Security Doors and Confinement Doors in PF-4*. The CF worker supervising the door opening must be certified to that procedure and be on the door opening authorization list kept in the OC.

[1] Perform the following notifications prior to performing the door opening:

[a] At least 1 day prior to needing the door opened, schedule the door opening on the Integrated Plan of the Day (IPOD), in order to have RCT coverage.

[b] Notify the OC approximately one hour prior to needing the door opening so that the OC can arrange for the door opening with security force.

WARNING

Hazard: Forklift operation:

- **A forklift or motorized hand truck may be used to transport drum assemblies over a rough surface and in a limited space with reduced visibility.**
- **A drum handling attachment is used, which reduces its rated weight capacity.**

Control:

- **Operator training and certification on the forklift or other motorized conveyance.**
- **Use of a spotter to observe and control operations.**
- **Forklift operators are trained and certified to Plan 9418, PMT-2 Forklift Operator.**
- **Forklift operators must perform a daily inspection, verifying that the forklift is in proper working order, and document the results on the appropriate inspection form.**
- **When the drum attachment is used with the motorized hand truck, capacity is reduced to 1000 pounds, and the lifting height at 850 pounds can be no more than 24 inches.**

[2] Prior to using the forklift to move drums, inspect the forklift for proper condition using Forklift Operator's Daily Inspection Form or equivalent (ex., TA55-WI-002-FM2, *Inspection Checklist for Forklifts and Electrical-Powered Industrial Trucks*).

5.6 Moving Drum Assemblies into PF-4 (continued)

[3] Prior to the corridor door being opened, use a forklift to move each drum assembly to the loading dock outside the PF-4 corridor door.

[4] Notify the OC that the corridor door is about to be opened by the security force personnel.

[5] Have the security force personnel open the corridor door.

WARNING

Hazard: Manual lifting: The drum assemblies weigh over 60 pounds each. The risk of back strains, pinches, contusions, and possibly more serious injuries can occur.

Control:

- **Avoid lifting the drum assemblies to move them. Move the drum assemblies by tipping and rolling them or by using a moving device such as a dolly.**
- **Use two people when needed.**
- **Use caution.**
- **Wear hard-toed shoes.**
- **Before carrying a heavy object, the route is to be checked to ensure that obstructions and slip and trip hazards are removed. If clearance is not adequate, an alternate route is to be chosen.**

[6] Move each drum through the door and into the corridor.

[7] WHEN all drums have been moved into the corridor,
THEN have the corridor door closed.

[8] Notify the OC when the door closing is complete.

[9] Move the drums into room 401 and store in the assigned floor location until needed for attachment to the CF glovebox per PMT2-DOP-CF-002, *Drum-in/Drum-out Operations for Cement Fixation*.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not Applicable

6.2 Restoration

Not Applicable

6.3 Results

[1] Drum, torque wrench and carbon filter information is recorded into WCATS via the hand held WCATS unit.

6.4 Independent Verification

Not Applicable

6.5 Records Processing

Not Applicable

7.0 EMERGENCY ACTIONS

Not Applicable

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
CCP	Central Characterization Project
CF	Cement Fixation
DOP	Detailed Operating Procedure
DOT	Department of Transportation
FOD	Facility Operations Director
ISI	In-Service Inspection
NMHWA	New Mexico Hazardous Waste Act
OC	Operations Center
PPE	Personal Protective Equipment
IPOD	Integrated Plan Of The Day
QA	Quality Assurance
QA-IQ	Quality Assurance – Institutional Quality
RCT	Radiological Control Technician
TRU	transuranic
TSR	Technical Safety Requirement
UN	United Nations Number
WIPP	Waste Isolation Pilot Plant
WCATS	Waste Compliance and Tracking System

9.0 RESPONSIBILITIES

9.1 Waste Services

- Responsible for supplying the QA inspected empty 55-gal drums, rigid liners and bar code labels.

9.2 Quality Assurance

- Responsible for ensuring the drums and rigid liners meet specifications required in this DOP.

10.0 REFERENCES

Document Number	Title
10 CFR 830	*Nuclear Safety Management Quality Assurance*
49 CFR 173.465	*Transportation - Type A Packaging Tests*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
LANL P101-18	*Procedure for Pause/Stop Work*
TA55-PLAN-046	*Quality Management Plan (QMP)*
PMT2-DOP-CF-002	*Drum-in/Drum-out Operations for Cement Fixation*
TA55-DOP-547	*Opening and Closing of the External Security Doors and Confinement Doors in PF-4*
TA55-DOP-001	*Pre-Job Briefing and Post-Job Review*
TA55-WI-002-FM2	*Inspection Checklist for Forklifts and Electrical-Powered Industrial Trucks*
Plan 9418	*PMT-2 Forklift Operator*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
Attachment B, *Performance Checklist*	Training Record	Maintain in training file	Record shall be maintained by the Training Coordinator upon completion of training and qualification. When no longer in use transfer to the DCC for archiving.

12.0 APPENDICES AND ATTACHMENTS

Appendix	Title
A	*Fitting Installations for UN, Type A, 55-gallon Drums*
Attachment	**Title**
A	*Drum Label Placement*
B	*Performance Checklist*

Appendix A,
Fitting Installations for UN, Type A, 55-gallon Drums

CAUTION

In order for the Type A, 55-gal drum to safely perform to its rated ability, the installation of the drum lid ring and bung hole fittings need to be strictly adhered to. Any other method of assembly, or the use of any drum components (rings, gaskets, or fittings) that are not specified in this design type, will immediately invalidate the UN and DOT performance rating of the drum.

The table below shows the proper torque that must be applied to each drum fitting to assure proper container performance.

Plug Torque Setting

Drums are typically procured from Skolnik Industries. However, other drum manufacturers may be used. The specifications below are approved for Skolnik drums, but others manufacturers may be different. Always refer to purchase order and data package to insure use of actual manufacturer's current closure instructions.

	Type II-Reike VGII Serrated Base, Hexagon Head Plug		
	Steel Plugs		*Poly Plugs*
Plug Size	**Rubber Gasket**	**Poly Gasket**	
2-in.	30 ft-lbs	40 ft-lbs	20 ft-lbs

Filter Torque Setting

The specifications below are approved for NucFil-019DS Filter with 3/4" – 14 NPS Threads manufactured by Nuclear Filter Technology. However, filters from other manufacturers and other filters from Nuclear Filter Technology may be different. Always refer to purchase order and data package to insure use of actual manufacturer's current closure instructions.

	NucFil-019DS Filter with ¾"-14 NPS Threads
Plug Size	**Payload <900 lbs.**
3/4-in.	10 ft-lbs 120 in-lbs

Attachment A,
Drum Label Placement

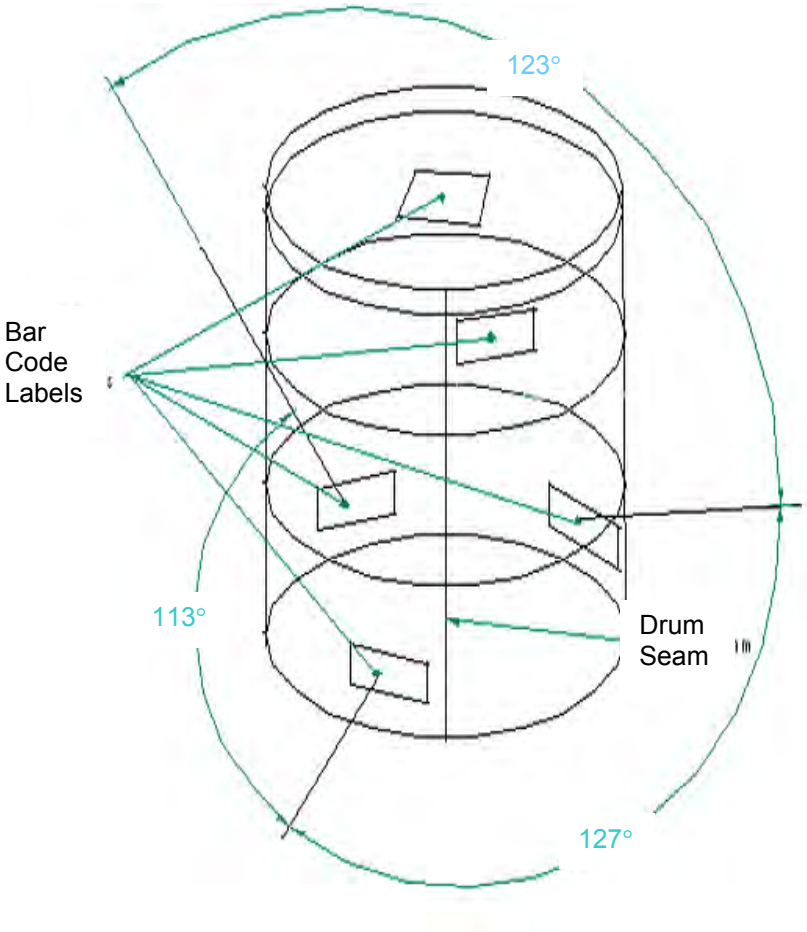
Following the diagram and instructions below, apply five large labels to the drum:

- Apply three large identification bar code labels around the circumference of the drum, evenly spaced, about 4 in. (but not more than 6 in.) above the bottom rim, with one label being immediately to the left of the drum seam.

CAUTION

When applying the label between the top two rolling hoops, the manufacturer's information is NOT to be covered by the label.

- Apply one large label between the top two rolling hoops, immediately to the right of the drum seam.
- Place one large label on the top center of the drum lid.



Attachment B, Performance Checklist

Procedure Number: PMT2-DOP-CF-001, R1 Title: *Preparing Drum Assemblies for Cement Fixation*

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites _____
(Verifiers name and Z number)

Task #	Qualification Requirements	Instruction	Evaluation
	Emergency Actions		
1	Describe what actions to take in an emergency.	☐	☐
	Comments:		
	Hazards and Controls		
1	Describe the actions to take if a rodent or evidence of a rodent is detected.	☐	☐
2	Describe how a properly constructed drum assembly protects workers from radiological contamination hazards during subsequent use.	☐	☐
3	Describe the lifting limits and controls associated with this work instruction.	☐	☐
4	Describe the hazards and controls associated with the retainer strip.	☐	☐
5	Describe ergonomic hazards and controls.	☐	☐
6	Describe the hazards and controls for forklift operation.	☐	☐
7	Describe the hazards and controls for hand tools.	☐	☐
8	Describe the hazards and controls for noise.	☐	☐
	Comments:		

Attachment B,
Performance Checklist

Task #	Qualification Requirements	Instruction	Evaluation
	Procedural Steps		
1	Demonstrate and/or discuss how to inspect the drum.	☐	☐
2	Demonstrate and/or discuss how to place the bar code label.	☐	☐
3	Demonstrate and/or discuss how to prepare the liner when preparing the drum.	☐	☐
4	Demonstrate and/or discuss how to install the bag and liner when preparing the drum.	☐	☐
5	Demonstrate and/or discuss the torque requirements for the carbon filter and the bung hole plug.	☐	☐
	Comments:		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 2

PMT2-DOP-CF-002, R3 Drum-in/Drum-out Operations for Cement

ENV-DO-14-0145

LA-UR-14-24704

Date: JUL 0 2 2014

Extended Until 6/24/15 per Memo MET-DO:13-08. Extension request was approved by Jeff Yarbrough on 06/24/13.

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-002,R3

Effective date: 06/08/12

Next review date: 06/08/14

Supersedes:

Title: Drum-in/Drum-out Operations in Cement Fixation

Status:	Hazard:	For Document Control Use Only:
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☐ Use every Time	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
Operations: Georgette Ayers	NCO-2	4/10/12	SIGNATURE ON FILE
Authorized for Use By:			
Operations Responsible Line Manager: Thomas Ricketts	NCO-2	4/10/12	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	4/12/12	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
SME/Engineer: Gerald Veazey	MET-1	4/11/12	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader: Kent Abney	MET-1	4/11/12	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
Quality Assurance: ***Date***	***SME:*** ***Date***

☒ Unclassified ☐ Restricted Data	**Derivative Classifier:**
☐ Confidential ☐ Formerly Restricted Data	**Name:** SIGNATURE ON FILE
☐ Secret ☐ National Security Information	**Title:** SCIENTIST 3 **Date:** 4/11/12
☐ Unclassified Controlled Nuclear Information	
☐ Official Use Only	**Derived from: N/A**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-002,R3	06/08/12	Major Revision	• Revised the TSR controls to comply with the 2011 TSRs.
PMT2-DOP-CF-002,R2	10/24/11	Major Revision	• Changed accumulation start date from "cemented" to "drummed out" in step 5.5[1][a]2.
PMT2-DOP-CF-002,R1	5/23/11	Major Revision	• Incorporated IPC modifications from previous document concerning TSR 6.2.5 ISI 5. • Reformatted to latest DOP template format. • Replaced MASS with LANMAS and WMS with WCATS. • Removed attachments on MASS instructions, PAFD and CSLA. • Added use of TA55-DOP-016 to confirm MAR is within limits. • Supersedes PMT2-DOP-CF-008,R0-IPC-2. • Added TSR concerning WES-FFS confirming WIPP-approved drum and fitting. • Modified drum and drum fitting torqueing instructions in attachment.
PMT2-DOP-009-CF-002,R0		New	• Reformatted to IMP 300. • Incorporated FOD safety recommendations. • Supersedes NMT2-WI-009-CF-902,R3 and NMT2-IWD-WI-009-CF-902,R3.
NMT2-WI-009-CF-902,R3	03/19/07	Revised	• Removed steps, hazards and controls associated with internal lead shielding. • Added steps, hazards and controls associated with temporary shielding. • Changed drum weight to reflect no internal lead shielding. • Updated acronyms and reference list.
NMT2-WI-009-CF-902,R2	08/25/2006	Revision	• Added hazards and controls for hazardous materials, ergonomics, manual lifting, mechanical hazards, and radiological contamination. • Added definitions of WMS and TSD. • Revised steps in Sections 5.4 and 5.5. • Updated group names.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This Detailed Operating Procedure (DOP) identifies how to inspect the cemented waste, remove a drum of cemented waste from the Cement Fixation (CF) glovebox (GB) (drum-out), and attach an empty drum assembly (drum-in). The cemented waste drum is closed out on the Waste Compliance and Tracking System (WCATS) after drum-out.

1.2 Scope

This DOP is performed at TA-55 in Room 401, locations CF and FLO1 by NCO-2 personnel assigned to the CF process.

1.3 Applicability

[1] This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled TRU waste.

[2] The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Nuclear Safety Management Quality Assurance.*

[3] This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment*.

[4] This procedure is intended to produce a cemented waste form that meets the Resource Conservation and Recovery Act (RCRA), definition of a non-mixed waste as defined 40 CFR, Parts 260 through 273, *Solid Waste*, as amended by the Hazardous and Solid Waste Amendments (HSWA). Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act.

[5] The process of pH adjusting the waste neutralizes RCRA-corrosive materials and renders them non-corrosive. In addition, cement fixation is designed to sufficiently bind the RCRA-toxic metals to meet Toxicity Characteristic Leaching Procedure (TCLP) standards for non-mixed waste. Cemented waste forms that do not meet the TCLP for any RCRA-toxic metal are considered mixed waste and must be labeled according to Section 5.5 of this DOP. To determine if the cemented waste drum is mixed waste, the following is used:

- Code of Federal Regulations, 40 CFR Part 261, subparts C, *Characteristics of Hazardous Waste*, and D, *Lists of Hazardous Wastes.*
- P409, *Waste Management.*

[6] Cement drums are produced to meet the Type A DOT container testing criteria in 49 CFR 173.465. The gross weight shall not exceed the 852 lb weight at which a mock-up cement drum was satisfactorily drop tested at Los Alamos National Laboratory according to 49 CFR 173.465, *Transportation—Type A Packaging Tests* as reported in LANL memorandum NMT-14: 05-037, *Request for Removal of TA-55 Compensatory Measures from Type A Transuranic (TRU) Waste Containers PISA*, April 29, 2005.

1.4 Technical Safety Requirements

TSR 6.2.5 / ISI 5 is performed by Waste Services to confirm the following:

- An individual packaged TRU waste shipping container (DOT Type A) is to be visually inspected for presence of vents (WIPP-Approved, torque to the proper setting)
- and signs of wear or degradation

Frequency: Upon final container packaging (e.g., when the drum is sealed and/or when a tamper indicating device is applied).

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

If this procedure cannot be completed as written or abnormal conditions are encountered, STOP, place the work in a safe configuration if possible, and notify the Operations Center (OC) and First Line Manager (FLM).

B. Hazards and Controls

Hazards and controls that are associated with this DOP are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Nuclear Criticality Accident An inadvertent self-sustaining or divergent chain reaction that may release large amounts of neutron and gamma radiation causing serious injury or death.	• Process specific controls (administrative requirements and engineered features) are detailed on the applicable Criticality Safety Limit Approvals (CSLA) associated with this operation. See Section 10.0, References, for a listing of the applicable CSLA(s).

2.1 General (continued)

Hazard	Controls
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555. • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personnel protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.
Hazardous Chemicals Many of the wastes processed in the CF GB contain acids and heavy metals (cadmium, chromium, and lead). Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (GB, gloves, etc.) is breached or if transfer lines leak.	• The pH adjusting and cementing the hazardous waste neutralizes acids and immobilizes the heavy metals. • The controls provided by TA55-RD-555, *TA-55 Radiation Protection Requirements*, are effective in preventing exposure to hazardous chemicals. • To minimize the hazards from dangerous chemicals: – Eyewash and shower are within 100 feet of work. – Experienced and trained personnel make use of Material Safety Data Sheets (MSDS) to acquaint themselves with chemicals they are handling. – Wear PPE (chemical resistant gloves, safety glasses, safety shoes, face shield, apron, etc.) appropriate to the material being handled. – Engineered containment (GBs, pipes). – Frequent inspections of the TSD area keep NCO-2 personnel abreast of changing conditions. – During walk-arounds, watch for evidence of leaks. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Observe barriers in hazardous waste areas. • Follow guidelines in TA55-RD-539, *TA-55 Waste Management Requirements* and LIR 404-00-03.1, Hazardous and Mixed Waste Requirements. • Formal hazardous waste training is mandatory.

2.1 General (continued)

B. Hazards and Controls (continued)

Hazard	Controls
Regulated Waste This work takes place within the Treatment, Storage, and Disposal (TSD) Unit. A TSD Unit is a permitted or interim status hazardous waste management area where hazardous or mixed waste regulated by the Resource Conservation and Recovery Act (RCRA) may be stored or treated before disposal.	• The CF Process operates as a TSD Unit and must comply with New Mexico State-regulated requirements for inspection and safe operation. The inspection procedure is found in PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*. • Manage waste in compliance with regulations. Specific waste controls are available at http://int.lanl.gov/environment/waste/. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training • During walk-arounds, watch for evidence of leaks. • pH adjustment and/or cementation removes the characteristics of corrosivity and toxicity of the waste.
Elevated workspace Personnel must step onto an elevated work platform to operate GB equipment. The stand is secured to the GB with a mechanism that allows the platform to be removed for access during drum-out. There is an elevated walkway behind the GB. • When entering or leaving the elevated platform, personnel may fall. • If detached from the GB, the stand may roll away from the GB while personnel are on it. • One person is positioned on the elevated walkway behind GB during drum-out and drum-in operations. This area presents a falling and tripping hazard.	• Before climbing onto the rollable elevated work stand, attach it to the GB stand. • Signs are posted to alert personnel to the tripping hazard. • When in elevated areas, personnel should use appropriate caution.

2.1 General (continued)

B. Hazards and Controls (continued)

Hazard	Controls
Manual lifting Equipment and materials weighing over 60 lb are routinely moved and lifted manually as part of the cementation process.	• Obtain assistance as needed. • To avoid back strain, use caution when moving drums with the dolly. • Only use a forklift with the drum gripper attachment to move filled drums or drums that weigh more than 200 lb. • Wear hard-toed shoes. • Before handling, inspect materials for slivers, jagged or sharp edges, burrs, and rough or slippery surfaces. • Before carrying a heavy object to another location, check the routes to ensure that obstructions and slip and trip hazards are removed. If clearance is not adequate, choose an alternate route.
Beryllium (Be) Hazard • Drums containing waste from the Pu-Be program can contain trace amounts of Be. Be is a carcinogen and is known to cause acute health effects. Inhaling particulate containing Be may cause a serious, chronic lung disease called Chronic Beryllium Disease. • The presence of Be can also result in elevated dose rates, although this effect is only considered a problem when the Be is in solution form.	• The engineered containment (glovebox) used to control radiological hazards in PF-4 is sufficient for Be hazards. • The PPE used to control radiological hazards in PF-4 (coveralls, safety glasses, gloves and booties) is sufficient for Be hazards. • Additional shielding is used if the RCT determines an elevated dose rate is present.

C. Unique Entry Conditions

Not Applicable

D. Sequence of Steps

The steps and Sections in the Performance Section are to be performed in sequence unless otherwise stated.

2.1 General (continued)

E. Criticality Safety Limit Approval (CSLA) Requirements

The CSLA requirements are detailed in documents NCS-CSLA-10-062 and NCS-CSLA-08-107. In this DOP, steps associated with criticality issues are marked with an asterisk (*) in the margin.

NCS-CSLA-10-062 *Cementation Glovebox G454*

Administrative Requirements	
Pu in solution/cemented waste/particulate	≤520 grams Pu total. No more than 200 grams Pu per drum

NCS-CSLA-8-107 *Floor Staging (FLO1)*

Administrative Requirements	
Pu in waste (cemented or typical glovebox waste) • Drum location is nominally 2 ft. by 2 ft. or larger • 15-, 30-, and 55-gallon drums only • 55-gallon drums define their own location	≤200 g Pu / drum location

F. Required Permits

NMED Permit to operate as a TSD Unit.

G. Training and/or Qualifications

Operators shall be trained on the procedural steps and documented on Attachment A, *Performance Checklist.*

2.1 General (continued)

H. Cautions

Not Applicable

I. Material Control and Accountability

This procedure complies with the LANL Nuclear Material Control and Accountability Procedural Handbook and TA55-RD-585, *Nuclear Materials Control and Accountability Requirements.* Receipt or shipment of material is accompanied by appropriate Los Alamos Nuclear Material Accountability System (LANMAS) transactions and manifests.

Because the drum is attached to the GB system, to prevent any unauthorized personnel from diverting nuclear material out through a cemented drum, the process operation also requires the following:

- If the cementation GB is unattended, it is locked. Only the CF and Evaporator (EV) operations have keyed access to DB-424 in PF-4. The CF GB has a combination lock, the combination to which is known only by CF personnel.
- When the CF process is running, two personnel must be present.

2.2 Additional Requirements and Conditions (WR Use)

Not Applicable

3.0 PREREQUISITE ACTION

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre-Job Briefing and Post Job Review*.

[2] Obtain permission from the Operations Center [TA55], if applicable, before conducting a Technical Safety Requirement (TSR) or In-Service Inspection (ISI) surveillance**.**

[3] Ensure the work is scheduled on the TA55 Integrated Plan of the Day (IPOD).

[4] Ensure that tool, equipment, and material numbers in the work area match those specified.

[5] Coordinate with Waste Services personnel on the timing for performing the TSR after closure of the drum.

3.2 Performance Documents

Not Applicable

3.3 Special Tools, Equipment, Parts, and Supplies

- 55-gal drum assembly
- hand dolly
- drum-out bag (ex. LANL-BAG-3-SPVC or equiv.)
- vinyl bag skirt, 26-in. diameter, 19 to 20 in. long
- yellow tape
- carbon composite filter (NucFil-019DS)
- calibrated 1½-in. socket torque wrench
- calibrated 15/16-in. socket torque wrench
- 15/16-in. open-end wrench
- impact wrench
- mallet
- screwdriver
- rod(s) for hardness testing and stub removal
- forklift with drum gripper attachment
- TID
- temporary drum shielding

3.4 Field Preparation

[1] Ensure the forklift with drum is charged and inspected.

[2] Ensure the empty drum assembly required for the drum-in is present in room 401.

[3] Ensure the following equipment is calibrated and controlled according to WMEC-PED-105-12, *Calibration and Measurement Control*:

- Weigh scale, once a year

3.5 Approvals and Notifications

Not Applicable

4.0 ACCEPTANCE CRITERIA

Prior to proceeding with the drum-out, the cemented waste must show the following characteristics:

- The surface is sufficiently hard to withstand more than ¼-inch penetration with a rod intended for this purpose,
- The surface contains no free liquid.

5.0 PERFORMANCE

5.1 Inspecting the Cement

WARNING

Hazard: Mechanical: If the mixers are started while personnel's hands are in the gloves, the mixers can cause injury.

Control: Ensure that the ON/OFF switch for the mixers is in the OFF position before performing the following steps.

[1] Remove the drum port cover if present.

NOTE Free liquid is defined as liquid not absorbed into the cement that could spill or drain from its container.

[2] Visually inspect the cemented waste for free liquid.

NOTE Free liquid is usually reabsorbed into the cement within 2 days.

[3] If free liquid is present, allow additional time for re-absorption into the cement, if possible.

[a] IF there are small volumes of free liquid,
THEN sprinkle cement powder to absorb the liquid.

[b] IF the liquid does not re-absorb, OR additional time is not available for re-absorption,
THEN remove the liquid by vacuuming it into the glass pH-adjustment column using flexible tubing.

NOTE The cement should not be able to be penetrated by more than ¼ inch.

[4] Inspect the cement for hardness by pressing on the top surface of the cement with the rod-like device supplied for this purpose.

[a] IF excessive penetration is encountered,
THEN let the cement harden for additional time.

[b] IF the cement does NOT harden adequately,
THEN notify your supervisor**.**

[5] Acknowledge on WCATS that dryness and a hard set have been confirmed.

5.2 Performing the Drum-out

WARNING

Hazard: Mechanical: If the mixers are started while personnel's hands are in the gloves, the mixers can cause injury.

Control: Ensure that the ON/OFF switch for the mixers is in the OFF position before performing the following steps.

[1] Place the bagout stub that was removed from the previous drum and stored in the GB into the attached cemented drum.

[a] IF there is no room for the stub,
THEN set it aside to be discarded in another drum.

[2] From inside the GB, using the rod supplied for this purpose, remove the bag skirt from the drum port,
AND push it down into the drum.

WARNING 1

Hazard: Limited egress: The presence of the forklift and un-attached work stands in an aisle reduce access that may be needed in case of room evacuation.

Control:
- **Park the forklift in a manner that allows adequate egress.**
- **Lower the forks of the forklift to allow personnel to easily step over them without tripping.**
- **After disconnecting the work stands, place them in a location not restrictive of egress.**

WARNING 2

Hazard: Ionizing radiation: After the shielded work stand is moved from in front of the drums, personnel will be exposed to higher ionizing radiation.

Control: Temporary shielding can be applied to the drum. A lead apron may also be worn.

[3] Unhook and move the elevated work stand away from the GB so that the drums can be accessed.

[4] Gather the drum-out bagout bag tightly,
AND wrap 6 to 10 inches of gathered area with 2 or 3 layers of yellow tape, pulling the tape firmly.

5.2 Performing the Drum-out (continued)

[5] Attach two 14-inch plastic cable ties around the bag approximately 5 inches apart, in the center of the taped area,
AND pull the ties closed only to hand tightness.

NOTE The excess tails are not to be cut off of the cable ties after tightening.

[6] Wrap the tails from the ties around the bag,
AND secure them with a yellow tape wrap.

[7] Wrap the tied-off area with 2 or 3 layers of yellow tape, pulling the tape firmly and extending the tape approximately 1 inch beyond each tie.

[8] Mark the location of each tie with a permanent marker on the outer layer of the tape.

WARNING 1

Hazard: Radiological Contamination:

- **The drum-out involves breach of the containment bag, which can release contamination.**
- **The blade of the cutting tool is contaminated.**

Control:

- **Before the drum-out is started, the RCT must be present.**
- **All personnel involved in the drum-out must be wearing full-face respirators.**
- **In addition to the standard PPE, the RCT may require additional PPE.**
- **Do not touch the blade of the cutting tool.**
- **Always store the cutting tool in its storage container when the tool is not in use.**

WARNING 2

Hazard: Mechanical: The drum-out is performed with a bag cutter that could cut personnel.

Control:

- **Use caution to avoid pinch points.**
- **Do not touch the blade of the bag cutter.**

NOTE In the following step, at least 1.5 inches is to be between the cut and each tie.

[9] With one person holding the top of the taped area, and a 2nd person holding the bottom, have one of these persons cut through the middle of the taped area with the cutting tool.

5.2 Performing the Drum-out (continued)

NOTE It is advantageous to prepare ahead of time the strips of yellow tape used in the following step.

[10] Cover the cut ends of the bag stub with strips of tape, THEN wrap each stub with 2 more layers of tape.

[11] Place the lower bag stub into the drum.

[12] Place the drum lid and lid closure ring on top of the drum, but do not fasten them.

WARNING

Hazard: Mechanical: The scale platform is mechanically moved in and out and may result in pinching if contacted.

Control:
- **Watch for obstructions that would impede scale movement and be prepared to stop scale movement to clear the path.**
- **The movement of the scale can be stopped at the ON/OFF switch on the control panel.**

[13] Using the scale that the drum is on, obtain the gross weight of the drum assembly.

[14] Write the gross weight on the drum lid.

NOTE The following information to be recorded in WCATS can be done at a later time.

[15] Record the gross weight in WCATS.

NOTE The ball screw should stop automatically when it reaches the full out position by contacting a limit switch.

[16] Move the scale with drum to the full-out position (~18 inches) from under the GB by activating on the control panel the ball screw attached to the scale.

5.2 Performing the Drum-out (continued)

WARNING

Hazard: **Operating a forklift (motorized hand truck): A forklift or motorized hand truck is operated in a limited space with reduced visibility. The use of a drum handling attachment reduces the rated weight capacity of the hand truck.**

Control: **The risks remain elevated for this task because no engineered controls are practical and economical for the process. The administrative controls that apply include:**

- **Forklift operators must be trained and certified to Plan 9418, PMT-2 Forklift Operator.**
- **Forklift operators must perform a daily inspection, verify that the forklift is in proper working order, and document the results on the appropriate inspection form.**
- **Use a spotter to observe and control operations.**
- **When the drum attachment is used with the motorized hand truck, be aware that the truck's capacity is reduced to 1000 lb, and the lifting height at 850 lb can be no more than 24 in.**
- **If the forklift fails while moving a drum, use another forklift to remove and transport the drum. Do not attempt to manually remove the drum from the failed forklift.**

[17] Remove the drum from the scale using the forklift with drum gripper, AND place the drum in the vicinity for preparing for drum closure in Section 5.4, *Closing the Cemented Drum.*

WARNING

Hazard: **Limited egress: The presence of the forklift and un-attached work stands in an aisle reduce access that may be needed in case of room evacuation.**

Control:

- **Park the forklift in a manner that allows adequate egress.**
- **Lower the forks of the forklift to allow personnel to easily step over them without tripping.**
- **After detaching the work stands from the GB, put them in a location that allows egress.**

[18] IF not attaching a new drum to the GB port, THEN attach a drum-out bag over the drum-out port to protect against bagout stub leakage. For the drum attachment procedure, see Section 5.3, *Attaching the Drum (Drum-in).*

5.3 Attaching the Drum (Drum-in)

NOTE This procedure is usually done immediately after a drum is removed from the GB and while personnel are still wearing respirators. The drum-in requires 2 workers handling the drum attachment.

WARNING

Hazard: Radiological contamination: the potential for contamination release is elevated.

Control:
- **An RCT must be present.**
- **All personnel must wear full-face respirators.**
- **The RCT may require additional PPE.**

CAUTION

Before pulling the bag, skirt or bag stub, communicate with the other worker to ensure that everyone is pulling in the correct direction.

[1] Prior to proceeding, bring to the area a drum assembly prepared according to PMT2-DOP-CF-001, *Preparing Drum Assemblies for Cement Fixation.*

5.3 Attaching the Drum (Drum-in) (continued)

WARNING 1

Hazard: **Ergonomic:**

- **Ergo hazards are posed by the awkward positions encountered during the drum-in process.**

Control:

- **An ergonomics evaluation can be requested at ergonomics@lanl.gov or from Industrial Hygiene.**
- **Take breaks.**
- **Use care to support body weight properly.**
- **Use additional personnel as needed.**

WARNING 2

Hazard: **Manual lifting: An empty drum assembly weighs over 70 lb. The weight of temporary shielding can also be significant. The risk of back strains, pinches, contusions, and possibly more serious injuries is significant.**

Control:

- **Use the hand dolly or forklift with the drum gripper attachment to move drum assemblies.**
- **Use additional personnel as needed.**

[2] Prior to placing the drum on the scale, zero the empty scale below the drum port.

NOTE The weight is to be recorded in WCATS as the tare weight.

[3] Place the drum with the lid and lid closure ring on the scale, AND obtain the tare weight.

[4] Remove the lid and lid closure ring from the drum, AND set aside for later use.

[5] With a screwdriver, loosen the hose clamp holding the bagout stub to the drum port.

5.3 Attaching the Drum (Drum-in) (continued)

WARNING

Hazard: **Radiological contamination: While pulling the elastic cord off the drum port, personnel can be exposed to contamination hazards.**

Control:
- **An RCT must be present.**
- **All personnel must wear a full-face respirator. The RCT will determine when to don and doff the respirator.**
- **Do not to pull any part of the elastic cord of the stub off of or away from the drum port.**
- **Avoid touching the elastic cord edge or the drum port.**
- **2 personnel are required to put the skirt and bagout bag elastic cord onto the drum port. They must pull the elastic cord on the skirt or bag in the same direction and must hold the back side of the skirt or the elastic cord so that it does not slip off.**

[6] Carefully pull the stub's elastic cord down to just above the lower drum port ring.

[7] Pull the new bag skirt onto the drum port, placing its elastic cord just above the stub's cord and still below the upper port ring.

[8] Pull up the new drum-out bag and place its cord ½" -1" above the upper port ring.

WARNING

Hazard: **Radiological contamination: If the clamp holding the bag to the drum port is not made secure, it may come off the drum port during normal operations.**

Control: **Ensure that the clamp holding the bag to the drum port is tightened sufficiently.**

[9] Ensure the bag and elastic cord are not twisted around the drum port and the bag hangs straight down.

[10] Place the clamp between the top port ring and the top of the bag skirt.

[a] Using a screw driver, tighten the hose clamp in order to secure the drum-out bag to the port.

[b] Be careful not to catch the bag skirt or the stub under the clamp.

NOTE The following step of removing the bag stub may be done later, prior to adding waste to the drum in other procedures.

[11] Pull the bag stub off the drum port from inside the GB using the rod tool.

[12] Store the stub in the GB for disposal in the next drum.

5.4 Closing the Cemented Drum

NOTE This activity usually takes place next to the GB where the drum is first placed after drum-out and before being transferred to FLO1.

WARNING 1

Hazard: Ionizing radiation: Without the shielded work stand in front of the drums, personnel will be exposed to higher ionizing radiation.

Control: A lead apron may be worn.

WARNING 2

Hazard: Handling materials: If temporary drum shielding is installed, be aware that the shielding can be heavy and present a lifting hazard. The shielding may also be awkward to install and present an ergonomic hazard.

Control: At least 2 personnel are required to lift and install temporary drum shielding.

[1] Have the RCT take the beta/gamma and neutron readings and fill out the Health Physics Radioactive Materials Survey Tag.

NOTE Contact exposure must be ≤ 200 mrem/hr according to DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, Section 3.3.5 Radiation Dose Equivalent Rate.

[2] IF the contact exposure beta/gamma reading is >200 mrem/hr at contact, THEN notify your supervisor.

[3] Measure the drum freeboard to the top of the drum liner.

[4] Place the lid on the drum,
AND make sure the lid has the same bar code number as the drum.

[5] Verify that the lid has a carbon composite filter.

[6] Using a calibrated torque wrench with a 1½-in. socket, tighten the carbon filter to the specified torque for the bung-hole plug (see Appendix A for torque specification).

[7] Position the lid so that the carbon filter is lined up next to the seam of the drum.

[8] Make sure that the lid gasket is seated against the lip of the drum and the gasket recess on the underside of the lid.

5.4 Closing the Cemented Drum (continued)

NOTE 1 The gasket should not irregularly protrude from the lid and drum lip.

NOTE 2 The bolt used to close the lid closure ring has a hole drilled at ~2½ in. from the bolt head. This hole is 11/32 in. in diam., and is used for the TID.

[9] Install the lid closure ring,
AND position the bolt lugs so that they are aligned with the carbon filter over the drum seam.

[10] Ensure that the bolt ring is oriented so that the lugs are not positioned above the lid.

WARNING 1

Hazard: Use of hand and power tools: A mallet and a power impact wrench may be used to tighten the drum lid.

Control: Use caution with hand tools.

WARNING 2

Hazard: Noise: Using the impact wrench to close the drum generates high noise levels.

Control: Wear hearing protection when performing tasks that generate excessive noise levels.

[11] Press against the drum lid with your palm or a rubber mallet to make sure that it is seated on the lip of the drum.

[12] Check to see that the drum lid and drum lip are pinched together within the closure ring.

NOTE An impact wrench may be used to perform the initial threading of the lock nut.

[13] Thread the bolt into the lugs with the lock nut between the lugs.

[14] Using a calibrated torque wrench with a 15/16-in. socket, tighten the bolt to 60 ft-lb while tapping the ring with the mallet during tightening.

NOTE The ends of the ring must not touch when torqued.

[15] Tighten the jam nut with the 15/16-in. open-end wrench against the ring lug closest to the bolt head.

$ **[16]** Notify Waste Services to perform TSR 6.2.5 / ISI 5 (prior to applying TID).

[17] Apply a TID into the hole in the ring bolt to secure the lid on the drum,
AND record the TID seal number on LANMAS.

5.5 Drum Labeling and Recording Drum Information

NOTE The process of cementing waste is designed to sufficiently bind RCRA-toxic metals to meet TCLP standards for non-mixed waste. Cemented waste forms that do not meet the TCLP for a toxic metal are considered hazardous (mixed) waste.

CAUTION

If placing a new label in the designated space described below in steps [1] and [2] will result in covering another label or stenciling on the drum, choose an alternate location for the new label in the vicinity of the original designated space.

[1] Apply either a non-hazardous or hazardous waste label to the drum according to the following guidance:

[a] IF the cemented waste is hazardous waste as defined by the Code of Federal Regulations, 40 CFR Part 261, subparts C, *Characteristics of Hazardous Waste*, and D, *Lists of Hazardous Wastes*, or by P409, *Waste Management,*
THEN place a hazardous waste label on the drum as follows:

1. Refer to 40 CFR Part 261 for the waste code for the hazardous material,
AND

a. Consult supervisor for code, as needed.

b. Fill in the code on the label.

2. Enter the date the drum was drummed out as the accumulation start date.

3. Clean the label area on the drum, if necessary.

4. Attach the label to the drum to the left of the drum seam, between the 2 top rolling hoops.

NOTE Samples of the cemented waste form are periodically analyzed for toxic metals as defined in 40 CFR Part 261 for ability to meet the leaching resistance limits required of a nonhazardous waste.

[b] IF there are no hazardous components,
OR if the drum does not meet the definition of hazardous waste,
THEN place a blue non-regulated waste label to the left of the drum seam between the 2 top rolling hoops.

[2] Place a yellow radioactive waste label to the right of the drum seam, under the bar code label, between the 2 top rolling hoops.

5.5 Drum Labeling and Recording Drum Information (continued)

[3] Input into WCATS the drum closure information including the following:

- the date when the drum is physically closed and sealed,
- The gross weight of the drum and contents,
- TID number,
- Drum hardness,
- Absence of free liquid
- Drum freeboard.

[4] Perform the necessary LANMAS transactions to update the drum.

5.6 Moving the Drum

* **[1]** The criticality limit for FLO1 is 200g SNM per 55-gallon drum. Following TA55-AP-522, *Nuclear Criticality Safety,* and TA55-DOP-016, *TA55 Material Transfer Procedure,* confirm that the quantity of SNM in the drum does not exceed 200g. LANMAS may be used as an aid for this determination.

[2] Perform the LANMAS transactions to move the drum to FLO1.

WARNING

Hazard: Operating a forklift (motorized hand truck):

- **A forklift is used to maneuver the cemented drums, which can weigh over 800 lb.**
- **A forklift or motorized hand truck is operated in a limited space with reduced visibility.**
- **A drum handling attachment is used, which reduces the truck's rated weight capacity.**

Control: The risks remain elevated for this task because no engineered controls are practical and economical for the process. The administrative controls that apply include:

- **Forklift operators must be trained and certified to Plan 9418, PMT-2 Forklift Operator.**
- **Forklift operators must perform a daily inspection, verify that the forklift is in proper working order, and document the results on the appropriate inspection form.**
- **Use a spotter to observe and control operations.**
- **When the drum attachment is used with the motorized hand truck, the truck's capacity is reduced to 1000 lb, and the lifting height at 850 lb can be no more than 24 in.**

[3] Move the drum to floor location FLO1 using the forklift with drum gripper.

5.6 Moving the Drum (continued)

WARNING 1

Hazard: **Handling materials and Ergonomic: Temporary drum shielding can be heavy and be a lifting hazard. Shielding may also be awkward to handle and present an ergonomic hazard.**

Control:
- **At least 2 personnel are required to handle the temporary drum shielding.**
- **Ergonomic hazards can arise during installation and removal of the temporary shielding.**

WARNING 2

Hazard: **Mechanical: Pinching can occur during installation of the temporary drum shielding.**

Control:
- **Two personnel are present, and each one watches to prevent an accident by the other.**
- **Use caution to avoid pinch points.**

[4] Install temporary shielding on the cement drum if required by the RCT to reduce high dose.

[a] Place on the outside of the temporary shielding all labels and information applied to the drum surface.

NOTE The following steps apply to moving the drum to the corridor and PF-4 basement.

[b] Remove the shielding on the drum as needed to allow moving the drum with the forklift with drum gripper attachment.

[5] Ensure MAR limits will not be exceeded when the drum moves to the corridor and the basement are performed by following TA55-DOP-016, *TA55 Material Transfer Procedure*.

[6] Prior to moving cement drums to the corridor for RCT survey in preparation for moving the drums to the PF-4 basement, contact MBA Custodian personnel to coordinate the drum transfer and to be told which basement location to move the drums into.

NOTE The RCT must be WIPP-certified to survey the drum.

[7] When the RCT is ready to survey the drum, move the drum to the corridor using the forklift with drum gripper attachment.

5.6 Moving the Drum (continued)

[8] Have RCT to perform the following:

[a] Perform smears on the drum surface and measure the radiation dose rate at the drum surface.

[b] Record the information on the Health Physics Radioactive Materials Survey Tag.

WARNING 1

Hazard: **Operating a forklift (motorized hand truck): See above for hazards of forklift use.**

Control: **See above for controls for forklift use.**

WARNING 2

Hazard: **Limited egress: The forklift in an aisle reduces access in case of room evacuation.**

Control:
- **Park the forklift in a manner that allows adequate access.**
- **Lower the forks of the forklift to allow personnel to easily step over them without tripping.**

[9] Using the forklift with drum gripper, move the drum to the basement storage area.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not Applicable

6.2 Restoration

Note Applicable

6.3 Results

[1] Information for the item and the drum are recorded in the CF logbook and in WCATS.

6.4 Independent Verification

[1] Waste Services verifies proper torque on carbon filter and drum condition after the drum assembly is loaded with cemented waste and upon final container packaging.

6.5 Records Processing

Not Applicable

7.0 EMERGENCY ACTIONS

[1] IF a site emergency develops,
THEN follow TA55-AP-018, *TA-55 Emergency Procedures.*

[2] No actions will be taken in response to an emergency beyond those prescribed in TA55-PLAN-007, *TA-55 Facility Emergency Plan*. They involve evacuating the area and calling the OC (55-911), then Emergency 911.

[3] In case of physical injury, call the OC at 55-911 or 7-3330,
AND request the Emergency Response Team.

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
$	When located in far left hand margin identifies steps that implement Technical Safety Requirements.
*****	When located in far left hand margin identifies steps that are criticality safety significance.
ALARA	as low as reasonably achievable
Be	beryllium
CCP	Central Characterization Project
CF	cement fixation
CFR	code of federal regulations
CSLA	criticality safety limit approval
DB	dropbox
Detailed Operating Procedure	Operations-level written instructions that describe activities in a systematic format.
DOE	Department of Energy
DOP	Detailed Operating Procedure
DOT	Department of Transportation
EV	evaporator
FLM	first line manager
FLO	floor location
FOD	facility operations director
GB	glovebox
HSWA	Hazardous and Solid Waste Amendments
IPOD	Integrated Plan of the Day
ISI	In-Service Inspection
LANL	Los Alamos National Laboratory
LANMAS	Los Alamos Nuclear Material Accountability System
LIR	Laboratory implementation requirement
MAR	Material At Risk
MBA	Material Balance Area
MC&A	material control and accountability
MSDS	material safety data sheet
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act
OC	operations center

8.0 DEFINITIONS AND ACRONYMS (continued)

Term	Definition
PAFD	Process Accountability Flow Diagram
PF	Plutonium Facility
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RWP	Radiological Work Permit
SME	Subject Matter Expert
SNM	Special Nuclear Material
TCLP	Toxicity Characteristic Leaching Procedure
TID	Tamper-Indicating Device
TRU	Transuranic
TSD	Treatment, Storage, and Disposal
TSR	Technical Safety Requirement
TWSR	Transuranic Waste Storage Record
WAC	Waste Acceptance Criteria
WCATS	Waste Compliance and Tracking System
WI	Work Instruction
WIPP	Waste Isolation Pilot Plant

9.0 RESPONSIBILITIES

9.1 Waste Services

- Responsible for performing **TSR 6.2.5 / ISI 5** upon final container packaging.
- TSR 6.2.5 / ISI 5 is performed by Waste Services to confirm the following:
  - An individual packaged TRU waste shipping container (DOT Type A) is to be visually inspected for presence of vents (WIPP-Approved, torque to the proper setting)
  - and signs of wear or degradation

9.2 Radiation Protection Technician

- An RCT is required to be present during the tasks in Section 5.2, *Performing the Drum-out*, Section 5.3, *Attaching the Drum (Drum-in)*, Section 5.4, *Closing the Cemented Drum* and Section 5.6, *Moving the Drum.*

9.3 MBA Custodian for B-35

- Responsible for receiving the cement drum into an approved basement location prior to shipment to TA-54.

10.0 REFERENCES

Document Number	Title
	LANL Nuclear Material Control and Accountability Procedural Handbook
	CF Process Accountability Flow Diagram (PAFD)
10 CFR 830	*Code of Federal Regulations - Nuclear Safety Management Assurance*
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR Part 261, Subpart C	*Characteristics of Hazardous Waste*
40 CFR Part 261, Subpart D	*Lists of Hazardous Wastes*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
49 CFR 173.465	*Code of Federal Regulations - Transportation---Type A Packaging Tests*
CCP-QP-016	*CCP Control of Measuring, Testing, and Data Collection Equipment*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
LIR 404-00-03.1	*Hazardous and Mixed Waste Requirements*
NCS-CSLA-10-062	*Criticality Safety Limit Approval – Cementation Glovebox GB454*
NCS-CSLA-8-107	*Criticality Safety Limit Approval – Floor Staging (FLO1)*
NMT-14: 05-037 memorandum	*Request for Removal of TA-55 Compensatory Measures from Type A Transuranic (TRU) Waste Containers PISA*
P101-18	*Procedure for Pause/Stop Work*
P409	*Waste Management*
PMT2-DOP-CF-001	*Preparing Drum Assemblies for Cement Fixation*
PMT2-DOP-CF-009	*Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*
TA55-AP-018	*TA-55 Emergency Procedures*
TA55-AP-102	*Using Temporary Shielding in PF-4*
TA55-AP-522	*Nuclear Criticality Safety*
TA55-DOP-001	*Pre-Job Briefing and Post Job Review*
TA55-DOP-016	*TA55 Material Transfer Procedure*
TA55-PLAN-007	*TA-55 Facility Emergency Plan*

10.0 REFERENCES (continued)

Document Number	Title
TA55-PLAN-046	*Quality Management Plan (QMP)*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*
TA55-RD-585	*Nuclear Materials Control and Accountability Requirements*
TA55-TSR-2011	*Technical Safety Requirements (TSRs)*
WMEC-PED-105-12	*Calibration and Measurement Control*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
Attachment A, *Performance Checklist*	Training Record	Maintain in training file	Record shall be maintained by the Training Coordinator upon completion of training and qualification. When no longer in use transfer to the DCC for archiving.
Forklift Operator's Daily Inspection Form or equivalent	Inspection record	Lead CF process operator keeps completed form	When the records are ready for final disposition, the record is transferred to Records Management.
WCATS	Electronic TRU waste management record	Electronic media protected by password	When the records are ready for final disposition, the record is transferred to Records Management.
CF Logbook	Written process data record	Records shall be maintained at the CF process location.	When the records are ready for final disposition, the record is transferred to Records Management.

12.0 APPENDICES AND ATTACHMENTS

Appendix	Title
A	*Fitting Installations for UN, Type A, 55-gallon Drums*

Attachment	Title
A	*Performance Checklist*

Appendix A, Fitting Installations for UN, Type A, 55-gallon Drums

CAUTION

In order for the Type A, 55-gal drum to safely perform to its rated ability, the installation of the drum lid ring and bung hole fittings need to be strictly adhered to. Any other method of assembly, or the use of any drum components (rings, gaskets, or fittings) that are not specified in this design type, will immediately invalidate the UN and DOT performance rating of the drum.

The table below shows the proper torque that must be applied to each drum fitting to assure proper container performance.

Plug Torque Setting

Drums are typically procured from Skolnik Industries. However, other drum manufacturers may be used. The specifications below are approved for Skolnik drums, but others manufacturers may be different. Always refer to purchase order and data package to insure use of actual manufacturer's current closure instructions.

	Type II-Reike VGII Serrated Base, Hexagon Head Plug		
	Steel Plugs		*Poly Plugs*
Plug Size	**Rubber Gasket**	**Poly Gasket**	
2-in.	30 ft-lbs	40 ft-lbs	20 ft-lbs

Filter Torque Setting

The specifications below are approved for NucFil-019DS Filter with 3/4" – 14 NPS Threads manufactured by Nuclear Filter Technology. However, filters from other manufacturers and other filters from Nuclear Filter Technology may be different. Always refer to purchase order and data package to insure use of actual manufacturer's current closure instructions.

	NucFil-019DS Filter with ¾"-14 NPS Threads	
Plug Size	**Payload <900 lbs.**	**Payload >900 lbs.**
3/4-in.	10 ft-lbs 120 in-lbs	15 ft-lbs 180 in-lbs

Attachment A, Performance Checklist

Page 1 of 2

Procedure Number: PMT2-DOP-CF-002,R3 Title: *Drum-in/Drum-out Operations in Cement Fixation*

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites _____
(Verifiers name and Z number)

☐ _____ ☐ _____
☐ _____ ☐ _____
☐ _____ ☐ _____
☐ _____ ☐ _____
☐ _____ ☐ _____
☐ _____ ☐ _____

Task #	Qualification Requirements	Instruction	Evaluation
	Emergency Actions		
1	Discuss how to respond in an emergency shutdown while performing this procedure.	☐	☐
	Comments	☐	☐
	Hazards and Controls		
1	Discuss the hazards associated with this procedure and how to minimize them.	☐	☐
2	Discuss the heavy lifting hazard associated with this procedure and how to minimize it.	☐	☐
3	Discuss the contamination hazard when performing the drum-in and drum-out, and how to minimize it.		
	Comments	☐	☐

Attachment A, Performance Checklist

Page 2 of 2

Task #	Qualification Requirements	Instruction	Evaluation
	Procedural Steps		
1	Demonstrate and/or discuss inspecting the cement.	☐	☐
2	Demonstrate and/or discuss how to prepare for drum-out.	☐	☐
3	Demonstrate and/or discuss how to perform the drum-out.	☐	☐
4	Demonstrate and/or discuss how to complete the closure of the cemented drum.	☐	☐
5	Demonstrate and/or discuss the steps for moving the drum.	☐	☐
6	Demonstrate and/or discuss how to attach the drum.	☐	☐
	Comments	☐	☐

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 3

PMT2-DOP-CF-003, R1 Certifying, Transferring and Storing Evaporator Bottoms for Cement Fixation

ENV-DO-14-0145

LA-UR-14-24634

Date: JUL 0 2 2014

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-003, R1

Effective date: 8/20/12

Next review date: 8/20/15

Supersedes:

Title: Certifying, Transferring and Storing Evaporator Bottoms for Cement Fixation

Status:	**Hazard:**	**For Document Control Use Only:**
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☐ Reference ☒ Use every Time (Attachment A only)	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
SME: Georgette Ayers	NCO-2	8/16/12	SIGNATURE ON FILE
Authorized for Use By:			
Operations Responsible Line Manager: Jennifer Butler	MET-1	8/16/12	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	8/20/12	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
SME/Engineer: Casey Finstad	MET-1	8/6/12	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader: Kent Abney	MET-1	8/6/12	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
N/A	N/A
Quality Assurance: ***Date***	***SME:*** ***Date***
	N/A

☒ Unclassified ☐ Restricted Data	**Derivative Classifier:**
☐ Confidential ☐ Formerly Restricted Data	**Name: Keith Fife**
☐ Secret ☐ National Security Information	**Title: TSM-TPM Date: 8/9/12**
☐ Unclassified Controlled Nuclear Information	
☐ Official Use Only	**Derived from: N/A**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-003, R1	8/20/12	Major revision	• Updated Section 10, *References* • Reformatted to latest DOP template format. • Removed attachments on LANMAS instructions, PAFD and CSLA. • Replaced MASS with LANMAS and WMS with WCATS.
PMT2-DOP-CF-003, R0	12/1/10	New Procedure	• Reformatted to IMP 300. • Incorporated Facility and RP-1 audit findings. • Supersedes NMT2-WI-009-CF-904, R2 and NMT2-IWD-WI-009-CF-904, R3.
NMT2-WI-009-CF-904, R2	08/25/06	Major revision	• Added hazards and controls for regulated waste and hazardous chemicals. • Updated the acronym list. • Updated group names. • Updated the CSLA in Attachment A.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This Detailed Operating Procedure (DOP) describes how evaporator (EV) bottoms solutions are certified and transferred to the Cement Fixation (CF) storage feed tanks (FTs). The EV bottoms are the primary waste feed to the CF process where they are treated and solidified to meet regulatory requirements. They are inspected and certified to verify they are as reported by the generator, are compatible with the cement, and meet discard criteria. CF personnel document the certification on the Waste Management Waste Compliance and Tracking System (WCATS). Then, with the help of EV personnel, the CF personnel transfer the EV bottoms solution to the FT tanks.

1.2 Scope and Applicability

This DOP is performed at TA-55 in Room 401, location CF by NCO-2 personnel assigned to the CF process. The EV personnel assist in the waste transfer by performing the required valve alignments within the EV process.

1.3 Applicability

This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled TRU waste.

The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Code of Federal Regulation - Nuclear Safety Management Assurance.*

This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment*.

This procedure involves the transfer and storage of a waste stream that is regulated as a mixed waste through the Resource Conservation and Recovery Act (RCRA), as defined by 40 CFR, Parts 260 through 273, *Code of Federal Regulation - Solid Waste*, as amended by the Hazardous and Solid Waste Amendments (HSWA). Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, *New Mexico Hazardous Waste Act (NMHWA)*.

1.4 Technical Safety Requirements

Not Applicable

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

B. Hazards and Controls

Hazard	Controls
Nuclear Criticality Accident	• Process specific controls (administrative requirements and engineered features) are detailed on the applicable Criticality Safety Limit Approvals (CSLA) associated with this operation. See Section 10.0, References, for a listing of the applicable CSLA(s).
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555. • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personnel protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

B. 2.1 General (continued)

Hazards and Controls (continued)

Hazard	Controls
Regulated Waste: The CF process operates as a Treatment, Storage, and Disposal (TSD) Unit. A TSD Unit is a hazardous waste management unit where hazardous or mixed waste regulated by the Resource Conservation and Recovery Act (RCRA) may be stored or treated before disposal.	• The CF process must comply with New Mexico State-regulated requirements for TSD Unit operation, including inspections to ensure safe operation. The inspection procedure is found in PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*. • Manage waste in compliance with regulations. Specific waste controls are available at http://int.lanl.gov/envoronmental/waste. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training • During walk-arounds, watch for evidence of leaks.
Hazardous chemicals: • Many of the wastes processed in the CF glovebox contain acid (nitric, hydrochloric, and sulfuric) and heavy metals (cadmium, chromium and lead). • Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (glovebox, gloves, etc.) is breached or if transfer lines leak.	To minimize the hazards from dangerous chemicals: • Eye wash and shower are located within 100 feet of the glovebox. • Material Safety Data Sheets (MSDS) are used to acquaint personnel with chemicals they are handling. • Personnel wear PPE appropriate to the material being handled. • Engineered containment (gloveboxes, pipes). • Frequent inspections of the TSD area keep personnel abreast of changing conditions. • During walk-arounds, personnel watch for evidence of leaks. • Personnel observe barriers in hazardous waste areas. • Personnel follow guidelines in TA55-RD-539, *TA-55 Waste Management Requirements* and P409, *Waste Management*. • Formal hazardous waste training is mandatory.

B. 2.1 General (continued)

Hazards and Controls (continued)

Hazard	Controls
Beryllium (Be) Hazard: • Some waste solutions from the Pu-Be program can contain trace amounts of Be. Inhaling particulate containing Be may cause a serious, chronic lung disease called Chronic Beryllium Disease. Leakage of and drying out of EV bottoms can result in respirable form of Be. • The presence of Be in can result in elevated dose rates of ionizing radiation, although this effect is usually only considered a problem when the Be is in solution form.	• Be in EV bottoms solution is not in a respirable form. • In the event of a spill of EV bottoms, standard PPE protection for radiological protection is sufficient to protect against Be inhalation. Additional shielding is used if the RCT determines an elevated dose rate is present. Refer to procedure TA55-AP-102, *Using Temporary Shielding in PF-4* for additional shielding that maybe required.

C. Unique Entry Conditions

Not Applicable

D. Sequence of Steps

The steps and Sections in the Performance Section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

In this DOP, steps associated with criticality issues are marked with an asterisk (*) in the margin. See the following Criticality Safety Limit Approval (CSLA) document for requirements:

NCS-CSLA-10-061 *FT Tanks at Location CF*

Administrative Requirements	
Pu	Pu in EV liquid waste solution

2.1 General (continued)

F. Required Permits

NMED Permit to operate as a TSD Unit.

Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

G. Training and/or Qualifications

Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on the Performance Checklist, Attachment B.

H. Cautions

Not Applicable

I. Material Control and Accountability

Procedures under this DOP comply with the *LANL Nuclear Material Control and Accountability Procedural Handbook.* Receipt or shipment of material is accompanied by appropriate Material Accountability and Safeguards System (LANMAS) transactions and manifests, and includes passwords and other security measures that are designed to protect the shipment and personnel who are involved with it. The protective force is responsible for providing physical security for a shipment to and from the facility.

2.2 Additional Requirements and Conditions (WR Use)

Not Applicable

3.0 PREREQUISITE ACTION

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre Job Briefing and Post Job Review*.

[2] No technical Safety Requirement (TSR) or In-Service Inspection (ISI) surveillances are performed in this procedure.

[3] Ensure the work is scheduled on the TA55 Integrated Plan of the Day (IPOD).

[4] Ensure that tool, equipment, and material numbers in the work area match those specified.

[5] Coordinate with the Evaporator personnel for the appropriate time to transfer solution to the FT tanks.

3.2 Performance Documents

PMT2-DOP-CF-006-FM1, *CF Storage Tank Log Sheet*

3.3 Special Tools, Equipment, Parts, and Supplies

- Computer for feed tank (FT) valve control and WCATS
- Push button station for FT valve control

3.4 Field Preparation

Not Applicable

3.5 Approvals and Notifications

Not Applicable

4.0 ACCEPTANCE CRITERIA

Not Applicable

5.0 PERFORMANCE

5.1 Examining the EV Bottoms

[1] EV personnel - Contact the CF personnel when an EV batch is on hand for examining.

NOTE 1 EV personnel are responsible for entering the identification and assay information for the waste item into WCATS.

NOTE 2 *Evaporator Bottoms* should be listed as the matrix.

[2] In WCATS,
select the item to be certified.

[3] Obtain from the EV process personnel the C-AAC assay sheet.

WARNING

Hazard: Elevated work platforms and ladders: Such equipment may be used to view tank volumes and can present tripping and falling hazards.

Control:

- When working on elevated platforms and ladders, use caution.
- Place the ladder on a solid, level surface.
- If possible, use the mirror extension to determine tank volume instead of climbing a ladder.

NOTE The following instructions reflect that evaporation can result in a volume loss and a volume gain can indicate the addition of an unknown liquid.

[4] Verify that the volume for the EV batch reported on the C-AAC assay sheet and WCATS matches the actual volume in the EV glovebox glass column (TK tank).

[a] IF there is a volume difference,
THEN perform the following:

1. IF the reading is ≤0.5 liters less than the WCATS value,
THEN accept the WCATS value.

2. IF the reading is >0.5 liters less than the WCATS value,
THEN require the EV personnel to resample and re-assay the batch.

3. IF the reading is ≤0.1 liters more than the WCATS value,
THEN accept the WCATS value.

4. IF the reading is >0.1 liters more than the WCATS value,
THEN require the EV personnel to resample and re-assay the batch.

5.1 Examining the EV Bottoms (continued)

[5] Before the TK Tank is sparged,
THEN examine the EV bottoms in the TK tank for the following:

NOTE Excessive amounts of precipitate in the EV bottoms can plug the FTs.

[a] Verify that there is no more than 1.5 liters of salt (precipitate) at the bottom of the column.

1. IF more than 1.5 liters of salt are present,
THEN contact your supervisor for instructions.

[b] Verify that there is only a single liquid phase (i.e., the liquids have not separated into layers).

1. IF there is only a single liquid phase,
THEN indicate on WCATS that this is a single phase item.

2. IF there is more than one liquid phase,
THEN contact your supervisor because one of the phases may be prohibited organic liquid.

[6] Verify that the EV personnel have indicated on WCATS the hazardous nature of the waste in accordance with P409, *Waste Management*, or 40 CFR Part 261, subparts C, *Characteristics of Hazardous Waste*, and D, *Lists of Hazardous Wastes*.

[7] Verify that the item identification and assay information agrees between the C-AAC assay sheet, WCATS and LANMAS.

NOTE 1 The discard limit (DL) for EV bottoms may be exceeded (up to and including 10g/L Pu) if a discard justification memo is attached in WCATS.

NOTE 2 To determine whether the item has exceeded the DL, WCATS converts the analysis in grams/liter to the grams/kilogram of waste matrix using a density value of 1.5 kg/L of waste.

[8] Determine if the item meets the DL.

[a] IF the item exceeds the DL,
THEN attach the appropriate discard justification memo from the list of memos in WCATS.

[9] On WCATS, sign off that the item is certified.

5.2 Transferring EV Bottoms to CF Storage Tanks

NOTE 1 Do not split one EV batch (TK tank) between two FTs.

NOTE 2 FT5 is normally reserved for draining the vacuum trap. If FT5 is needed for storage, then supervision is to be contacted for permission.

[1] Select a CF feed tank (FT) that is not currently being used for a cementation run.

[a] IF a storage tank is selected that already has EV solution in it, THEN ensure that none of the EV solution in the tank has already been used on a cementation run.

CAUTION

Do not select an FT for filling if the final volume could exceed ~50 liters or be above the top of the top sight glass.

[2] Select the waste item on WCATS.

NOTE WCATS calculates the volume and SNM for the tank.

[3] On WCATS, place the item into the FT selected.

[4] On Attachment A, *CF Storage Tank Log Sheet*, enter the following in the **ITEM IN** section:

- Date In
- Item ID
- MT (of the item to be transferred into the FT)
- Volume
- Tech (initials of the person doing the transfer)

NOTE WCATS assigns a new ID number for the first EV batch to be transferred into the FT. Additional batches added to the tank are combined into this new ID.

[5] On Attachment A, *CF Storage Tank Log Sheet*, enter the (new) Item ID in the **BLENDED ITEM** section.

[6] WHEN more than one EV batch is to be added to an FT tank, calculate the new blended Pu and Am or U grams, and the uncertainty for the entire volume by adding the values from the individual batches.

5.1 Transferring EV Bottoms to CF Storage Tanks (continued)

[7] On Attachment A, *CF Storage Tank Log Sheet*, enter the new combined values in the **BLENDED ITEM** section.

[8] Verify that the SNM grams, enrichment and volume listed on WCATS match those on LANMAS.

[9] Perform the necessary LANMAS transactions to move the item to the FT tank.

∗ **[10]** Before physically moving fissile material, ensure that the transfer will not cause the criticality limits to be exceeded at the destination location or other locations en route.

[11] Have the EV personnel sparge their TK tank for about 2 to 3 minutes just prior to transferring the solution.

NOTE The CF system has an interlock that will disable air flow to the air-actuated valves in the FT system if the glovebox negativity reduces past a set point on the photohelic. This was designed to prevent an uncontrolled flow of air into the glovebox. However, the photohelic can respond to a temporary condition such as several personnel putting their hands into the glovebox at the same time.

[12] IF it is found that there is no air pressure for valve actuation, THEN have the appropriate facility personnel reset the photohelic.

[13] Close the vent valves on the vent/vacuum trap and all of the FTs, except the FT into which the solution is to be transferred.

[14] Open the vacuum valve to the vent/vacuum trap.

[15] Ensure that the vent/vacuum valve on the selected FT is open.

[16] Ensure the feed inlet valves for all the other tanks are closed, THEN open the feed inlet valve on the selected FT.

[17] Open the main FT system feed inlet valve.

[18] Notify EV personnel that the transfer can begin from the EV side.

[19] Verify with the EV technician that they have opened the drain valve on the appropriate TK tank.

[20] Watch through the receiving FT sight glass for the EV solution to begin filling the FT, AND alert the EV technician if the EV solution does not begin filling the FT within 1 minute.

5.1 Transferring EV Bottoms to CF Storage Tanks (continued)

NOTE 1 It takes ~5 minutes to empty the transfer line between the TK and the FT.

NOTE 2 When the discharging solution can no longer be observed through the top sight glass on the receiving FT tank, the line is empty.

[21] Verify the EV to FT transfer is complete.

[22] IF this transfer is to be immediately followed by a 2nd batch (either to the same FT or another),
THEN repeat steps 5.1[11] through 5.1[21].

[23] After all the transfers are complete,
perform the following:

[a] Close the feed inlet valve to all FTs.

[b] Close the main FT system inlet valve.

[c] Close the vacuum valve and open the vent valve on the vent/vacuum trap.

[d] Open the vent/vacuum valves on all FTs.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not Applicable

6.2 Restoration

Not Applicable

6.3 Results

[1] Record information for the EV item on Attachment A and in WCATS.

6.4 Independent Verification

Not Applicable

6.5 Records Processing

Not Applicable

7.0 EMERGENCY ACTIONS

CAUTION

If the FT tank is overfilled, the overflow will be pulled into the vacuum trap. Transfer of the solution back to the original FT tank may result in another overflow.

[1] IF the FT tank is overfilled,
THEN contact your supervisor for guidance.

CAUTION

If a tank is leaking solution it may be necessary to transfer the contents from one FT to another.

[2] IF a solution needs to be transferred from one FT to another FT,
THEN contact your supervisor for guidance.

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
ALARA	As Low As Reasonably Achievable
Am	Americium
Be	beryllium
C-AAC	Actinide Analytical Chemistry
CF	cement fixation
CFR	Code Of Federal Regulations
CSLA	Criticality Safety Limit Approval
DL	Discard Limit
DOP	Detailed Operating Procedure
EV	evaporator
FT	Feed Tank for the cement fixation system
g/L	grams per liter
HSWA	Hazardous and Solid Waste Amendments
IPOD	Intergrated Plan of the Day
ISI	In-Service Inspection
LANMAS	materials accountability and safeguards system
MSDS	Material Safety Data Sheet
MT	material type
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act
Pu	plutonium
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RWP	radiological work permit
SNM	special nuclear material
TK tanks	glass columns in the EV glovebox
TSD	Treatment, Storage and Disposal
TSR	Technical Safety Requirement
TRU	transuranic
U	uranium
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WCATS	Waste Compliance and Tracking System

9.0 RESPONSIBILITIES

9.1 EV Process Operator

- Responsible for entering the waste's identification and assay information into WCATS.
- Responsible for the TK tank valve manipulations during transfer of waste from the TK tanks to the FT tanks.

10.0 REFERENCES

Document Number	Title
	LANL Nuclear Material Control and Accountability Procedural Handbook
10 CFR 830	*Code of Federal Regulations - Nuclear Safety Management Assurance*
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR Part 261, Subpart C	*Characteristics of Hazardous Waste*
40 CFR Part 261, Subpart D	*Lists of Hazardous Wastes*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
CCP-QP-016	*CCP Control of Measuring, Testing, and Data Collection Equipment*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
NCS-CSLA-10-061	*Criticality Safety Limit Approval for FT Tanks at Location CF*
P101-18	*Procedure for Pause/Stop Work*
P409	*Waste Management*
PMT2-DOP-CF-006-FM1	*CF Storage Tank Log Sheet*
PMT2-DOP-CF-009	*Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*
TA55-DOP-001	*Pre Job Briefing and Post Job Review*
TA55-PLAN-046	*Quality Management Plan (QMP)*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
Attachment A, *CF Storage Tank Log Sheet*	QA Record	Supervision shall implement a reasonable level of protection to prevent loss and degradation. Records shall be maintained in a metal file cabinet when not in use.	When the records are ready for final disposition, the record is transferred to Records Management and processed in accordingly.
Attachment B, *Performance Checklist*	Training Record	Maintain in training file	Record shall be maintained by the Training Coordinator upon completion of training and qualification. When no longer in use transfer to the DCC for archiving.

12.0 APPENDICES AND ATTACHMENTS

Attachment	Title
A	*CF Storage Tank Log Sheet*
B	*Performance Checklist*

Attachment A, CF Storage Tank Log Sheet

SITE ID: 481

CF Storage Tank Log Sheet

LOCATION: 401 TANK #_____ Effective Date: _____

EPA WASTE NUMBERS: D002, D006, D007, D008, D009 HANDLING CODE: S02

ITEM IN					BLENDED ITEM							
Date In	Item ID	MT	Volume	Tech	Item ID	Pu SNM & UNC*	Am SNM & UNC	Initial Volume	Actual Volume to Drum	Remaining Volume	Date Out	Tech

*UNC = uncertainty

RCRA Part A Unit Capacity: 460 Gallons CF Storage Tank Log Sheet-FM1

PMT2-DOP-CF-006-FM1-R0

Attachment B, Performance Checklist

Page 1 of 2

Procedure Number: PMT2-DOP-CF-003, R1 Title: *Certifying, Transferring and Storing Evaporator Bottoms for Cement Fixation*

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites _____
(Verifiers name and Z number)

The worker must be qualified on the following procedures and training plans.

☐ Plan # 256, Hazardous/Mixed Waste Worker Training

Qualification Requirements

Task #	Emergency Actions	Instruction	Evaluation
1	Discuss the emergency situations listed in Section 7.0, and what your response should be.	☐	☐
	Comments		
Task #	**Hazards and Controls**	**Instruction**	**Evaluation**
1	Discuss the criticality hazards associated with this work instruction and how to minimize them.	☐	☐
2	Discuss the other hazards associated within this procedure and how to minimize them.	☐	☐
	Comments		

Attachment B, Performance Checklist

Qualification Requirements, Continued

Task #	Procedural Steps	Instruction	Evaluation
1	Discuss why feeds need to be certified.	☐	☐
2	Demonstrate and discuss how to examine the EV bottoms.	☐	☐
3	Demonstrate and discuss how to determine if the item meets the DL.	☐	☐
4	Demonstrate and discuss how to prepare for the transfer.	☐	☐
5	Discuss how to deal with discrepancies between the volume reported by the EV personnel and that observed during the certification process.	☐	☐
6	Demonstrate and discuss how to perform the transfer of the EV bottoms.	☐	☐
7	Discuss how to transfer EV from the vacuum trap to an FT, the potential problem that can occur, and how to avoid the problem.	☐	☐
	Comments		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 4

PMT2-DOP-CF-005, R1 Non-evaporator Solution Operations for Cement Fixation

ENV-DO-14-0145

LA-UR-14-24711

Date: JUL 0 2 2014

Extended Until 6/24/15 per Memo MET-DO:13-08. Extension request was approved by Jeff Yarbrough on 06/24/13.

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-005, R1
Effective date: 5/10/12
Next review date: 5/10/14
Supersedes:

Title: Non-evaporator Solution Operations for Cement Fixation

Status:	Hazard:	For Document Control Use Only:
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☐ Use every Time	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
Operations: Georgette Ayers	NCO-2	5/2/12	SIGNATURE ON FILE
Authorized for Use By:			
Operations: Ron Chavez	NCO-2	5/9/12	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	5/10/12	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
SME: Casey Finstad	MET-1	5/2/12	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader: Kent Abney	MET-1	5/3/12	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
Quality Assurance: ***Date***	***SME:*** ***Date***

☒ Unclassified ☐ Restricted Data ☐ Confidential ☐ Formerly Restricted Data ☐ Secret ☐ National Security Information ☐ Unclassified Controlled Nuclear Information ☐ Official Use Only	**Derivative Classifier:** **Name: Steve Willson (SIGNATURE ON FILE)** **Title: Scientist 3 Date: 5/10/12** **Derived from: n/a**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-005, R1	5/10/12	Major Revision	• Updated Section 10, *References*. • Reformatted to latest DOP template format • Removed attachments on MASS instructions, PAFD and CSLA • Replaced MASS with LANMAS and WMS with WCATS. • Added LANL WAC to Sections 1.3 and 10.
PMT2-DOP-CF-005,R0	12/01/10	Extension	• Periodic review, no changes
PMT2-DOP-CF-005,R0	12/11/08	New Procedure	• Reformatted to IMP 300. • Supersedes NMT2-WI-009-CF-912,R2 and PMT2-IWD-WI-009-CF-912,R2.
NMT2-WI-009-CF-912,R2	08/25/06	Major Revision	• Added hazards and controls for Hazardous Chemicals, Regulated Waste, Handling Materials, Falls, Radiological Contamination, Pressurized Waste Containers, Sharp Objects, and Ergonomics. • Added details of storage for pH electrode. • Revised steps in Sections 5.1, 5.2, and 5.6. • Updated group names.
NMT2-WI-009-CF-912,R1	06/25/04	Major Revision	• Combined NMT2-WI-009-CF-905 with NMT2-WI-009-CF-912. • Revised and reformatted to conform to the new Work Instruction template.
NMT2-WI-009-CF-912,R0	12/11/01	New	• Transferred from NMT-7. • Supersedes NMT7-WI13-SOP-TA55-DP-04T.

Table of Contents

2.0 INTRODUCTION

2.1 Purpose

This Detailed Operation Procedure (DOP) identifies how non-evaporator solutions (any waste solution not from the evaporator (EV)) are acquired, treated and cemented by the Cement Fixation (CF) process. Acidic solutions require neutralization using sodium hydroxide (NaOH) to adjust them to the proper basic pH range for immobilization in cement. Basic pH solutions within the proper pH range may also be cemented. All non-EV solutions are treated and added to the drum before EV bottoms are added.

2.2 Scope and Applicability

This DOP is performed in PF-4 at TA-55 by NCO-2 personnel assigned to the CF process at location CF in room 401, the Shipping and Receiving Group unpacking room in the basement, and the Material Management Room (MMR) in room 414, or any other MMR.

2.3 Applicability

This procedure is intended to produce a cemented waste form that complies with the LANL Waste Acceptance Criteria (WAC) as defined in *LANL Waste Acceptance Criteria,* P930-1, and the Waste Isolation Pilot Plant (WIPP) WAC as defined in *Transuranic Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled waste.

The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Nuclear Safety Management Quality Assurance.*

This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment.*

This procedure is intended to produce a cemented waste form that meets the Resource Conservation and Recovery Act (RCRA), definition of a non-mixed waste as defined 40 CFR, Parts 260 through 273, *Solid Waste*, as amended by the Hazardous and Solid Waste Amendments (HSWA). Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act (NMHWA).

2.4 Technical Safety Requirements

Not Applicable

3.0 PRECAUTIONS AND LIMITATIONS

3.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

If this procedure cannot be completed as written or abnormal conditions are encountered, STOP, place the work in a safe configuration if possible, and notify the Operations Center (OC) and First Line Manager (FLM).

B. Hazards and Controls

Hazards and controls that are associated with this DOP are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Nuclear Criticality Accident: An inadvertent self-sustaining or divergent chain reaction that may release large amounts of neutron and gamma radiation causing serious injury or death.	• Operators of this process are trained to and comply with the applicable CSLA(s). See Section 10.0, References for applicable CSLA(s).
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555. • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personnel protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

B. Hazards and Controls (continued)

Hazard	Controls
Ergonomics: Awkward, reaching and static positions are encountered.	• Use caution. • Ask for assistance if necessary. • Take breaks.
Hazardous chemicals: • Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (glovebox, gloves, etc.) is breached or if transfer lines leak. • Many of the wastes processed in the CF glovebox contain acids (nitric, hydrochloric, and sulfuric) and heavy metals (cadmium, chromium, and lead).	• Eye wash and shower are located within 100 feet of the glovebox. • Experienced and trained personnel make use of Material Safety Data Sheets (MSDS) to acquaint themselves with the chemicals that they are handling. • Personnel wear PPE (chemical resistant gloves, safety glasses, safety shoes, face shield, apron, etc.) appropriate to the material being handled. • Engineered containment (gloveboxes, pipes). • Frequent inspections of the Treatment, Storage, and Disposal (TSD) area keep NCO-2 personnel abreast of changing conditions. • During walk-arounds, personnel watch for evidence of leaks. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Personnel observe barriers in hazardous waste areas. • Follow guidelines in TA55-RD-539, *TA-55 Waste Management Requirements* and P409, *Waste Management.* • Formal hazardous waste training is mandatory.

B. Hazards and Controls (continued)

Hazard	Controls
Elevated workspace: The worker must step onto an elevated work platform to operate equipment. The platform is secured to the glovebox stand with a mechanism that allows the platform to be removed during drum-out. There is also an elevated walkway behind the glovebox. • When entering or leaving the elevated work surface, workers may fall or stumble. • If detached from the glovebox, the stand may roll away from the glovebox with workers on it.	• Signs are posted to alert personnel to the tripping hazard. • When in elevated areas, personnel should use appropriate caution. • When working on the elevated platforms, workers should make sure the platforms are attached to the glovebox.
Regulated Waste: This work takes place within the TSD Unit. A TSD Unit is a permitted or interim status hazardous waste management unit where hazardous or mixed waste regulated by the Resource Conservation and Recovery Act (RCRA) may be stored or treated before disposal.	• The CF process operates as a TSD Unit and must comply with New Mexico State-regulated requirements for operation and inspection. Requirements include inspections to ensure safe operation. The inspection procedure is found in PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*. • Manage waste in compliance with regulations. Specific waste controls are available at http://int.lanl.gov/environment/waste/. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training • During walk-arounds, personnel watch for evidence of leaks. • pH adjustment and/or cementation removes the corrosivity and toxicity from the waste being treated.

C. Unique Entry Conditions

Not Applicable

2.1 General (continued)

D. Sequence of Steps

The steps in the Performance section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

See Applicable CSLAs.

F. Required Permits

- New Mexico Environmental Division (NMED) Permit to operate as a TSD unit.
- Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

G. Training and/or Qualifications

Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on the Performance Checklist, Attachment A.

H. Cautions

Not applicable

I. Material Control and Accountability

This procedure complies with the *LANL Nuclear Material Control and Accountability Procedural Handbook* and TA55-RD-585, *Nuclear Materials Control and Accountability Requirements.* Receipt or shipment of material is accompanied by appropriate Los Alamos Nuclear Material Accountability System (LANMAS) transactions and manifests.

Because the drum is attached to the GB system, to prevent any unauthorized personnel from diverting nuclear material out through a cemented drum, the process operation also requires the following:

- If the cementation GB is unattended, it is locked. Only the CF and Evaporator (EV) operations have keyed access to DB-424 in PF-4. The CF GB has a combination lock, the combination to which is known only by CF personnel.
- When the CF process is running, two personnel must be present.

3.2 Additional Requirements and Conditions (WR Use)

Not applicable.

4.0 PREREQUISITE ACTION

4.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre-Job Briefing and Post Job Review*.

[2] Obtain permission from the Operations Center [TA55], if applicable, before conducting a Technical Safety Requirement (TSR) or In-Service Inspection (ISI) surveillance.

[3] Schedule the work with the Facility Operations Director (FOD) organization.

[4] Ensure that tool, equipment, and material numbers in the work area match those specified.

[5] Coordinate with Shipping and Receiving for the appropriate time to retrieve the waste solutions from the unpacking room.

4.2 Performance Documents

Not Applicable

4.3 Special Tools, Equipment, Parts, and Supplies

- silicon defoamer (General Electric #9120 or equivalent)
- sodium hydroxide (~9 molar NaOH, piped to glovebox)
- nitric acid (concentrated)
- calibrated pH meter and electrode
- 250-ml beaker for taking pH
- Tygon® tubing, 3/8-in. inner diameter, thick wall
- cutting tool to remove bags from waste containers

4.4 Field Preparation

Not Applicable

4.5 Approvals and Notifications

Not Applicable

5.0 ACCEPTANCE CRITERIA

Not Applicable

6.0 PERFORMANCE

6.1 Retrieving the Solutions

NOTE Liquids containing organic compounds that are soluble in water are allowed to be cemented as long as they do not exhibit the Resource Conservation and Recovery Act (RCRA) definition of ignitability, which is a flash point of ≤140 degrees F. Organic solutions that are not soluble in water are prohibited from treatment in the CF process.

[1] Obtain a LANMAS printout of the items,
AND make sure they have the same values as that on the WCATS.

[a] IF the LANMAS printout does NOT have the same values,
THEN investigate further to resolve the discrepancy.

NOTE The location where the items are to be retrieved will typically be the Shipping and Receiving Group unpacking room in the PF-4 basement, but may also be a Material Management Room (MMR).

[2] Obtain a wagon or 2-tray cart,
AND take it to where the items are to be retrieved.

WARNING

Hazard: Pressurized containers: Unvented bottles of SNM can build up flammable concentrations of hydrogen gas that can ignite if there is an ignition source such as static charge.

Controls:
- **Inspect the bags and solution containers for pressurization. If pressurization is found, do not move the item and contact your supervisor immediately.**
- **Solution bottles have vented lids.**
- **Place containers with SNM in well-ventilated areas.**

[3] As you take each item, compare the label information with that on the LANMAS printout to verify that it is the correct item.

[a] IF the information does NOT match, (ex. added material types),
THEN

1. Do not take the item.

2. Notify your supervisor.

[4] As you take each item, ensure that there are no leaks and the tamper-indicating device (TID) is still intact.

[5] Leave each bottle in the carrier in which it was stored,
AND put it on the cart.

[6] To introduce the items into the glovebox system, take the cart with the items on it to one of the MMRs in the 400 area.

6.2 Introducing Solutions into the Glovebox System and Transferring to CF

NOTE Item introduction will typically take place in the room 414 MMR. However, introduction may also take place in other MMR's or into the CF glovebox at the time of drum-in via an empty drum.

[1] Notify an RCT that you are introducing bottles into the glovebox system.

[a] Wait until the RCT is present before you proceed.

[2] Tear off the tape seal on the solution carrier,
AND document per the TID Program.

WARNING

Hazard: Radiological contamination: A leaking item can result in radiological contamination.

Control: If a carrier has a leak, leave it and inform room personnel immediately.

[3] As you remove each item from the solution carrier, check for bottle leakage around the cap or through a crack.

[4] IF a bottle is cracked or leaking,
THEN put the bottle back into the solution carrier,
AND proceed as follows:

[a] IF decontamination of the outside of the carrier is necessary,
THEN follow the instructions of the RCT.

[b] Mark the outside of the solution carrier to indicate the bottle is leaking.

NOTE Rejected bottles must be sealed in accordance with the TID Program, and must sufficiently contain the leak with additional bagging.

[c] Follow RCT instructions,
AND contact your supervisor for further guidance.

[5] Check for the following conditions on non-leaking bottles:

[a] Note whether there is any liquid separation (layers) or any obvious solids mixed with the liquids.

[b] Ensure that the SNM value on the bottle label is the same as the value on WCATS and the LANMAS printout.

[c] Verify that the item meets the current discard limit (DL).

[d] Ensure that the approximate volume is as stated on the LANMAS printout.

[6] IF the item does NOT meet the conditions in Step **[5]**,
THEN return it to the solution carrier,
AND notify your supervisor.

5.2 Introducing Solutions into the Glovebox System and Transferring to CF (continued)

WARNING 1

Hazard: Falls: The worker may introduce the bottles into the room 414 glovebox system through an entry point that requires a ladder or elevated platform to access it.

Controls:
- **When in elevated areas, workers should use appropriate caution.**
- **If a rollable work platform is used, make sure it is anchored in place.**
- **Plan 3950: Ladder Safety**

WARNING 2

Hazard: Radioactive contamination: Introducing waste bottles into the glovebox system through the port into the room 414 dropbox may result in release of contamination.

Controls:
- **An RCT must be present during introduction of waste items into the glovebox system.**
- **All workers in room 414 must wear a full-face respirator while the port door is open.**

[7] Introduce the items into the glovebox line, which is usually through the port in the glovebox in room 414.

[8] Have an RCT monitor the cart or wagon and the solution carriers in the MMR.

[a] The RCT attaches an *Empty* tag to the solution carriers.

[b] Return the wagon or 2-tray cart and the solution carriers back to the area where they are stored.

NOTE Inspection and certification of the waste solutions typically takes place in a CF dropbox (DB).

[9] Perform the following steps associated with introducing the item into the GB line and transferring it via trolley to the CF DB or any other GB or DB.

[a] Following TA55-DOP-016, *TA-55 Material Transfer Procedure,* determine the quantity of SNM that is currently present in the destination. LANMAS may be used as an aid for this determination.

[b] Before physically moving fissile material, check that the transfer will not cause the criticality safety limits to be exceeded in the destination workstation or other workstations en route. Use LANMAS to aid in determining compliance.

5.2 Introducing Solutions into the Glovebox System and Transferring to CF (continued)

[c] Unlock trolley station #1 in room 401 at the CF dropbox DB-424, AND transfer the waste solutions to that dropbox station. (See TA55-DOP-024, *Trolley Hoist Conveying System*.)

[d] When the transfer is complete, lock out trolley station #1.

[10] IF you leave the CF glovebox unattended and the EV personnel need to use the dropbox DB-424,
THEN move all waste items into the CF glovebox,
AND lock the door between the dropbox and CF glovebox.

6.3 Examining and Certifying Non-EV Solutions

NOTE For items not generated by the analytical chemistry group, but generated inside the glovebox system, steps **[1]** – **[4]** are to be performed. These steps for inspection and certification of an item typically take place in the generator's GB.

[1] Based on information obtained from the generator (or in the case that CF is the generator, from LANMAS or the vault feed list) record in the CF logbook all identifying information for the item including ID #, Process/Status, matrix, RCRA-hazardous characteristics and generator contact information.

[2] Observe the generator take the solution sample that they will submit to the Analytical Chemistry Group for analysis.

[3] Have the generator close the container, tape the top of the container closed with vinyl tape, and label the container with the item ID. As CF examiner, initial the tape where it overlaps.

[4] When the generator receives the assay, the item can be accepted by the CF process for inspection, certification and cementation. Perform actions listed in Steps **[9a]**, **[9b]**, **[9c]** and **[9d]** in Section **5.2** to bring the item(s) to the CF DB.

5.3 Examining and Certifying Non-EV Solutions (continued)

WARNING 1

Hazard: Pressurized containers: Unvented bottles of SNM can build up flammable concentrations of hydrogen gas that can ignite if there is an ignition source such as static charge.

Controls:
- **Inspect the bags for pressurization. If pressurization is found, do not move the item and contact your supervisor immediately.**
- **Vent the solution bottles by loosening the caps.**
- **Solution bottles should have vented lids.**
- **Place bottles with SNM in well-ventilated areas.**

WARNING 2

Hazard: Radiological contamination and Cutting injury: The use of a knife or similar tool to cut bags from around waste bottles can result in cutting of the glovebox glove and release of contamination, as well as cutting of the worker.

Controls:
- **Cover and store sharp objects, such as razor blades, in a safe place.**
- **Use caution and cut away from your body.**

[5] In dropbox DB-424 (D-420), remove the bags from the bottles by using a knife or similar tool.

[6] Place the bags in a suitable area for later disposal.

NOTE In some cases, CF personnel need to enter the WCATS information, such as when the generator is unknown or when the CF process is the generator.

[7] IF information is missing in WCATS,
THEN contact the generator to complete the information.

[8] As generator, input each bottle's identification and characterization data into WCATS.

[9] If an item does NOT meet the Discard Limit (DL) concentration, select the proper discard justification memo from the list in WCATS.

[10] Sign off on WCATS that the item is certified.

[11] Log on to LANMAS,
AND verify that solution information is the same as on WCATS.

[a] IF there is a discrepancy,
THEN notify your supervisor.

6.4 Adjusting the pH of Non-EV Solutions

[1] Enter the drum identification information in WCATS.

[2] Perform and enter the pH electrode calibration information into WCATS according to PMT2-DOP-CF-006, *pH Adjustment of Evaporator Bottoms for Cement Fixation*.

[3] As part of criticality safety associated with moving the items into the CF glovebox, perform the following:

[a] Following TA55-DOP-016, *TA-55 Material Transfer Procedure,* determine the quantity of SNM that is currently present in the destination.

[b] Before physically moving fissile material, check that the transfer will NOT cause the criticality limits to be exceeded in the destination workstation. Use LANMAS to aid in determining compliance.

[c] Ensure that the criticality tag board accurately represents the amount of SNM that is currently in the glovebox location to be used.

[d] Move the waste solutions into the CF glovebox and next to the pH-adjustment column.

[e] Update the criticality tag board to accurately represent the amount of SNM that is now in the glovebox location.

CAUTION

To prevent the Tygon® tube from coming out of the solution during vacuuming and overflowing into the vacuum trap, hold the tube inside the solution container during the vacuum transfer. Throttle the vacuum valve as needed to control the amount of vacuum.

[4] Transfer the solutions into the pH-adjustment column by the following steps:

[a] Remove the cap on the solution container cap,
AND place the Tygon® tube from the column discharge line into the solution.

[b] Put a vacuum on the column,
AND open the valve on the discharge line to pull the solution into the column.

[c] Perform this transfer for all solution items.

5.4 Adjusting the pH of Non-EV Solutions (continued)

WARNING

Hazard: Rad contamination and Pinching: Manual valve operation presents a pinch hazard and can lead to a contamination release from a glove tear and a pinching injury.

Control: When operating the ball valves in the glovebox, do not pinch the gloves between the valve stop point and the handle to avoid cutting the gloves.

CAUTION 1

Do not store HCl solutions in the glass pH-adjustment column because they may cause corrosion of the stainless-steel components. Transfer them to the drum as soon as possible.

CAUTION 2

Throttle the vacuum valve as needed to control the amount of sparging so that the solution does not overflow into the vacuum trap.

[5] Begin sparging the solution in the pH-adjustment column by placing a vacuum on the column and cracking the column discharge valve to bring air into the bottom of the column.

[a] Keep sparging during the pH adjustment, except as noted.

[6] Open the sodium hydroxide valve beside the glass column,
AND add a small volume of sodium hydroxide to the sparging solution.

- Watch for foaming. If necessary, add small amounts of defoamer (about 20 ml at a time) by vacuuming it through the discharge line.
- Control sparging to prevent overflow.

[7] Obtain a representative sample for pH check by doing the following:

[a] Close the column discharge valve and vacuum valve.

[b] Open the column vent valve to stop sparging,
AND vent the column.

[c] Open the discharge valve,
AND fill a beaker with solution through the Tygon® tubing attached to the discharge line,
THEN close the discharge valve.

[d] To flush out the line, vacuum the solution back into the column by performing the following:

1. Close the vent valve.

2. Open the vacuum valve.

3. Open the discharge valve.

5.4 Adjusting the pH of Non-EV Solutions (continued)

[e] Repeat step **[7c]** to collect solution for the pH determination. Have enough solution in the beaker to cover the glass bulb at the end of the electrode.

WARNING

Hazard: Radiological contamination and Cutting: The electrode has a glass bulb on its end. If the electrode is struck or falls during use, the bulb may be broken and result in a contamination release from a glove breach and a cutting.

Controls:
- **Carefully handle the electrode to avoid breaking the glass bulb on the end.**
- **When replacing a broken electrode, avoid cutting the glovebox glove.**

[8] Using the calibrated pH electrode, obtain the pH of the solution. The target pH range is 9.5 to 11.5.

[9] Vacuum the sample solution back into the glass column as in Step **[7d]** and begin sparging the solution.

[10] Use the following instructions for pH adjustment:

[a] IF the pH is below the target range,
THEN

1. Add a small amount of sodium hydroxide to the sparging solution.

2. Repeat Steps **[6]** – **[9]** above as necessary to obtain the correct pH.

[b] IF the pH is above the target range,
THEN further pH adjustment is NOT required.

5.4 Adjusting the pH of Non-EV Solutions (continued)

WARNING

Hazard: **Radiological contamination: Compressed air is used to transfer waste solutions from the pH adjustment column to the 55-gal drum. Excessive pressure has the potential to overpressurize the glovebox or damage the glass column.**

Controls:
- **Adjust the air pressure to the glass column to ≤6 psi at the regulator. A photohelic switch monitors air pressure within the glovebox, and, if pressurization is detected, automatically closes the compressed air line**
- **The pH-adjustment column has a pressure relief valve to vent the column at ≥10 psi.**

[11] Discharge the contents of the column to the drum as follows:

NOTE The hose is to be adequately secured using fittings as necessary to prevent the hose from coming off during the transfer.

[a] Connect Tygon® tubing from the column discharge to the drum.

[b] Open the compressed air valve underneath the glovebox.

[c] Close the column vent valve and the column vacuum valve, AND open the air valve to the column.

[d] Open the column discharge valve to transfer column contents to the drum.

[e] When the discharge is nearly completed, turn off the compressed air valve to the column.

[f] Let the air pressure in the column vent completely through the discharge hose to clean it out.

[g] Close the column discharge valve.

[h] Open the column vent valve.

[12] Update WCATS.

[13] Proceed to PMT2-DOP-CF-006, *pH Adjustment of Evaporator Bottoms for Cement Fixation,* for the next step of adding EV solution to the drum.

7.0 POST-PERFORMANCE ACTIVITIES

7.1 Testing

Not Applicable

7.2 Restoration

Not Applicable

7.3 Results

[1] Record information for the item and the drum in the CF logbook and in WCATS.

7.4 Independent Verification

Not Applicable

7.5 Records Processing

[1] See Section 11.0 Records

8.0 EMERGENCY ACTIONS

[1] If a site emergency develops, follow TA55-AP-018, *TA-55 Emergency Procedures.*

[2] No actions will be taken in response to an emergency beyond those prescribed in TA55-PLAN-007, *TA-55 Facility Emergency Plan*. They involve evacuating the area and calling the OC (55-911), then Emergency 911.

[3] In case of physical injury, call the OC at 55-911 or 7-3330 and request the Emergency Response Team.

9.0 DEFINITIONS AND ACRONYMS

Term	Definition
ALARA	as low as reasonably achievable
CCP	Central Characterization Project
CF	cement fixation
CFR	code of federal regulations
CSLA	criticality safety limit approval
DB	dropbox
DL	discard limit
DOP	detailed operating procedure
EV	evaporator
FLM	first line manager
FOD	facility operations director
GB	Glovebox
HSWA	Hazardous and Solid Waste Amendments
ISI	In-Service Inspection
LANMAS	Los Alamos Nuclear Material Accountability System
MMR	material management room
MSDS	Material Safety Data Sheet
NaOH	sodium hydroxide
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act
OC	operations center
PF	plutonium facility
PPE	personal protective equipment
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RWP	radiological work permit
SNM	special nuclear material
TID	tamper-indicating device
TSD	treatment, storage and disposal
TSR	Technical Safety Requirement
TRU	transuranic
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WCATS	Waste Compliance and Tracking System

10.0 RESPONSIBILITIES

10.1 Waste Generator

- Responsible for providing non-EV solution in proper form and in approved container.
- Responsible for presenting the solution item to the CF Process Operator for visual inspection and observation of sampling for analytical results.

11.0 REFERENCES

Document Number	Title
	LANL Nuclear Material Control and Accountability Procedural Handbook
10 CFR 830	*Code of Federal Regulations - Nuclear Safety Management Assurance*
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
CCP-QP-016	*CCP Control of Measuring, Testing, and Data Collection Equipment*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
NCS-CSLA-10-062	*Cementation Glovebox GB454*
NCS-CSLA-10-124	*(DB424) Inspection Activities of PF-4 Vault Particulate Waste Items*
P101-18	*Procedure for Pause/Stop Work*
P409	*Waste Management*
P930-1	*LANL Waste Acceptance Criteria*
PMT2-DOP-CF-006	*pH Adjustment of Evaporator Bottoms for Cement Fixation*
PMT2-DOP-CF-009	*Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*
TA55-AP-018	*TA-55 Emergency Procedures*
TA55-DOP-001	*Pre-Job Briefing and Post-Job Review*
TA55-DOP-016	*TA-55 Material Transfer Procedure*
TA55-DOP-024	*Trolley Hoist Conveying System*
TA55-PLAN-007	*TA-55 Facility Emergency Plan*
TA55-PLAN-046	*Quality Management Plan (QMP)*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*
TA55-RD-585	*Nuclear Materials Control and Accountability Requirements*

12.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
CF Logbook	Written process data record	Records shall be maintained at the CF process location.	When the records are ready for final disposition, the record is transferred to Records Management in accordance with procedure.
Attachment A, *Performance Checklist*	Training record	Filed with training specialist.	

13.0 APPENDICES AND ATTACHMENTS

Attachment	Title
A	Performance Checklist

Attachment A, Performance Checklist

Page 1 of 2

Course:	**Session:**

Procedure No.: PMT2-DOP-CF-005, R1 Title: Non-evaporator Solution Operations for Cement Fixation

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites _____
(Verifier's name and Z number)

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

Task #	Emergency Actions	Instruction	Evaluation
1	Describe the response to an emergency shutdown.	☐	☐
	Comments		
Task #	**Hazards and Controls**	**Instruction**	**Evaluation**
1	Describe the hazard associated with nuclear criticality and how to minimize it.	☐	☐
2	Describe the hazard associated with ionizing radiation and how to minimize it.	☐	☐
3	Describe the hazard associated with alpha contamination and how to minimize it.	☐	☐
4	Describe the hazard associated with the elevated work platform and how to control it.	☐	☐
5	Describe the hazard of working with hazardous chemicals and how to control it.	☐	☐
6	Describe the ergonomic hazard and how to control it.	☐	☐
	Comments		

Attachment A, Performance Checklist

Page 2 of 2

Task #	Procedural Steps	Instruction	Evaluation
1	Demonstrate and/or discuss how to retrieve the non-evaporator solutions	☐	☐
2	Demonstrate and/or discuss how to introduce the non-evaporator solutions into the trolley system and transfer them to the CF GB.	☐	☐
3	Demonstrate and/or discuss how to examine and certify non-evaporator solutions	☐	☐
4	Demonstrate and/or discuss how to verify the sampling of non-evaporator solutions requiring analytical results.	☐	☐
5	Demonstrate and/or discuss how to adjust the pH of non-evaporator solutions	☐	☐
	Comments		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 5

PMT2-DOP-CF-006, R1 pH Adjustment of Evaporator Bottoms for Cement Fixation

ENV-DO-14-0145

LA-UR-14-24713

Date: JUL 0 2 2014

Extended Until 6/24/15 per Memo MET-DO:13-08. Extension request was approved by Jeff Yarbrough on 06/24/13.

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-006, R1
Effective date: 2/29/12
Next review date: 2/29/14
Supersedes: PMT2-DOP-CF-004,R0

Title: pH Adjustment of Evaporator Bottoms for Cement Fixation

Status:	**Hazard:**	**For Document Control Use Only:**
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☒ Use every Time (Attachments A and B only)	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
Operations: Georgette Ayers	NCO-2	2/27/12	SIGNATURE ON FILE
Authorized for Use By:			
Operations Responsible Line Manager: Jennifer Butler	NCO-2	2/27/12	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	2/27/12	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
SME: Gerald Veazey	MET-1	2/2/12	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader: Kent Abney	MET-1	2/23/12	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
Quality Assurance: ***Date***	***SME:*** ***Date***

☒ Unclassified ☐ Restricted Data ☐ Confidential ☐ Formerly Restricted Data ☐ Secret ☐ National Security Information ☐ Unclassified Controlled Nuclear Information ☐ Official Use Only	**Derivative Classifier:** **Name: Steve Willson (signature on file)** **Title: Scientist-3 Date: 2/29/12** **Derived from: N/A**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-006,R1	2/29/12	Major Revision	• Reformatted to latest DOP template format • Removed attachments on MASS instructions, PAFD and CSLA • Replaced MASS with LANMAS and WMS with WCATS. • Combined PMT2-DOP-CF-004,R0 and PMT2-DOP-CF-006,R0 • Supersedes PMT2-DOP-CF-004,R0
PMT2-DOP-CF-006,R0	12/01/10	Extension	• Periodic review, no changes
PMT2-DOP-CF-006,R0	12/11/08	New Procedure	• Reformatted to IMP 300. • Supersedes NMT2-WI-009-CF-911,R2 and NMT2-IWD-WI-009-CF-911,R3.
NMT2-WI-009-CF-911,R2	08/18/06	Major revision	• Added hazards and controls for Regulated Waste • Revised steps in Sections 5.2, 5.3, and 5.5 • Revised the Performance Checklist
NMT2-WI-009-CF-911,R1	05/19/06	Extension	
NMT2-WI-009-CF-911,R1	05/20/04	Major revision	• Revised and reformatted to conform to the new Work Instruction template • Changed the title • Added new hazard controls
NMT2-WI-009-CF-911,R0	01/09/02	New	• Transferred from NMT-7 • Supersedes NMT7-WI8-SOP-TA55-DP-04

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This Detailed Operating Procedure (DOP) first describes how to calibrate and maintain the pH electrode and equipment that is used to measure and adjust the pH of evaporator (EV) bottoms waste solution. This DOP then identifies how evaporator (EV) bottoms are pH adjusted and added to a drum for immobilization in cement.

1.2 Scope and Applicability

This procedure is performed at TA-55, PF-4, Room 401, location CF by NCO-2 personnel assigned to the Cement Fixation (CF) process.

1.3 Applicability

This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled TRU waste.

The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Nuclear Safety Management Quality Assurance.*

This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment.*

This procedure is intended to produce a cemented waste form that meets the Resource Conservation and Recovery Act (RCRA), definition of a non-mixed waste as defined 40 CFR, Parts 260 through 273, *Solid Waste*, as amended by the Hazardous and Solid Waste Amendments. Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act.

1.4 Technical Safety Requirements

Not Applicable

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

B. Hazards and Controls

Hazards and controls that are associated with this DOP are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Nuclear Criticality Accident: An inadvertent self-sustaining or divergent chain reaction that may release large amounts of neutron and gamma radiation causing serious injury or death.	• Process specific controls (administrative requirements and engineered features) are detailed on the applicable Criticality Safety Limit Approvals (CSLA) associated with this operation. See Section 10.0, References, for a listing of the applicable CSLA(s).
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555. • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personnel protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

B. Hazards and Controls (continued)

Hazard	Controls
Regulated Waste: The CF process operates as a Treatment, Storage, and Disposal (TSD) Unit. A TSD Unit is a hazardous waste management unit where hazardous or mixed waste regulated by the RCRA may be stored or treated before disposal.	• The CF process must comply with New Mexico State-regulated requirements for TSD Unit operation, including inspections to ensure safe operation. The inspection procedure is found in PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*. • Manage waste in compliance with regulations. Specific waste controls are available at http://int.lanl.gov/envoronmental/waste. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training. • During walk-arounds, watch for evidence of leaks.
Hazardous chemicals: • Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (GB, gloves, etc.) is breached or if transfer lines leak. • Many of the wastes processed in the CF glovebox contain corrosive (acid) and toxic (heavy metals) materials.	The controls provided by TA55-RD-555, *TA-55 Radiation Protection Requirements*, are effective in preventing exposure to hazardous chemicals. To minimize the hazards from dangerous chemicals: • Eye wash and shower are located within 100 feet of the GB. • Experienced and trained personnel make use of Material Safety Data Sheets (MSDS) to acquaint themselves with chemicals they are handling. • Wear PPE (chemical resistant gloves, safety glasses, safety shoes, etc.) appropriate to the material being handled. • Engineered containment (glovebox, pipes). • Frequent inspection of the Treatment, Storage, and Disposal (TSD) area to keep personnel abreast of changing conditions. • During walk-arounds, evidence of leaks is looked for. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Barriers observed in hazardous waste areas. • Guidelines are followed in TA55-RD-539, • *TA-55 Waste Management Requirements* and P409, *Waste Management.* • Formal hazardous waste training is mandatory.

B. Hazards and Controls (continued)

Hazard	Controls
Elevated workspace: Personnel must step onto an elevated work platform to operate GB equipment. The stand is secured to the GB with a mechanism that allows the platform to be removed for access to the drum during drum-out. There is also an elevated walkway behind the GB. • When entering or leaving the platform or walkway, personnel may trip, fall or stumble. • If detached from the GB, the platform may roll away while personnel are on it.	• Before climbing onto the rollable elevated work stand, attach it to the GB stand. • Signs are posted to alert personnel to the tripping hazard. • When in elevated areas, personnel should use appropriate caution.
Ergonomics: Awkward, reaching and static positions are encountered.	• Use caution. • Ask for assistance if necessary. • Take breaks.
Beryllium (Be) Hazard: • Some waste solutions from the Pu-Be program can contain trace amounts of Be. Be is a carcinogen and is known to cause acute health effects. In particular, inhaling Be particulate may cause a serious, chronic lung disease called Chronic Beryllium disease. • The presence of Be in can also result in elevated dose rates, although this effect is usually only considered a problem when Be is in solution form.	• Be in EV bottoms solution is not in a respirable form. • The engineered structures (gloveboxes) and PPE used to control radiological hazards in PF-4 (coveralls, safety glasses, gloves and booties) is sufficient for Be hazards. • Additional shielding is used if the RCT determines an elevated dose rate is present.

2.1 General (continued)

C. Unique Entry Conditions

Not Applicable

D. Sequence of Steps

The steps in the Performance section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

See the following Criticality Safety Limit Approval (CSLA) document for requirements.

- NCS-CSLA-10-062 *Cementation Glovebox GB454*

Administrative Requirements	
Pu in solution/cemented waste/particulate	≤520 grams Pu total. No more than 200 grams Pu per drum

- NCS-CSLA-10-061 *FT Tanks at Location CF*

Administrative Requirements	
Pu	Pu in EV liquid waste solution

F. Required Permits

NMED Permit to operate as a TSD Unit

G. Training and/or Qualifications

Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on Attachment C, *Performance Checklist*.

H. Cautions

Not applicable

2.1 General (continued)

I. Material Control and Accountability

This procedure complies with the LANL Nuclear Material Control and Accountability Procedural Handbook and TA55-RD-585, *Nuclear Materials Control and Accountability Requirements.* Receipt or shipment of material is accompanied by appropriate Los Alamos Nuclear Material Accountability System (LANMAS) transactions and manifests.

Because the drum is attached to the GB system, to prevent any unauthorized personnel from diverting nuclear material out through a cemented drum, the process operation also requires the following:

- If the cementation GB is unattended, it is locked. Only the CF and EV operations have keyed access to DB-424 in PF-4. The CF GB has a combination lock, the combination to which is known only by CF personnel.
- When the CF process is running, two personnel must be present.

2.2 Additional Requirements and Conditions (WR Use)

Not applicable.

3.0 PREREQUISITE ACTION

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre-Job Briefing and Post Job Review.*

[2] Obtain permission from the Operations Center [TA55], if applicable, before conducting a Technical Safety Requirement (TSR) or In-Service Inspection (ISI) surveillance.

[3] Schedule the work with the Facility Operations Director (FOD) organization.

[4] Ensure that tool, equipment, and material numbers in the work area match those specified.

3.2 Performance Documents

- Operator's manual for pH meter/electrode being used shall be available for reference.
- PMT2-DOP-CF-006-FM1, *CF Storage Tank Log Sheet*
- PMT2-DOP-CF-006-FM2, *Cement Run Sheet*

3.3 Special Tools, Equipment, Parts, and Supplies

- pH meter and electrode
- electrode filling solution (as needed)
- 2 beakers, one labeled *pH 7* and one labeled *pH 10*
- pH 7 buffer solution (traceable to National Institute of Standards and Technology [NIST])
- pH 10 buffer solution (traceable to NIST)
- silicon defoamer (General Electric #9120 or equivalent)
- ~9 molar NaOH (piped to glovebox from facility makeup)
- ≤2-L container of concentrated nitric acid
- Tygon® (or equivalent) tubing, 3/8-inch inner diameter, thick wall
- dip cup on long handle for obtaining pH sample from drum
- cloth for cleaning electrode
- Holder for pH beaker to prevent tip-over

3.4 Field Preparation

Not Applicable

3.5 Approvals and Notifications

Not Applicable

4.0 ACCEPTANCE CRITERIA

[1] pH buffer solutions must not be expired.

[2] Calibration of pH meter must be valid.

[3] Final pH of waste solution in glass column and drum must be 9.5 – 11.5.

5.0 PERFORMANCE

5.1 Calibrating to pH 7 and pH 10 Buffer Solutions

NOTE 1 Various pH meters and electrodes may be used in this procedure. Consult the operator's manual provided by the equipment manufacturer for specific instructions on calibration and use.

NOTE 2 The Waste Compliance and Tracking System (WCATS) is an online system used to document cement drum data. It may be used simultaneously with processing or updated after processing is completed. If the WCATS is not available data can be recorded on Attachment B, *Cement Run Sheet*. Information for WCATS can be transcribed from the Run Sheet at a later time.

WARNING

Hazard: Ergonomics: The transfer of the pH bottles between the dropbox and glovebox can present ergonomic issues due to the weight of the bottles and awkward hand and arm positions.

Controls:
- **When performing this task, personnel shall use caution.**
- **Personnel may use smaller volume bottles of buffer to reduce the weight.**
- **Obtain assistance as needed.**

NOTE The buffer containers are usually stored in the CF dropbox.

[1] Retrieve the buffer containers.

[a] Verify the pH buffer solutions have not expired.

[b] Record the serial number and expiration date for the pH 7 and pH 10 buffer solutions on the Cement Run Sheet or WCATS.

5.1 Calibrating to pH 7 and pH 10 Buffer Solutions (continued)

WARNING

Hazard: Broken glass and Radiological contamination: The pH electrode may have a glass bulb that can be broken and pose a cutting hazard. Breakage can also cut gloves and hands, which can result in contamination.

Controls:
- **Before using the pH electrode, check that the bulb is not broken.**
- **Carefully handle the electrode to avoid breaking the glass bulb.**
- **When not using the electrode, properly store it in its holder to keep it from falling over.**

[2] Remove the pH electrode from its storage container.

[3] Turn the pH unit on,
AND perform any necessary keypad or button operations to ready pH unit to perform a 2-point calibration with pH buffers 7 and 10.

CAUTION

To prevent cross-contaminate, use a separate labeled beaker exclusively for each buffer solution.

NOTE For the electrode to measure pH of the buffer, the buffer must cover the end of the electrode body where the glass bulb is located.

[4] Place the pH electrode in the beaker of pH 7 buffer solution.

[5] Observe the pH value on the display,
AND allow the pH reading to stabilize.

[6] If the pH unit requires a keypad or button operation (pressing OK or ENTER) to accept the pH reading, do so. The reading should lock in the range of pH 6.9 - 7.1.

5.1 Calibrating to pH 7 and pH 10 Buffer Solutions (continued)

[7] Use the following guidance to proceed:

[a] IF the pH reading stabilizes between 6.9 and 7.1,
THEN go to Step **5.1[8]**.

[b] IF the pH reading does NOT stabilize between 6.9 and 7.1, or takes longer than 10 minutes to stabilize,
THEN perform one or more of the following actions before restarting pH calibration at Step **5.1[4]**:

- Replace the electrode and/or meter.
- Gently wipe the glass bulb with a cloth.
- Replace the electrode filling solution.

[8] Record the stabilized pH reading under pH 7.

[9] Remove the electrode from the pH 7 buffer.

[10] Repeat Steps **5.1[4]** – **5.1[9]** for the electrode with pH 10 buffer with the exception of using 9.9 - 10.1 as the acceptable pH range.

[11] Place the electrode in the storage beaker filled with pH 7 storage solution until needed.

5.2 Preparing to Transfer EV Bottoms to the Glass Column

NOTE 1 The cementation Feed Tank (FT) system valves are air-actuated, remotely operated valves (ROV) that are operated via a control panel. A diagram of the tank valve layout on the control panel is used to assist in valve identification.

NOTE 2 The Target Volume is the maximum volume of waste + NaOH + water that is needed prior to cement addition to allow sufficient drum space for the cement needed. The Target Volume is pre-established by your supervisor.

[1] Record the date, drum number, tare weight of the drum assembly, target volume, carbon composite filter ID#, and which scale that the drum is on.

CAUTION

Do not sparge more than one FT at a time to avoid cross contamination of the contents of the FTs.

[2] Sparge the solution in the FT for ≥ 2 minutes by performing the following steps:

[a] Apply a vacuum to the FT by opening the vacuum ROV and closing the vent ROV on the FT trap.

[b] Keep the common vac/vent valve on the FT open.

[c] Open the manual vent valve on the glass column in the glovebox.

5.2 Preparing to Transfer EV Bottoms to the Glass Column (continued)

CAUTION

A manual valve (NAF-GB454-V1) to control sparging to the FT system is located outside and under the glovebox at the glass column workstation. If this valve is open when the FT drain valve is opened in the next step, an excessive amount of sparge air pulled into the FT can cause the solution in the FT to overflow into the trap. Ensure valve NAF-GB454-V1 is closed before opening the FT drain valve in the next step.

[d] Open the drain ROV on the FT to be sparged.

[e] Open and adjust the manual valve (NAF-GB454-V1) on the FT transfer line to maintain sparging without overflow to the FT trap.

NOTE Sparging can be detected by feeling the FT or by observing sparging through the lower FT sight glass.

[3] Discontinue sparging after no less than 2 minutes has passed by performing the following steps:

[a] Close the manual valve (NAF-GB454-V1) at the CF glovebox on the FT line.

NOTE The FT drain ROV may be left open if EV bottoms is to be removed from this FT immediately after sparging.

[b] Close the drain ROV on the FT that was being sparged.

[c] Close the vacuum ROV,
AND open the vent ROV on the trap. This also vents the FT.

[4] IF solution has overflowed into the FT system trap during the line clearing operation,
THEN drain the trap,
AND transfer the solution per supervisor's instructions.

5.3 Adjusting the pH of a Representative Sample

[1] Record the FT ID of the EV bottoms to be used.

[2] Transfer ~5L of EV bottoms to the glass column by performing the following steps:

[a] Vent the FT storage tank by closing the vacuum ROV and opening the vent ROV on the trap.

[b] Close the vent valve,
AND open the vacuum valve on the glass column.

[c] Open the drain ROV on the FT.

NOTE In the next step, control the transfer rate of the solution into the glass column by throttling the manual valve (NAF-GB454-V1).

[d] Open the manual valve (NAF-GB454-V1) at the CF glovebox to begin filling.

[e] Record the exact volume of EV Bottoms transferred to the glass column.

[3] Start gentle sparging on the solution in the column by vacuuming air through the column discharge valve as follows:

[a] Close the column vent valve.

[b] Open the column vacuum valve about halfway.

[c] Open the column discharge valve about halfway.

[d] Adjust these discharge and vacuum valves to produce sparging without overflow into the column's vacuum trap.

NOTE Watch for changes in the appearance of the mixture during the next step. The onset of precipitation and color change are indications of pH shift.

[4] To add NaOH in the following step, open the NaOH valve (NAOH-FT490-V1) located on the outside of the glovebox.

[5] Using the column NaOH valve, add 1 to 2 liters of NaOH to the sparging solution.

[6] IF excessive foaming is encountered,
THEN add defoamer (~20 ml at a time) as necessary by vacuuming it in through the discharge line.

[7] Sparge the contents for at least 1 minute.

[8] IF overflow has occurred,
THEN drain the trap,
AND transfer the solution back to the pH adjustment column.

5.3 Adjusting the pH of a Representative Sample (continued)

[9] Obtain a representative sample for pH check as follows:

[a] Stop sparging by closing the glass column's discharge and vacuum valves.

[b] Open the column vent valve.

NOTE In the following step, the glass column's discharge line and the sample beaker are flushed with column solution to remove remnants of previous batches.

[c] Open the column discharge valve,
AND fill the beaker.

[d] Transfer the solution back into the column by closing the vent valve, opening the vacuum valve, and drawing the solution into the column through the discharge line.

[e] Open the column discharge valve,
AND fill the beaker with enough solution to cover the glass bulb at the end of the electrode.

WARNING

Hazard: Radiological contamination & Sharps: The pH electrode has a glass bulb on its end. If the electrode is struck or falls during use, the bulb may get broken and cut personnel and/or a glove resulting in injury and/or external contamination.

Controls:
- **Handle the electrode carefully to avoid breaking the glass bulb on the end.**
- **When handling an electrode with a broken bulb, use caution and appropriate protective gloves.**
- **Replace electrodes with broken bulbs.**

[10] Determine and note the pH of the solution with respect to the desired final target range using the calibrated pH electrode.

[11] Transfer the EV bottoms solution back into the column according to Step **5.3[9][d]** in this Section.

[12] IF the pH is below the target pH range of pH 9.5 – 11.5,
THEN repeat Steps **5.3[3]** – **5.3[11]** in this Section with the exception of adding NaOH in smaller increments until the pH of the column contents has been adjusted to the target range.

5.3 Adjusting the pH of a Representative Sample (continued)

NOTE Before adding any EV bottoms in the following step, note the volume in the column so you will be able to determine how much additional volume of EV is added.

[13] If the pH is above the target range, perform the following steps:

[a] Add a small amount of EV bottoms from the same FT to reduce the pH using the valve manipulations described in Steps **5.3[2][a]** – **5.3[2][d]** of this Section.

[b] Record the new total volume.

[c] Continue checking the pH, adding EV bottoms solution, and recording the total volume until the pH is in the target range.

[d] IF the pH becomes too low again,
THEN repeat Step **5.3[12]**.

[14] When the pH is in the target range, record the final pH.

[15] Put the electrode back into the pH 7 soaking beaker.

[16] Transfer the sample solution back into the column according to Step **5.3[9][d]** of this Section.

[17] Close the column's discharge and vacuum valves,
AND open its vent valve and allow the solution to settle.

[18] IF excessive foaming obscures the volume reading,
THEN add defoamer as needed by vacuuming it through the discharge line as described in Step **5.3[9][d]** of this Section.

[19] Record the final total volume of the pH-adjusted solution in the column.

[20] From this volume, subtract the volume of EV added to calculate the NaOH volume.

[a] Record the NaOH and EV volumes.

[b] Calculate and record the NaOH/EV ratio.

5.4 Transferring EV Bottoms to the Drum

NOTE The first solution discharged will be the solution from Section 5.3 of ~5L EV with NaOH added to determine the NaOH/EV ratio.

[1] Connect a piece of Tygon® tubing to the column discharge line that is long enough to reach the drum,
AND place the discharge end of the Tygon® tubing inside the drum.

[2] To discharge the content of the column to the drum, perform the following steps:

[a] Close the column vent valve.

WARNING

Hazard: Radiological contamination: Compressed air is used to transfer solutions from the glass pH-adjustment column to the 55-gal drum. Excessive air pressure to the column could rupture it, which could damage the gloves or windows sufficiently to cause contamination release or injure personnel. If the pressure goes too high, the negativity in the glovebox could also be reduced sufficiently to result in the release of contamination.

Controls:

- **Pressure in the air line is controlled by a regulator. When using compressed air, ensure that the air pressure is regulated to no more than 6 psi. If higher pressure is required to transfer the EV bottoms to the drum, ask your supervisor for instructions.**
- **The pH adjustment column is fitted with a pressure relief valve that is design to vent the column at 10 psi or greater.**
- **A photohelic gauge monitors the air pressure within the glovebox, and, if sufficient loss of negativity is detected, automatically closes the compressed air line.**

[b] Open the manual compressed air valve (PCA-GB454-V1) under the glovebox.

[c] Open the column discharge valve.

[d] Open the compressed air valve on the column to begin discharge of the solution through the Tygon® tubing to the drum.

[e] AFTER discharge is complete,
THEN turn off the column compressed air valve,
AND close the column discharge valve.

[f] Close the compressed air valve (PCA-GB454-V1) under the glovebox.

[g] Open the column vent valve.

5.4 Transferring EV Bottoms to the Drum (continued)

[3] WCATS calculates and displays the volume of EV bottoms needed for the rest of the drum using the following equation:

Total EV vol. = Target Vol. / (1 + (NaOH/EV vol. ratio))

* **[4]** The criticality limit for a drum is 200 g SNM.

* **[a]** Following TA55-DOP-016, *TA55 Material Transfer Procedure*, determine the quantity of SNM that is currently present in the destination.

* **[b]** Before physically moving fissile material, check that the transfer will not cause the criticality safety limits to be exceeded in the destination drum. Use the grams Pu listed on the CF Storage Tank Log Sheet (STLS) for each FT for guidance.

[5] From the calculated Total EV volume, subtract the volume of EV used in the NaOH/EV ratio determination.

[a] Vacuum transfer into the glass column the remaining EV needed from the same FT to achieve the Total EV volume needed.

NOTE It may be necessary to transfer this volume of EV bottoms by filling and discharging the column more than once.

[6] Discharge the column contents to the drum following Step **5.4[2]** in this Section.

[7] If the FT empties, record that the tank is empty.

[8] If the FT is not emptied and solution from another FT is required to complete the drum (to reach the total EV volume), clear the discharge line by vacuuming the solution left in the discharge line back into its FT using the following steps:

[a] Ensure that the vent/vacuum ROV is open on this FT.

[b] Close the vent ROV,
AND open the vacuum ROV on the FT trap.

[c] Open the glass column vent valve to vent the glass column in the glovebox.

[d] Check that the drain ROV is open on the receiving FT.

[e] To start the transfer, crack open the manual valve (NAF-GB454-V1) on the line to the FT system at the CF glovebox.

5.4 Transferring EV Bottoms to the Drum (continued)

CAUTION

It is important to close the manual valve (NAF-GB454-V1) as soon as you detect air being pulled into the FT from the discharge line to prevent an excessive amount of air being pulled into the FT and causing an overflow to the trap. You can detect air sparging by feeling the lower part of the FT or by observing sparging through the lower FT sight glass. Have a separate worker feel the FT for sparging so that the manual valve can be closed quickly.

[9] When the line is empty, as shown by air sparging inside the FT, perform the following steps:

[a] Close the manual valve (NAF-GB454-V1) at the CF glovebox.

[b] Close the drain ROV on the FT from which this solution is drawn.

[c] Close the vacuum ROV and open the vent ROV on the FT trap.

[10] To use another FT to reach the total EV Bottoms solution needed in the drum, repeat Sections **5.3** and **5.4** for the next FT.

[11] For each FT used,

[a] Record on Attachment A, *CF Storage Tank Log Sheet* the actual volume out, the date removed, and whether the tank was emptied.

[b] Calculate the volume remaining in the FT, AND enter and initial it on the STLS.

[12] Create the drum on LANMAS.

5.5 Final pH Adjustment in the Drum

WARNING

Hazard: Operating equipment: A high-speed electric mixer is used to adjust the pH of the EV bottoms waste in the drum. Personnel may be injured if contact is made with the spinning mixer.

Controls:

- **Do not have your hands in the rear glovebox gloves when lowering the mixer.**
- **Operate the mixers only after lowering the propellers all the way into the drum.**
- **The top prop on the mixer shaft has a guard ring to reduce the potential for contact with the rotating props.**
- **An emergency stop button is located on the process control console. When activated, the mixer stops and is raised out of the drum.**
- **Two people are always present to observe the process and check on each other.**

[1] Fully lower the mixer into the drum.

CAUTION

Adequately secure the tubing either manually and/or using fittings to prevent the Tygon® tubing from coming off from the discharge valve or out of the drum during a transfer.

[2] Attach a Tygon® tube to the open-ended NaOH line and place the other end in the drum.

WARNING

Hazard: Mechanical hazard: The tubing can become caught in the rotating propeller and be forcibly pulled off the NaOH line.

Controls:

- **Do not allow the NaOH tubing to hang far enough inside the drum to become entangled in the spinning props.**
- **A second person holding the discharge end of the tubing prevents inadvertent entanglement.**

[3] Turn on the mixer to an rpm sufficient to stir the solution.

5.5 Final pH Adjustment in the Drum (continued)

[4] Add NaOH to the drum slowly by manually controlling the NaOH valve while monitoring the pH according to Steps **5.5[5] – 5.5[6]**.

WARNING

Hazard: Radiological contamination & Sharps: The electrode has a glass bulb on its end. If the electrode is struck or falls during use, the bulb may get broken and cut personnel and/or a glove resulting in injury and/or external contamination.

Controls:

- **Handle the electrode carefully to avoid breaking the glass bulb on the end of the electrode.**
- **When handling an electrode with a broken bulb, use caution and protective gloves.**

[5] The pH is monitored by taking the pH of grab samples from the drum. For this task, perform the following steps:

[a] Stop the mixer rotation.

[b] Retrieve a liquid sample from the drum using the long-handled dip cup.

[c] Place the pH electrode in the dip cup,
AND obtain the pH.

[d] Replace the electrode in its soaking beaker.

[e] Pour the liquid from the dip cup back into the drum,
AND set the dip cup aside in a safe place.

[6] As additional pH adjustment is required, restart the mixer, and then resume NaOH addition. Take the pH to the target range of 9.5 – 11.5.

5.5 Final pH Adjustment in the Drum (continued)

WARNING

Hazard: Hazardous chemicals: Concentrated nitric acid may be introduced into the glovebox through a reagent transfer device (RTD). Contact with nitric acid will cause chemical burns.

Controls: Follow the controls contained in TA55-DOP-055, *Reagent Transfer Device.*

NOTE If nitric acid is needed for the following step, when possible use clean or recycled nitric acid from other processes in the glovebox line.

[7] If you overshoot the target pH range, add concentrated nitric acid to adjust the pH by pouring it directly into the drum from the acid container. Use the minimum amount of acid necessary to reach the target range.

[8] Record the final pH and the amount of any acid added.

[9] After all pH adjustment has concluded for the drum, store the electrode in its storage beaker in a safe place.

[10] Observe the solution level in the drum using the volume marks on the inside of the drum liner. Each inch of liner height is equal to 6 liters.

[a] IF the volume is below the target volume,
THEN add sufficient industrial water directly to the drum to reach the target volume.

[b] IF the solution level is more than 6 liters above the target volume,
THEN notify your supervisor before proceeding. It may be necessary to remove pH-adjusted EV bottoms to obtain the desired volume or adjust the amount of cement that will be added.

[11] Proceed to PMT2-DOP-CF-007, *Cement Addition Operations for Cement Fixation* for adding cement to the drum.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not applicable

6.2 Restoration

Not applicable

6.3 Results

[1] Record information for the item and the drum in the CF logbook, WCATS, STLS, and Run Sheet as needed.

6.4 Independent Verification

Not applicable

6.5 Records Processing

[1] See Section 11.0 Records

7.0 EMERGENCY ACTIONS

[1] If a site emergency develops, follow TA55-AP-018, *TA-55 Emergency Procedures*.

[2] No actions will be taken in response to an emergency beyond those prescribed in TA55-PLAN-007, *TA-55 Facility Emergency Plan*. They involve evacuating the area and calling the OC (55-911), then Emergency 911.

[3] In case of physical injury, call the OC at 55-911 or 7-3330 and request the Emergency Response Team.

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
*	When located in far left hand margin identifies steps that are criticality safety significance.
ALARA	as low as reasonably achievable
Be	Beryllium
CCP	Central Characterization Project
CF	cement fixation
CFR	code of federal regulations
CSLA	criticality safety limit approval
DOE	Department of Energy
DOP	detailed operating procedure
EV	evaporator
FLM	first line manager

8.0 Definitions and Acronyms, (continued)

Term	Definition
FOD	facility operations director
FT	feed tank
HAZWOPER	hazardous waste operations
HSWA	Hazardous and Solid Waste Amendments
ISI	In-Service Inspection
LANMAS	Los Alamos Nuclear Material Accountability System
MSDS	material safety data sheet
NaOH	sodium hydroxide
NIST	National Institute of Standards and Technology
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act
OC	operations center
PAFD	Process Accountability Flow Diagram
PPE	personal protective equipment
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
ROV	remotely operated valve
RTD	reagent transfer device
RWP	radiological work permit
SNM	special nuclear material
STLS	storage tank log sheet
TID	tamper-indicating device
TRU	transuranic
TSD	treatment, storage and disposal
TSR	technical safety requirement
WAC	Waste Acceptance Criteria
WCATS	waste management system
WIPP	Waste Isolation Pilot Plant

9.0 RESPONSIBILITIES

Not Applicable

10.0 REFERENCES

Document Number	Title
	LANL Nuclear Material Control and Accountability Procedural Handbook
	CF Process Accountability Flow Diagram (PAFD)
10 CFR 830	*Code of Federal Regulations - Nuclear Safety Management Assurance*
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
49 CFR 173.465	*Code of Federal Regulations - Transportation---Type A Packaging Tests*
CCP-QP-016	*CCP Control of Measuring, Testing, and Data Collection Equipment*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
NCS-CSLA-10-061	*FT Tanks at Location CF*
NCS-CSLA-10-062	*Cementation Glovebox GB454*
P409	*Waste Management*
PMT2-DOP-CF-006-FM1	*CF Storage Tank Log Sheet*
PMT2-DOP-CF-006-FM2	*Cement Run Sheet*
PMT2-DOP-CF-007	*Cement Addition Operations for Cement Fixation*
PMT2-DOP-CF-009	*Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*
TA55-AP-018	*TA-55 Emergency Procedures*
TA55-DOP-001	*Pre-Job Briefing and Post-Job Review*
TA55-DOP-016	*TA55 Material Transfer Procedure*
TA55-DOP-055	*Reagent Transfer Device*
TA55-PLAN-007	*TA-55 Facility Emergency Plan*
TA55-PLAN-046	*Quality Management Plan (QMP)*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*
TA55-RD-585	*Nuclear Materials Control and Accountability Requirements*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
CF Logbook	Written process data record	Records shall be maintained at the CF process location.	When the records are ready for final disposition, the record is transferred to Records Management in accordance with procedure.
Attachment A, *CF Storage Tank Log Sheet*			
Attachment B, *Cement Run Sheet*			
Attachment C, *Performance Checklist*	Training record	Filed with training specialist	

12.0 APPENDICES AND ATTACHMENTS

Attachment	Title
A	CF Storage Tank Log Sheet
B	Cement Run Sheet
C	Performance Checklist

Attachment A, CF Storage Tank Log Sheet

SITE ID: 481

CF Storage Tank Log Sheet

LOCATION: 401

TANK #_____

Effective Date: _____

EPA WASTE NUMBERS: D002, D006, D007, D008, D009 **HANDLING CODE: S02**

ITEM IN					*BLENDED ITEM*							
Date In	Item ID	MT	Volume	Tech	Item ID	Pu SNM & UNC*	Am SNM & UNC	Initial Volume	Actual Volume to Drum	Remaining Volume	Date Out	Tech

*UNC = uncertainty

RCRA Part A Unit Capacity: 460 Gallons *CF Storage Tank Log Sheet-FM1*

PMT2-DOP-CF-006-FM1-R0

Attachment B, Cement Run Sheet

CEMENT RUN SHEET

Date_____ Workers_____ Drum #_____

Tare_____ Filter_____ Scale_____

TK to FT Transfer

TK___ to FTx_____ Vol_____ TK___ to FTy_____ Vol_____

Other waste ID#_____ Gross_____ Tare_____ Net_____

pH probe #____

7 Lot # _____ 10 Lot # _____

7 Exp date _____ 10 Exp date_____

Titration 1

___L EV + total volume with NaOH _____ pH_____

Vol of NaOH_____ NaOH/EV ratio _____

Remainder FTx to drum_____ Total FTx to drum_____

Pu_____ Am_____

Titration 2

_____L EV + total volume with NaOH _____ pH_____

Vol of NaOH_____ NaOH/EV ratio _____

Remainder FTy to drum_____ Total FTy to drum_____

Pu_____ Am_____

Drum pH adjust Final pH in drum_____

Cement

Starting vol_____ Starting wt_____

Cement wanted: actual vol (L) x ____ kg/L x 2.2 lb/kg = _____lbs

Expected final weight_____

Timer: cement wanted lbs/___ lbs/min= _____ min

Additional time needed_____ Final weight_____

PMT2-DOP-CF-006-FM2-R0

Attachment C, Performance Checklist

Page 1 of 2

Course:	**Session:**

Procedure No.: PMT2-DOP-CF-006,R1 Title: pH Adjustment of Evaporator Bottoms for Cement Fixation

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following qualification prerequisites

_____
(Verifier's name and Z number)

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

Qualification Requirements

Task #	Emergency Actions	Instruction	Evaluation
1	Discuss what to do in case of an emergency.	☐	☐
	Comments		
Task #	**Hazards and Controls**	**Instruction**	**Evaluation**
1	Describe the hazard associated with nuclear criticality and how to minimize it.	☐	☐
2	Describe the hazard associated with ionizing radiation and how to minimize it.	☐	☐
3	Describe the hazard associated with alpha contamination and how to minimize it.	☐	☐
4	Describe the hazard associated with air pressure and how to minimize it.	☐	☐
5	Describe the hazard associated with operating equipment and how to minimize it.	☐	☐
6	Describe the hazard associated with dangerous chemicals and how to minimize it.	☐	☐
7	Describe the hazard associated with working on elevated platforms and how to minimize it.	☐	☐
	Comments		

Attachment C, Performance Checklist

Page 2 of 2

Task #	Procedural Steps	Instruction	Evaluation
1	Discuss logging and inspecting the pH probe.	☐	☐
2	Discuss and/or demonstrate how to calibrate the pH probe to the pH 7 and pH 10 buffer solutions.	☐	☐
3	Discuss the difference between the first batch from a tank and any other batch from a tank.	☐	☐
4	Discuss the transfer of EV Bottoms solution to the glass column and drum.	☐	☐
5	Discuss adjusting and documenting the pH of a representative sample.	☐	☐
6	Discuss how to clear the lines and document the volumes on the STLS.	☐	☐
7	Discuss how to adjust the final pH in the drum.	☐	☐
	Comments		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 6

PMT2-DOP-CF-007, R3 Cement Addition Operations for Cement Fixation

ENV-DO-14-0145

LA-UR-14-24625

Date: JUL 0 2 2014

Extended Until 6/24/15 per Memo MET-DO:13-08. Extension request was approved by Jeff Yarbrough on 06/24/13.

PMT-2

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-007,R3

Effective date: 06/08/12

Next review date: 06/08/14

Supersedes:

Title: Cement Addition Operations for Cement Fixation

Status:	**Hazard:**	**For Document Control Use Only:**
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☒ Use every Time (Attachments A, only)	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Approved for Use By:			
SME: Thomas Ricketts	NCO-2	5/22/12	SIGNATURE ON FILE
SME: Georgette Ayers	NCO-2	5/22/12	SIGNATURE ON FILE
Authorized for Use By:			
SME Responsible Line Manager: Richard Mason	NCO-2	5/22/12	SIGNATURE ON FILE
Authorized for Use By:			
FOD/Operations Manager: Chuck Tesch	TA55-OPS	5/22/12	SIGNATURE ON FILE

Approved by:

	Organization	Date	Signature
Approved for Use By:			
Product Engineer	MET-1	5/22/12	SIGNATURE ON FILE
Authorized for Use By:			
Group Leader	MET-1	5/22/12	SIGNATURE ON FILE

Approved by:

Design Agency Liaison: ***Date***	***Process Owner:*** ***Date***
Quality Assurance: ***Date***	***SME:*** ***Date***

☒ Unclassified ☐ Restricted Data ☐ Confidential ☐ Formerly Restricted Data ☐ Secret ☐ National Security Information ☐ Unclassified Controlled Nuclear Information ☐ Official Use Only	**Derivative Classifier:** **Name: SIGNATURE ON FILE** **Title: MET-1 FLM Date: 5/23/12** **Derived from: CG-SS-4, change 6; 9/2000, DOE OC**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-007,R3	06/08/12	Major revision	• Added A $ next to step 6 in Appendix A. • Documented the SR 4.1.3.5 in Appendix A. • Deleted need for electrician in NOTE 2 of Appendix A. • Added a location to document the time cement is in the silo in Attachment A. • Added PMT2-DOP-CF-009, LANL course 12985, and Plan 256 to Attachment C.
PMT2-DOP-CF-007,R2	Approved never effective	Major Revision	• Revised the TSR controls to comply with the 2011 TSRs
PMT2-DOP-CF-007,R1	9/13/11	Major Revision	• Reformatted to latest DOP template format. • Removed attachments on MASS instructions, PAFD and CSLA. • Replaced MASS with LANMAS and WMS with WCATS. • Added cement silo fill operation
PMT2-DOP-CF-007,R0	12/1/10		Periodic Review No Revision
PMT2-DOP-CF-007,R0	12/18/2008	New Procedure	• Reformatted to IMP 300. • Combined NMT2-WI-009-CF-003 and NMT2-WI-009-CF-915. • Incorporated FOD and RP-1 safety recommendations. • Supersedes NMT2-WI-009-CF-903,R1, NMT2-IWD-WI-009-CF-903,R2, NMT2-WI-009-CF-915,R3. NMT2-WI-009-CF-915,R2.
NMT2-WI-009-CF-915,R3	03/19/07	Major Revision	• Removed steps, hazards and controls associated with internal lead shielding. • Added information about use of temporary shielding.
NMT2-WI-009-CF-903,R1	10/13/06		Periodic Review No Revision
NMT2-WI-009-CF-903,R1	07/14/06	Second Extension	

Revision History (continued)

Document Number	Effective Date	Action	Description
NMT2-WI-009-CF-903,R1	04/13/06	Extension	
NMT2-WI-009-CF-915, R2	01/24/06	Major Revision	• Add drum weight restriction from results of drop tests to comply with U.S. DOT Type A container requirements. • Revised and reformatted to conform to new WI template.
NMT2-WI-009-CF-915, R1	05/20/04	Major Revision	Reformatting, title change, and combining NMT2-WI-009-CF-910 with NMT2-WI-009-CF-915.
NMT2-WI-009-CF-903,R1	04/13/04	Major revision	• Revised and reformatted to conform to the new WI template. • Extensive revisions to the procedural steps. • Revised the hazards table to reflect changes to the HCP.
NMT2-WI-009-CF-915, R0	02/20/02	New	• Transferred from NMT-7 • Supersedes NMT7-WI9-SOP-TA55-DP-04.
NMT2-WI-009-CF-903,R0		New	• Transferred from NMT-7. • Supersedes NMT7-WI4-SOP-TA55-DP-04.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This Detailed Operating Procedure (DOP) describes how Portland cement powder is transferred and added to the waste drum in order to immobilize Transuranic (TRU) waste for disposal at the Waste Isolation Pilot Plant (WIPP). The cement powder is stored outside PF-4 in a silo. The cement is transferred via screw feeder from the silo into a dayhopper (DH) inside PF-4. The cement is then transferred into the glovebox and drum via the Glovebox Screw Feeder (GSF). This DOP also describes how to add cement powder to the cement silo such that the surface level is not above the ¼ of capacity level of the silo.

1.2 Scope and Applicability

This DOP is performed at TA-55, PF-4, Room 401, PF-53 Cement Silo, locations CF and FL01 by NCO-2 workers assigned to the Cement Fixation (CF) process.

This procedure can be performed in Mode 1 or Mode 2.

1.3 Applicability

This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled TRU waste.

The CF process and this procedure are subject to quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan (QMP)* and 10 CFR 830, *Nuclear Safety Management Assurance.*

This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, *CCP Control of Measuring, Testing, and Data Collection Equipment.*

This procedure is intended to produce a cemented waste form that meets the Resource Conservation and Recovery Act (RCRA), definition of a non-mixed waste as defined by 40 CFR, Parts 260 through 273, *Solid Waste*, as amended by the Hazardous and Solid waste Amendments (HSWA). Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act (NMHWA). This statute is implemented by the regulations contained in Title 20 New Mexico Hazardous Waste Management Regulations, as amended. The NMED is also authorized to regulate the hazardous component of mixed waste in lieu of the federal program.

To prevent damage to the cement drum package due to a drop during transport, cement drums are produced to meet the Type A DOT container testing criteria in 49 CFR 173.465. The gross weight shall not exceed the weight at which a mock-up cement drum has been satisfactorily drop tested. A gross weight of 852 lbs was established as the maximum weight through drop tests at Los Alamos National Laboratory that were conducted according to 49 CFR 173.465*, Transportation---Type A Packaging Tests* as reported in LANL memorandum NMT-14: 05-037, *Request for Removal of TA-55 Compensatory Measures from Type A Transuranic (TRU) Waste Containers PISA*, April 29, 2005.

1.4 Technical Safety Requirements

NOTE The amount of cement in the cement silo shall be limited to less than or equal to ¼ of the silo capacity at all times for conservatism.

LCO: CONFINEMENT INTEGRITY SHALL exist and the amount of cement in the PF-53 cement silo SHALL be ≤ ½ of silo capacity.

SR 4.1.3.5: VERIFY that the PF-53 cement silo level is ≤ ½ of silo capacity.

Frequency: Within 4 hours of adding cement to the PF-53 cement silo

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

If this procedure cannot be completed as written or abnormal conditions are encountered, STOP, place the work in a safe configuration if possible, and notify the Operations Center (OC) and First Line Manager (FLM).

B. Hazards and Controls

Hazards and controls that are associated with this DOP are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Nuclear Criticality Accident: An inadvertent self-sustaining or divergent chain reaction that may release large amounts of neutron and gamma radiation causing serious injury or death.	• Process specific controls (administrative requirements and engineered features) are detailed on the applicable Criticality Safety Limit Approvals (CSLA) associated with this operation. See Section 10.0, References, for a listing of the applicable CSLA(s).

B. Hazards and Controls (continued)

Hazard	Controls
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555. • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personnel protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.
Sharps: Potential sharps/burrs may be encountered in unexpected locations contact with which could result in a skin injury and/or glove puncture and contamination release.	• Workers should use caution. • Workers should visually survey the work area for potential sharps prior to working. • Workers should be aware of changing conditions that could result in the creation of a sharp.
Beryllium (Be) Hazard: • Cement drums containing waste from the Pu-Be program can contain trace amounts of Be. Some drums contain Be in the cemented waste matrix. Respirable Be is a carcinogen and is also known to cause a serious, chronic lung disease called Chronic Beryllium disease. • The presence of Be can also result in elevated dose rates, although this effect is usually only considered a problem when the Be is in solution form.	• Be in EV bottoms solution is not in a respirable form. • The engineered structures (gloveboxes) and PPE used to control radiological hazards in PF-4 (coveralls, safety glasses, gloves and booties) is sufficient for Be hazards. • Additional shielding is used if the RCT determines an elevated dose rate is present.

B. Hazards and Controls (continued)

Hazard	Controls
Hazardous chemicals: • Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (glovebox, gloves, etc.) is breached or if transfer lines leak. • Many of the wastes processed in the CF glovebox contain corrosive (acid) and toxic (heavy metals) materials.	The controls provided by TA55-RD-555, *TA-55 Radiation Protection Requirements,* are effective in preventing exposure to hazardous chemicals. To minimize the hazards from dangerous chemicals: • Eye wash and shower are located within 100 feet of the glovebox. • Experienced and trained personnel make use of Material Safety Data Sheets (MSDS) to acquaint themselves with chemicals they are handling. • Wear PPE (chemical resistant gloves, safety glasses, safety shoes, face shield, apron, etc.) appropriate to the material being handled. • Engineered containment (gloveboxes, pipes). • Frequent inspections of the TSD area keep PMT-2 personnel abreast of changing conditions. • During walk-arounds, watch for evidence of leaks. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Observe barriers in hazardous waste areas. • Follow guidelines in TA55-RD-539, *TA-55 Waste Management Requirements* and LIR 404-00-03.1, *Hazardous and Mixed Waste Requirements.* • Formal hazardous waste training is mandatory.
Ladder Hazard:	• Personnel climbing ladders are required to have current LANL course 12985 “Ladder Safety” training.
Regulated Waste: This work takes place within the Treatment, Storage, and Disposal (TSD) unit. A TSD unit is a permitted or interim status hazardous waste management unit where hazardous or mixed waste regulated by the Resource Conservation and Recovery Act (RCRA) may be stored or treated before disposal.	• The CF Process operates as a TSD unit and must comply with New Mexico State-regulated requirements for operation and inspection. Requirements include inspections to ensure safe operation. The inspection procedure is found in PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*. • Manage waste in compliance with regulations. Specific waste controls are available at http://swrc.lanl.gov/pdffiles/iwmWasteControls.pdf. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training • During walk-arounds, watch for evidence of leaks. • pH adjustment and/or cementation removes the characteristics of corrosivity and toxicity from the waste being treated.

B. Hazards and Controls (continued)

Hazard	Controls
Ergonomics: Awkward, reaching and static positions are encountered.	• Use caution. • Ask for assistance if necessary. • Take breaks.
Elevated workspace: The operator works on an elevated stand to operate glovebox equipment. The stand is secured to the glovebox with a pin/hole arrangement that allows the platform to be removed for access to the drum during drum-out. There is also an elevated walkway behind the glovebox. • When entering or leaving the elevated work surface, workers may fall or stumble. • If detached from the glovebox, the stand may roll away from the glovebox while workers are on it. • The elevated walkway behind the presents a tripping hazard.	• Before climbing onto the rollable elevated work stand, attach it to the glovebox stand. • Signs are posted to alert personnel to the tripping hazard. • When in elevated areas, personnel should use appropriate caution.

C. Unique Entry Conditions

Not Applicable

D. Sequence of Steps

The steps in the Performance section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

The CSLA requirements are detailed in documents NCS-CSLA-10-062 below.

NCS-CSLA-10-062 *Cementation Glovebox G454*

Administrative Requirements	
Pu in solution/cemented waste/particulate	≤520 grams Pu total. No more than 200 grams Pu per drum

2.1 General (continued)

F. Required Permits

New Mexico Environmental Division (NMED) Permit to operate as a TSD unit.

G. Training and/or Qualifications

- Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on Attachment C, *Performance Checklist*.
- Personnel climbing ladders are required to have current LANL course 12985 "Ladder Safety" training.

H. Cautions

Not applicable

I. Material Control and Accountability

This procedure complies with the *LANL Nuclear Material Control and Accountability Procedural Handbook* and TA55-RD-585, *Nuclear Materials Control and Accountability Requirements.* Receipt or shipment of material is accompanied by appropriate Los Alamos Nuclear Material Accountability System (LANMAS) transactions and manifests.

Because the drum is attached to the GB system, to prevent any unauthorized personnel from diverting nuclear material out through a cemented drum, the process operation also requires the following:

- If the cementation GB is unattended, it is locked. Only the CF and EV operations have keyed access to DB-424 in PF-4. The CF GB has a combination lock(s), the combination to which is known only by CF personnel.
- When the CF process is running, two personnel must be present.

2.2 Additional Requirements and Conditions (WR Use)

Not applicable.

3.0 PREREQUISITE ACTION

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with TA55-DOP-001, *Pre-Job Briefing and Post Job Review.*

[2] Obtain permission from the Operations Center [TA55], if applicable, before conducting a Technical Safety Requirement (TSR) Surveillance Requirement (SR) or In-Service Inspection (ISI).

[3] Schedule the work with the Facility Operations Director (FOD) organization.

[4] Ensure that tool, equipment, and material numbers in the work area match those specified (see sub-section 3.3).

[5] Preventive Maintenance.

[a] The following equipment should be checked for proper operability or replaced once per year and the results recorded in the logbook.

- Pressure Relief Valve (PRV) on pH adjustment glass column (replace)
- Panic button (see below in Section 7 for description)

[b] The operability of the high-level detector in the DH is verified each time the DH is filled by successful stopping of cement delivery when the detector is reached.

[6] Cement Procurement.

The cement fixation process SME does the ordering of the cement. Order cement from the appropriate vendor for bulk delivery after the cement level is within the cone of the silo, but before the silo is empty. No more than 4 tons of cement should be ordered after the cement in the silo reaches the silo cone.

Perform Appendix A for filling the PF-53 Cement Silo and record level of cement silo on Attachment A. Attachment A shall be turned into the Operations Center.

3.2 Performance Documents

Not Applicable

3.3 Special Tools, Equipment, Parts, and Supplies

- screen scoop
- bag to contain hopper cleanout material
- polypropylene cloths
- tools for cleanup (ex. spatula and wire brush)
- cement accelerator or additive as needed
- watch or clock
- tape measure
- flashlight

3.4 Field Preparation

- pH of waste must be within 9.5 – 11.5 prior to cement addition.
- All wastes must be in the drum and ready for cementation.
- Emergency stop button must be in the OUT position.
- The area in front of the PF-53 cement silo must be clear to allow for the delivery of cement.

3.5 Approvals and Notifications

Not Applicable

4.0 ACCEPTANCE CRITERIA

NOTE The amount of cement in the cement silo shall be limited to less than or equal to ¼ of the silo capacity at all times for conservatism.

$ **SR 4.1.3.5**: VERIFY that the PF-53 cement silo level is ≤ ½ of silo capacity.

Frequency: Within 4 hours of adding cement to the PF-53 cement silo

Ensure the PF-53 cement silo is not filled to greater than ¼ of the silo capacity (the measurement from the low side of the port to the top of the cement level inside the silo shall be ≥ 177 inches). This acceptance criteria is met in Attachment A, *Filling the PF-53 Cement Silo Acceptance Sheet*.

5.0 PERFORMANCE

5.1 Checking the Dayhopper Screen

NOTE 1 The DH is equipped with a screen over the discharge port to prevent large chunks of hardened cement from entering the GSF (formally called the Accu-Rate® system) and causing damage or becoming plugged.

NOTE 2 The screen does not need to be checked each time the DH is filled. The screen is to be checked periodically and any time cement does not discharge properly.

NOTE 3 The screen is located in the lowest part of the DH over the discharge port. Therefore, it is most easily accessed when the cement level in the DH is low.

WARNING

Hazard: Elevated work surface: The worker uses an elevated platform to access the DH that poses the following hazards:

- **Tripping and falling hazard.**
- **Overhead obstructions with limited head room.**
- **Tools left on the platform grating may fall on those below.**

Controls:

- **Hand rails and a door on the platform provide protection from falling.**
- **Clear workers out from under the platform.**
- **Personnel should use appropriate caution when in these areas.**

[1] Remove bolt-on window on the lid of the DH.

[2] Have the RCT check inside the DH for contamination.

5.1 Checking the Dayhopper Screen (continued)

WARNING 1

Hazard: **Radiological contamination: Opening the DH for inspection can expose workers to radiological contamination.**

Control: **Before workers enter the DH, an RCT must monitor the inside of the hopper for contamination. The RCT may require that the room is red-lit during this inspection.**

WARNING 2

Hazard: **Hazardous chemicals:**

- **Portland cement may contain substances that are hazardous if inhaled.**
- **Airborne cement dust can dry out tissue if contacting skin or inhaled into the lungs.**

Controls:

- **Wear full-face respirator with P-100 cartridges when opening the DH and exposing self to cement dust while on the elevated platform next to the DH.**
- **When the DH is closed, the engineered barrier of the DH and cement delivery system protects the worker against exposure.**

[3] If necessary, move the cement to access the screen.

[4] Use the screen scoop to remove any chunks of cement or foreign material, AND discard them in a bag.

[5] Dispose of the bag in a yellow-top trash can.

[6] Record screen cleaning in the logbook, AND describe what was found.

5.2 Filling the Dayhopper with Cement

CAUTION 1

Operating equipment: It is possible for foreign objects to become lodged in the screw conveyer systems. Immediately turn off the screw feeder if it makes any noises that suggest that something is caught in it and contact the supervisor.

CAUTION 2

In the following step, if the open-status lights for the knife gate valves do no stay lit after opening the valves, the valves did not fully open. Due to electronic interlocks in the cement delivery system, the DH filling operation may not start. Contact your supervisor. Electrical or mechanical trouble-shooting may be necessary.

NOTE The lights stay on when the knife gates are fully open.

[1] To begin filling the DH with cement from the silo, open knife gate valves A (KGA) and B (KGB) by pushing their open buttons on the control panel.

[2] Press the RESET button,
AND verify that the RESET light is then off.

[3] Before starting to fill the hopper, make sure that the following conditions exist:

- DH high-level light #1 is off
- RESET button light is off
- flexible spool is in (SPOOL IN light is on)
- drum is not being filled with cement
- silo is not being filled with cement

NOTE When the START button is pressed, the silo vibrator, rotary air lock valve (RA), and silo screw feeder (SSF) start running.

[4] Press the START button to start filling the hopper.

5.2 Filling the Dayhopper with Cement (continued)

CAUTION

Normal current readings are 2.0 to 4.0 amps for the SSF and 1.0 to 3.0 amps for the RA. If the current registers above or below the normal levels on the SSF or RA gauges, turn off the equipment by pressing the STOP button. Notify your supervisor.

[5] Verify that the SSF and the RA are running by observing a reading on the amperage gauges.

CAUTION

If the high level detector fails to detect the cement, the DH filling operation will not stop, which can lead to a compaction of cement in the SSF and DH. Observe the filling operation to completion. If the high level detector fails to detect the high level, immediately press the STOP button on the control panel.

NOTE The level will be above the window shortly before the high-level detector is reached.

[6] Use the side window on the DH to see the cement level.

[7] When cement contacts the DH #1 high-level detector, the following occur:

- The operation stops.
- The KGA and KGB valves automatically close.
- The DH #1 high-level light illuminates.

5.3 Performing the Cementation

NOTE 1 If an additive such as a set accelerator or retarder is required, your supervisor will determine what it is and when to add it.

NOTE 2 The weight of the drum lid and lid ring will be needed in Step **5.3[12]** for estimating the gross weight of drum after drum-out/closure to make certain that it does not exceed the 852-lb limit for a DOT Type A container.

[1] Obtain the weight of the drum lid and lid ring.

NOTE 1 WCATS is to be used to keep track of the cementation activities including visual volume (liters) and the weight (lbs) of the drum.

NOTE 2 Attachment B, *Cement Run Sheet* may be used to record information for later transcribing into WCATS.

NOTE 3 WCATS will use the following weight to calculate the final amount of cement added in Step **5.3[14]**.

[2] Enter the drum weight (without lid and ring) in WCATS as the initial weight.

[3] Enter the volume of liquid in the drum using the volume markings on the liner,
AND add water as necessary to reach the target volume, which is pre-determined by your supervisor.

NOTE The desired cement weight for this drum is determined by the cement-to-liquid ratio (pre-set in WCATS by your supervisor) and the liquid volume. WCATS calculates the cement add time by dividing the desired weight of cement for this drum by the Glovebox Screw Feeder (GSF) cement discharge rate for the previous drum.

$$\text{Cement}_{(lb)} = \text{Cement-to-liquid ratio}_{(Kg/L)} \times \text{Liquid volume}_{(L)} \times 2.2_{(lb/Kg)}$$

$$\text{GSF Time}_{(min)} = \text{Cement}_{(lb)} / \text{GSF discharge rate}_{(lb/min)}$$

[4] Set the timer on the GSF to the cement add time calculated or indicated on WCATS.

[a] Make sure that the GSF Feed Rate is set at 999 and the Agitation Rate is set at 650.

[5] Place the cement discharge tube inside the drum.

[6] Fully lower the mixer into the drum.

5.3 Performing the Cementation (continued)

WARNING

Hazard: Radiological contamination and Operating equipment: Contact with the rotating mixer can cause injury or pinch glove material if the worker contacts to mixer props.

Controls:
- **The top stirrer propeller has a guard around its perimeter.**
- **Avoid rotating the mixer while hands are in the mixer workstation and avoid having your hands in the glovebox when the mixers are rotating.**
- **Stop rotation of mixer before raising the mixer props to within reaching distance.**
- **Operate the mixers only after lowering the propellers all the way into the drum.**
- **An emergency stop button stops and raises the mixers when pushed in.**

[7] Turn on the mixer,
AND adjust the speed to an rpm adequate to generate thorough mixing without splashing.

CAUTION

Mechanical: The GSF could be damaged if a foreign object enters it.

- **Turn off the GSF if any noises indicate an obstruction and contact the supervisor.**
- **When pushed, the emergency stop button causes the GSF to the drum to stop, and the butterfly valve located between the DH and GSF to close.**

NOTE The cement delivery system will not operate unless the following conditions are satisfied.

[8] On the mobile control rack, ensure the emergency stop button is in the OUT position and the scale switch is in the ON position.

NOTE The following step will allow cement delivery to be started from the GSF control panel.

[9] Ensure the switch on the GSF control panel is OFF and the cement discharge switch located between the two front workstations is ON.

5.3 Performing the Cementation (continued)

WARNING

Hazard: Radiological contamination: The cement powder in the DH and GSF provide a barrier to back contamination. If the DH or GSF becomes empty, it presents a path for contamination upstream.

Controls: Low-level detectors in the DH and GSF ensure proper cement level is maintained. If a low level is detected in either location, cement delivery stops and the BF valve closes.

- **If the DH low-level detector is reached, refill the DH with cement powder from the silo.**
- **If the GSF low-level detector is reached, this indicates a blockage between the GSF and DH. Stop work and call your supervisor.**

NOTE The following step simultaneously starts the DH vibrator, opens the butterfly (BF) valve, and starts the agitation and screw rotation in the GSF.

[10] To start cement delivery to the drum, press the ON switch at the GSF panel, AND immediately press the Reset button on the panel to reset the timer display.

[11] As more cement is added, gradually turn the mixer speed up, but only to the minimum necessary to keep the cement powder mixed in quickly, AND ensure good center-to-edge mixing.

[a] Do not let cement powder pile up on the surface.

CAUTION

The drum will not meet the DOT shipping requirements if the weight of the drum and contents exceed 852 lbs. Stop cement addition if the estimate approaches 852 lbs.

NOTE The scale weight taken during mixing will be high because of the downward force on the scale from mixing.

[12] As cement addition and mixing continues, estimate drum gross weight drum by adding the combined weight of the lid and lid ring obtained in Step **5.3[1]** to the weight indicated on the scale display.

5.3 Performing the Cementation (continued)

WARNING

Hazard: Radiological contamination and Operating equipment: Attempting to scrape off caked-up cement or particulate on the inside of the liner with an extension tool can lead to contact with the rotating mixer and subsequent glove breach and physical injury.

Control: When mixing, never attempt to scrape cement build-up from the inside of the liner. Stop the mixer first, and then use a long-handled scraper to dislodge the cement.

[13] Continue cement addition until the timer reaches 0.0. However, mixing and/or cement addition should be stopped sooner for the following conditions.

[a] IF the discharge rate of the cement begins to exceed the ability of the mixer at 100% rpm to adequately mix in the cement powder,
THEN before center-to-edge mixing is lost, stop adding cement by pressing stop button,
AND continue mixing at 100%.

1. IF the mixture does NOT thin out enough to restart cement addition within 30 seconds,
THEN proceed to Step **5.3[20]** to conclude the drum.

2. IF the mixture thins out within 30 seconds,
THEN restart the cement addition.
AND repeat this step until the mixture does not thin out within 30 seconds or the timer reaches 0.0.

[b] IF the cement reaches the 3-in. mark below liner lip,
THEN stop cement addition.

[c] IF the cement appears to be hardening quickly,
THEN stop cement addition and mixing,
AND raise the mixer immediately.

[d] IF, using the guidance in Step **5.3[12]**, you determine that the gross weight of the drum is approaching the 852-lb limit,
THEN stop cement addition.

5.3 Performing the Cementation (continued)

NOTE If the current needed to power the mixer exceeds a preset level (~12 to 14 amps) the mixer shuts off automatically.

[e] IF the cement becomes so thick that the current needed to power the mixer exceeds a preset level (~12 to 14 amps),
THEN

1. Stop cement addition.

2. Raise the mixer.

3. Do NOT restart mixing.

WARNING

Hazard: Operating equipment: If a worker's hands are in the rear gloves of the glovebox when the mixer is raised, this can pose a risk of personal injury or glove damage.

Control: When raising the mixer, make sure no one has their hands in the rear glovebox gloves.

NOTE WCATS calculates how much cement was added and if it was within the acceptable range of cement needed for the liquid volume to achieve the target cement-to-liquid ratio.

[14] Enter the drum weight in WCATS.

[15] Use the following guidance depending on the cement weight:

[a] IF the cement is within or above the acceptable range (indicated by no warning notice),
THEN proceed to Step **5.3[16]** to restart mixing.

5.3 Performing the Cementation (continued)

NOTE 1 A low cement weight may be due to a blockage causing a decrease in the GSF discharge rate. The WCATS calculates the next drum's cement discharge rate (add time) from this drum's cement weight vs. add time. To compensate for the reduced rate in the next drum, the WCATS will increase the add time to obtain the required cement weight. If a blockage is found and remedied prior to the next drum, this increased add time will not be valid. Consult your supervisor before the next drum in order to make the appropriate changes to the add time.

NOTE 2 WCATS displays the added cement time needed in the additional cement add time field.

[b] IF the cement is below the acceptable range, a warning is displayed on WCATS that additional cement is required,
THEN perform the following steps:

1. Set the timer for the GSF to the additional time indicated,
AND restart mixing and cement addition, following Steps **5.3[7]** – **5.3[13]**. Allow the GSF timer to time out.

2. WHEN the GSF time times out,
THEN stop and raise the mixer.

3. Enter the new weight in WCATS.

[16] Restart mixing,
AND continue mixing for 4 minutes at maximum speed without splashing.

[17] Record the mix time in WCATS,
AND indicate if accelerator or other additive was added.

[18] Indicate on WCATS that cementation has been completed.

[19] After mixing is complete, raise the props.

5.3 Performing the Cementation (continued)

WARNING

Hazard: Sharps: Potential sharps/burrs may be encountered in unexpected locations contact with which could result in a skin injury and/or glove puncture and contamination release.

Controls:
- **Workers should use caution.**
- **Workers should visually survey the work area for potential sharps prior to working.**
- **Workers should be aware of changing conditions that could result in the creation of a sharp.**

NOTE A small amount of water may be used for rinsing.

[20] Using an appropriate cleaning tool, clean off the mixer props into the drum.

[a] Clean the area of cement dust using the cloths.

[b] Clean the tools used for cleaning.

NOTE Usually the drum is left to harden at least overnight before drum-out.

[21] Do NOT drum-out the drum until the cement has set (hardened) and free liquid has been absorbed. (See PMT2-DOP-CF-002, *Drum-in/Drum-out Operations for Cement Fixation*.)

[22] Perform the necessary LANMAS transactions.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not applicable

6.2 Restoration

Not applicable

6.3 Results

[1] Record information for the item and the drum in the CF logbook and in WCATS.

6.4 Independent Verification

Not applicable

6.5 Records Processing

[1] See Section 11.0 Records

7.0 EMERGENCY ACTIONS

[1] If a site emergency develops, follow TA55-AP-018, *TA-55 Emergency Procedures.*

[2] No actions will be taken in response to an emergency beyond those prescribed in TA55-PLAN-007, *TA-55 Facility Emergency Plan*. They involve evacuating the area and calling the OC (55-911), then Emergency 911.

[3] In case of physical injury, call the OC at 55-911 or 7-3330 and request the Emergency Response Team.

[4] A *panic button* (emergency stop button) on the control rack shuts down the system safely. This device is used whenever a system upset or hazardous condition arises and in the event of an evacuation. When this button is pushed, the mixers stop and raise out of the drum, the butterfly valve closes, and the cement delivery to the glovebox stops.

[5] The proper functioning of the emergency stop button should be verified once per year and the results recorded in the logbook.

[6] If you must stop mixing or delivering cement because of an emergency or having to vacate the area, push the emergency stop button. **If you cannot do this quickly and get out of the area, do not endanger anyone by taking time to push the button.**

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
$	When located in far left hand margin identifies steps that implement Technical Safety Requirements.
*****	When located in far left hand margin identifies steps that are criticality safety significance.
ALARA	As Low As Reasonably Achievable
Be	Beryllium
BF	Butterfly (valve)
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CSLA	Criticality Safety Limit Approval
DH	Dayhopper
DOP	Detailed Operating Procedure
DOT	U.S. Department of Transportation
EV	Evaporator
FLM	First Line Manager
FOD	Facility Operations Director
GSF	Glovebox Screw Feeder
HSWA	Hazardous and Solid Waste Amendments
ISI	In-Service Inspection
KGA	Knife Gate Valve A
KGB	Knife Gate Valve B
LANL	Los Alamos National Laboratory
LANMAS	Los Alamos Nuclear Material Accountability System
MSDS	Material Safety Data Sheet
NMED	New Mexico Environmental Division
NMHWA	New Mexico Hazardous Waste Act
OC	Operations Center
PPE	Personal Protective Equipment
RA	Rotary Air Lock
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RWP	Radiological Work Permit
SSF	Silo Screw Feeder
TRU	Transuranic
TSD	Treatment, Storage And Disposal (unit)
TSR	Technical Safety Requirement

8.0 DEFINITIONS AND ACRONYMS (continued)

Term	Definition
WAC	Waste Acceptance Criteria
WCATS	waste characterization and tracking system
WIPP	Waste Isolation Pilot Plant

9.0 RESPONSIBILITIES

Not Applicable

10.0 REFERENCES

Document Number	Title
10 CFR 830	*Code of Federal Regulations - Nuclear Safety Management Assurance*
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
49 CFR 173.465	*Code of Federal Regulations - Transportation---Type A Packaging Tests*
CCP-QP-016	*CCP Control of Measuring, Testing, and Data Collection Equipment*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
LIR 404-00-03.1	*Hazardous and Mixed Waste Requirements*
NCS-CSLA-10-062	*Cementation Glovebox G454*
NMT-14: 05-037 memorandum	*Request for Removal of TA-55 Compensatory Measures from Type A Transuranic (TRU) Waste Containers PISA*
PMT2-DOP-CF-002	*Drum-in/Drum-out Operations for Cement Fixation*
PMT2-DOP-CF-009	*Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*
TA55-AP-018	*TA-55 Emergency Procedures*
TA55-AP-138	*Records Processing Procedure for ADPSM Organizations*
TA55-DOP-054	*Vehicle Operations Program*
TA55-DOP-001	*Pre-Job Briefing and Post-Job Review*
TA55-PLAN-007	*TA-55 Facility Emergency Plan*
TA55-PLAN-046	*Quality Management Plan (QMP)*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*
TA55-RD-585	*Nuclear Materials Control and Accountability Requirements*
TA55-TSR-2011	*TA-55 Technical Safety Requirements (TSRs)*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
CF Logbook	Written process data record	Records shall be maintained at the CF process location.	When the records are ready for final disposition, the record is transferred to Records Management and processed in accordance with TA55-AP-138.
Attachment A, *Filling the PF-53 Cement Silo Acceptance Sheet*	QA record	Maintained in a metal file cabinet when not in use.	Record shall be turned into the Operations Center.
Attachment B, *Cement Run Sheet*	Aid for data input into the WCATS	Kept until data is placed into the WCATS.	Not a record.
Attachment C, *Performance Checklist*	Training record	Filed with training specialist.	Record shall be maintained by the Training Coordinator upon completion of training and qualification. When no longer in use transfer to the DCC for archiving.

12.0 APPENDICES AND ATTACHMENTS

Appendix	Title
A	Filling the PF-53 Cement Silo

Attachment	Title
A	Filling the PF-53 Cement Silo Acceptance Sheet
B	Cement Run Sheet
C	Performance Checklist

Appendix A, Filling the PF-53 Cement Silo

Page 1 of 2

SR 4.1.3.5: VERIFY that the PF-53 cement silo level is ≤ ½ of silo capacity.

Frequency: Within 4 hours of adding cement to the PF-53 cement silo**CAUTION**

The cement silo must not be filled to more than ¼ full in order to comply with the seismic considerations.

NOTE The cement fixation process SME does the ordering of the cement. Order cement from the appropriate vendor for bulk delivery after the cement level is within the cone of the silo, but before the silo is empty. No more than 4 tons of cement should be ordered after the cement in the silo reaches the silo cone.

[1] Escort the driver and cement vehicle to the cement silo in accordance with TA55-DOP-054, *Vehicle Operations Program*.

[2] Unlock the cover from over the pneumatic delivery pipe with the key obtained from the Operations Center.

[3] Have the driver hook up the hose from the cement truck trailer to the pneumatic delivery fill pipe on the silo and pneumatically transfer the cement into the silo.

[4] When the delivery transfer is complete, escort the driver and cement vehicle from the cement silo.

[5] Lock the cover plate over the pipe,
AND return the key to the Operations Center.

$ **[6]** After the cement dust has sufficiently dissipated inside the silo to allow viewing of the cement surface, perform the following steps to confirm that the level is at or below the ¼ capacity of the silo. Document the time on Attachment A.

NOTE 1 Due to the pneumatic transfer, the cement powder will be aerated, thus at a greater height than normal. The silo may be vibrated to assist in de-aerating, settling and leveling the cement at a lower level.

NOTE 2 Vibrating the silo may be done by using the dayhopper fill operation detailed in section **5.2**.

[a] Vibrate the silo for approximately 15 minutes.

[b] Notify security prior to climbing the cement silo.

Appendix A, Filling the PF-53 Cement Silo

Page 2 of 2

WARNING 1
Hazard: Ladder Hazard **Control:** ● **Always face the ladder and use at least one hand to grasp the ladder when climbing and descending.** ● **Do not carry objects that could cause you to lose balance and fall.** ● **Keep tools in tool belt.** ● **Avoid excessive stretching, leaning or overreaching.**
WARNING 2
Hazard: The top of the silo is an elevated work surface from which the worker may fall. **Control:** ● **Use caution when on the top of the silo.** ● **Hand rails provide protection from falling.**

[c] Climb the ladders to the top of the silo,
AND remove the cover from the access port.

WARNING 1
Hazard: Pinching Hazard **Control:** ● **Maintain awareness of pinch points associated with the silo port cover.** ● **Wear appropriate work gloves.**
WARNING 2
Hazard: The inside of the silo is a confined space. **Control: Do not break the plane of the silo opening while taking a measurement.**

$ **[d]** Verify amount of cement in silo is less than or equal to ¼ of silo capacity by measuring from the low side of the port to the top of the cement level inside the silo,
AND record the measurement and time the measurement was taken on Attachment A.
(This measurement shall be ≥ 177 inches.)

[e] IF the measurement is less than 177 inches,
THEN notify the Operations Center.

[f] Replace the cover on the access port,
AND climb down to ground level.

[g] Note the measurement in the cement logbook.

[h] Notify security that checking the level in the cement silo is complete.

[i] Turn the original of Attachment A into Operations Center.

Attachment A, Filling the PF-53 Cement Silo Acceptance Sheet

NOTE The amount of cement in the cement silo shall be limited to less than or equal to ¼ of the silo capacity at all times for conservatism.

SR 4.1.3.5: VERIFY that the PF-53 cement silo level is ≤ ½ of silo capacity.

Frequency: Within 4 hours of adding cement to the PF-53 cement silo

NOTE The measurement recorded below ensures that the amount of cement in the cement silo is less than or equal to ¼ of the silo capacity.

[1] Record the time that the cement is in the Silo and has been filled and dissipated.

Time: _____ AM/PM

[2] Record the time that the measurement is taken:

Time: _____ AM/PM

$ **[3]** Record the measurement from the low side of the port to the top of the cement level inside the silo.

Level: _____ inches _____
(Level shall be ≥ 177 inches.) Initials

[4] IF the measurement is less than 177 inches,
THEN notify the Operations Center.

Surveillance Test Procedure Acceptance			
Date of Test:		(unless already listed elsewhere on the attachment)	
Test Results:	SATISFACTORY/UNSATISFACTORY (circle one)		
Surveillance Personnel:			
	Signature/Z#/date		
OC Operator:		**OC On-Duty Supervisor:**	
	Signature/Z#/date		Signature/Z#/date
Surveillance Test Results Review			
System Engineer:			
	Signature/Z#/date		
Comments			

Attachment B, Cement Run Sheet

NOTE Attachment B may be used to record information for later transcribing into WCATS.

Date_____ Workers_____ Drum #_____

Tare_____ Filter_____ Scale_____

TK to FT Transfer

TK___ to FTx_____ Vol_____ TK___ to FTy_____ Vol_____

Other waste ID#_____ Gross_____ Tare_____ Net_____

pH probe #_____

7 Lot # _____ 10 Lot # _____

7 Exp date _____ 10 Exp date_____

Titration 1

_____L EV + total volume with NaOH _____ pH_____

Vol of NaOH_____ NaOH/EV ratio _____

Remainder FTx to drum_____ Total FTx to drum_____

Pu_____ Am_____

Titration 2

_____L EV + total volume with NaOH _____ pH_____

Vol of NaOH_____ NaOH/EV ratio _____

Remainder FTy to drum_____ Total FTy to drum_____

Pu_____ Am_____

Drum pH adjust Final pH in drum_____

Cement

Starting vol_____ Starting wt_____

Cement wanted: actual vol (L) x ____ kg/L x 2.2 lb/kg = _____lbs

Expected final weight_____

Timer: cement wanted lbs/___ lbs/min= _____ min

Additional time needed_____ Final weight_____

Attachment C, Performance Checklist

Page 1 of 2

Course:	**Session:**

Procedure No.: PMT2-DOP-CF-007,R3 Title: Cement Addition Operations for Cement Fixation

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites: _____
(Verifier's name and Z number)

☐ PMT2-DOP-CF-009, *Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage*

☐ Plan 256: RCRA Hazardous/Mixed Waste Worker Training

☐ LANL course 12985 "Ladder Safety" training

☐ _____

Task #	Emergency Actions	Instruction	Evaluation
1	Discuss what can be done in case of an emergency.	☐	☐
	Comments		

Task #	Hazards and Controls	Instruction	Evaluation
1	Describe the hazard associated with nuclear criticality and how to minimize it.	☐	☐
2	Describe the hazard associated with ionizing radiation and how to minimize it.	☐	☐
3	Describe the hazard associated with alpha contamination and how to minimize it.	☐	☐
4	Describe the hazard associated with tripping and how to minimize it.	☐	☐
5	Describe the hazard associated working on elevated platforms and how to minimize it.	☐	☐
6	Describe the hazard associated with operating equipment and how to minimize it.	☐	☐
7	Discuss the hazards associated with working with cement powder and how to minimize it.	☐	☐
	Comments		

Attachment C, Performance Checklist

Page 2 of 2

Task #	Procedural Steps	Instruction	Evaluation
1	Discuss how to measure the cement level inside the silo. (Attachment A)	☐	☐
2	Demonstrate and/or discuss checking and cleaning the dayhopper screen.	☐	☐
3	Demonstrate and/or discuss filling the dayhopper with cement.	☐	☐
4	Discuss performing cementation.	☐	☐
5	Discuss what to do if the cement paste becomes too thick for adequate mixing.	☐	☐
6	Discuss what to do if the cement weight is higher than the target ratio.	☐	☐
7	Discuss what to do if the cement weight is below the target weight.	☐	☐
8	Discuss how to estimate the final drum weight during cement addition and what to do if the estimate exceeds 852 lbs.	☐	☐
	Comments		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)

ENCLOSURE 7

PMT2-DOP-CF-008, R4 Particulate Waste Certification and Cementation

ENV-DO-14-0145

LA-UR-14-24636

Date: JUL 0 2 2014

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document number: PMT2-DOP-CF-008, R4

Effective date: 01/25/13

Next review date: 01/25/16

Supersedes:

Title: Particulate Waste Certification and Cementation

Status:	Hazard:	For Document Control Use Only:
☐ New	☐ Low-hazard	
☒ Major revision	☒ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
☐ Review, no change	**Use Type:**	
	☒ Reference ☐ Use every Time	
	☐ WR (Use every Time)	

	Organization	Date	Signature
Written By:			
Casey Finstad MET-1 Engineer	MET-1	10/10/12	SIGANTURE ON FILE
Approved for Use By: Responsible Line Manager:			
Kent Abney MET-1 Group Leader	MET-1	01/25/13	SIGNATURE ON FILE
Authorized for Use By: FOD:			
Chuck Tesch Operations Manager	TA55-OPS	01/25/13	SIGNATURE ON FILE

☒ Unclassified ☐ Restricted Data ☐ Confidential ☐ Formerly Restricted Data ☐ Secret ☐ National Security Information ☐ Unclassified Controlled Nuclear Information ☐ Official Use Only	**Derivative Classifier:** **Name:** Darren Quintana (Signature on File) **Title:** MET-1/DC **Date:** 01/25/13 **Derived from:**

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-008, R4	01/25/13	Major Revision	• Repealed the part of previous IPC that removed size reduction as an option. • Rolled-up of the part of previous IPC that provided additional directions for non-discardable items. • Updated references
PMT2-DOP-CF-008, R3-IPC1	3/27/12	IPC	Added 'subMBA' as a valid destination for discardable material.
PMT2-DOP-CF-008, R2-IPC1	2/16/12	IPC	• Removed mechanical crushing as an option for size-reduction • Clarified destination of material depending on results of NDA.
PMT2-DOP-CF-008, R1	5/31/11	Major Revision	Reformatted to DOP standard. Incorporated IPC modifications from previous document. Removed instructions for if waste item entered as non-waste item. Removed Caution concerning wattage limit. Removed the limit on containers larger than 5 liters. Replaced MASS with LANMAS and WMS with WCATS. Removed attachment on MASS instructions. Removed the exception for very dense particulates. Supersedes PMT2-DOP-CF-008,R0-IPC-1.
PMT2-DOP-CF-008, R0 IPC-1	12/01/2010	IPC	Removed requirement to weigh the particulate before adding to drum. Added possible blend/split operation. Added possible crusher operation. Supersedes PMT2-DOP-CF-008,R0.
PMT2-DOP-CF-008, R0	12/18/2008	New	Reformatted to IMP 300. Incorporated FOD and RP-1 safety recommendations. Supersedes NMT2-WI-009-CF-913,R2 and NMT2-IWD-WI-009-CF-913,R2.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

Define the steps by which particulates are examined, certified and disposed of via cement fixation by personnel from the Cement Fixation (CF) process.

1.2 Scope and Applicability

This procedure is performed at TA-55, PF-4, Room 401, in location CF by NCO-2 personnel assigned to the CF process. Examination and certification may also be performed at the waste generator's glovebox (GB) location, and size reduction may be done in room 420 per PMT2-DOP-CLO-001. The particulate waste may be non-soluble or soluble and in an acidic or basic pH form. The particulate may be residues or waste items from the vault or a waste generator's safe, glovebox or floor location.

1.3 Applicability

A. This procedure is intended to produce a cemented waste form that complies with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria as defined in Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, DOE/WIPP-02-3122, for contact-handled TRU waste.

B. The CF process and this procedure are subject to the quality assurance program plan specified in TA55-PLAN-046, *Quality Management Plan*, and 10 CFR 830, Nuclear Safety Management Quality Assurance.

C. This procedure is subject to the Central Characterization Project (CCP) procedure CCP-QP-016, CCP Control of Measuring, Testing, and Data Collection Equipment.

D. This procedure is intended to produce a cemented waste form that meets the Resource Conservation and Recovery Act (RCRA), definition of a non-mixed waste as defined 40 CFR, Parts 260 through 273, Solid Waste, as amended by the Hazardous and Solid Waste Amendments. Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act.

1.4 Technical Safety Requirements

Not Applicable.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. LANL Policy P101-18 provides more information on the differences between pausing or stopping work and the process for resuming work in either case

If this procedure cannot be completed as written or abnormal conditions are encountered, PAUSE WORK, place the work in a safe configuration if possible, and notify the Operations Center (OC) and First Line Manager (FLM).

B. Hazards and Controls

Hazards and controls that are associated with this procedure are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Nuclear Criticality Accident	• See applicable CSLA for a list of controls (administrative and engineering feature requirements), see Section 10, *References*.
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555 • Follow radiological postings • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers • Correct personnel protective equipment (PPE) is to be used • Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact

B. Hazards and Controls, (continued)

Hazard	Controls
Regulated Waste: This work takes place within the TSD Unit. A TSD Unit is a permitted or interim status hazardous waste management unit where hazardous or mixed waste regulated by the Resource Conservation and Recovery Act (RCRA) may be stored or treated before disposal.	• The CF Process must comply with New Mexico State-regulated requirements for operation and inspection. Requirements include inspections to ensure safe operation. This inspection procedure is found in PMT2-DOP-CF-009. • Manage waste in compliance with regulations. Specific waste controls are available at http://swrc.lanl.gov/int.lanl.gov/environment/waste/. Additional waste management information is available at http://swrc.lanl.gov. • Plan 256: RCRA Hazardous/Mixed Waste Worker Training • During walk-arounds, watch for evidence of leaks. • Cementation removes the characteristics of toxicity.
Hazardous chemicals: • Exposure to hazardous chemicals and waste containing hazardous materials can result if containment (GB, gloves, etc.) is breached or if transfer lines leak. • Many of the wastes processed in the CF GB contain acids and heavy metals (cadmium, chromium, and lead). The controls provided by TA55-RD-555 are effective in preventing exposure to hazardous chemicals.	To minimize the hazards from dangerous chemicals: • The glovebox (GB) is an engineering control that protects the worker from exposure to hazardous chemicals in addition to preventing radioactive contamination • Eye wash is required to be within 10 seconds travel time of any work with acids or bases performed outside the GB. • Shower is located within 100 feet of the GB. • Experienced and trained personnel make use of Material Safety Data Sheets (MSDS) to acquaint themselves with chemicals they are handling. • Wear PPE (chemical resistant gloves, safety glasses, safety shoes, etc.) appropriate to the material being handled. • Engineered containment (glovebox, pipes). • Frequent inspection of the Treatment, Storage, and Disposal (TSD) area to keep personnel abreast of changing conditions. • During walk-arounds, evidence of leaks is looked for. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Barriers observed in hazardous waste areas. • Guidelines are followed in TA55-RD-539 and P409. • Formal hazardous waste training is mandatory.

B. Hazards and Controls, (continued)

Hazard	Controls
Elevated workspace: Personnel must step onto an elevated work platform to operate GB equipment. The stand is secured to the GB with a mechanism that allows the platform to be removed for access to the drum during drum-out. There is also an elevated walkway behind the GB. • When entering or leaving the platform or walkway, personnel may trip, fall or stumble. If detached from the GB, the platform may roll away while personnel are on it.	• Before climbing onto the rollable elevated work stand, attach it to the GB stand. • Signs are posted to alert personnel to the tripping hazard. • When in elevated areas, personnel should use appropriate caution.
Ergonomic Issues: The activities and operations included in the scope of this DOP require the work to be performed in a glovebox. Because of the nature of working through gloveports, the workers range of motion is restricted and causes increased stress on the musculoskeletal system. This results in an increase injury risk and thus ergonomic guidance is necessary including both engineering controls and administrative controls.	• Try to avoid use of tools with very small grips, such as allen wrenches without handles. Adapt tools to increase grip diameter or ask for assistance from the ergonomics team if tools require a pinch grip. Increase break frequency if work requires pinch gripping. • Workers should take breaks on a regular schedule, every 30 minutes for 2-5 minutes • Items that need to be moved that weigh over 15 lbs should have either a lifting assistive device or a second person to assist. • Practice good housekeeping and organize process equipment and materials to help avoid awkward motions. • Individuals that are less than 5ft 8 in should use step platforms when centerline gloveport height is 52 in. Use anti-fatigue mats to reduce leg and back strain. • Workers should be familiar and follow the ergonomic guidance in P101 -28, section 3.3. Glovebox safety program.

2.1 General, (continued)

C. Unique Entry Conditions

Not Applicable

D. Basis for Use Categorization/Sequence of Steps

This procedure is routinely used and was determined to be a Reference use category.

The steps and Sections in the Performance Section are to be performed in sequence unless otherwise stated.

E. Criticality Safety Limit Approval (CSLA) Requirements

In this DOP, steps associated with criticality issues are marked with an asterisk (*) in the margin.
See the Criticality Safety Limit Approvals (CSLA's), referenced in section **10.0**, *REFERENCES*, for specific criticality safety requirements:

F. Required Permits

NMED Permit to operate as a TSD Unit.

Radiation Work Permits (RWPs) are required when dose rates ≥ 75 mrem/hr at 30 cm or ≥ 700 mrem/hr on contact.

G. Training and/or Qualifications

Operators must be qualified to this procedure or in supervised qualification on this procedure. Operator qualification is documented on Attachment A, *Performance Checklist*.

H. Cautions

Not Applicable.

2.1 General, (continued)

I. Material Control and Accountability

This procedure complies with the *Material Control and Accountability Plan* (NMCA-FSD-001) and TA55-AP-585, *Nuclear Materials Control and Accountability Implementation Plan.* Receipt or shipment of material is accompanied by appropriate Local Area Nuclear Material Accountability Software (LANMAS) transactions and manifests.

Because the drum is attached to the GB system, to prevent any unauthorized personnel from diverting nuclear material out through a cemented drum, the process operation also requires the following:

- If the cementation GB is unattended, it is locked. Only the CF and EV operations have keyed access to DB-424 in PF-4. The CF GB has a combination lock, the combination to which is known only by CF personnel.
- When the CF process is running, two HRP certified operators must be present.
- CF personnel inspect the particulate feed material to ensure no foreign objects are being diverted out through CF.
- The gross weight of the item and container must agree to within +/- 10 grams with the initial weight obtained during the initial inspection of the item at the generator's GB.

Items are accepted and coded according to the Process Monitoring Flow Diagram (PMFD) for the CF Process/Status. See Section **10.0**, *References*, for identification of the relevant PMFD.

2.2 Additional Requirements and Conditions (WR Use)

Not Applicable.

3.0 PREREQUISITE ACTION

The sections and the steps in the Prerequisite Action section are not required to be performed in sequence, unless otherwise stated.

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with PA-AP-01020, *TA-55 Pre-Job Briefing and Post Job Review*.

[2] Obtain permission from the Operations Center before conducting a Surveillance Test procedure (STP), In-Service Inspection (ISI), or Administrative Surveillance Instruction (ASI) surveillance

[3] Schedule the work with the Facility Operations Director organization.

[4] The Worker is responsible for ensuring that they are working to the most current procedure and complies with document control processes concerning copying, marking, and final disposition.

[5] Ensure that tool, equipment, and material numbers in the work area match those specified

[6] Per section **2.1.0**, two HRP certified operators are required to be present while this procedure is being performed. One of the operators may be in training as outlined in section **2.1.G**.

3.2 Performance Documents

The following documents may be required for the completion of this procedure:

- PMT2-DOP-CLO-001, *Size Reduction*
- TA55-AP-522, *TA55 Nuclear Criticality Safety Program*
- TA55-AP-585, *Nuclear Materials Control and Accountability Implementation Plan*
- TA55-DOP-016, *TA55 Material Transfer Procedure*
- TA55-DOP-024, *Trolley Hoist Conveying System*
- TA55-DOP-030, *Introducing Items Through a Pencil Drop or Hood Into Gloveboxes in PF-4*
- TA55-DOP-026, *Operating Electronic Balances*
- TA55-PMFD-01030, *Cement Fixation (CF) MBA 743*
- TA55-RD-539, *TA-55 Waste Management*

3.3 Special Tools, Equipment, Parts, and Supplies

Equipment

- Furnace or oven for drying. As this is equipment is only used to dry waste material, precise or accurate temperature control and measurement is not required. Calibration is not required.

Tools and Fixtures

- Temporary container to be used while the original item container is being tared.
- Suitably-sized stainless steel container for particulate wastes (may be original container)
- Hand tools for size-reducing particulate or fibrous material (ex. 8-mesh screen with bottom pan, mortar and pestle, scissors). Screen does not require calibration.
- Heavy gloves for sharps protection (Hexarmor or similar)
- Lead shielding for high dose items as needed
- Forceps for segregation

Measuring and Test Equipment

- Calibrated and certified weigh scale with range of 0 to 1000 grams. All equipment used to perform MC&A is maintained and calibrated by NPI-1. Ensure calibration is current before use. This may be accomplished by checking LANMAS.

3.4 Field Preparation

The item must be inspected by CF personnel for suitability for cementation. The CF personnel may require one or more of the following pretreatments:

- Particle size reduction by the generator
- Crushing and pulverizing by room 420 personnel
- Blending and splitting the item by room 208 personnel to reduce the item into Pu amounts suitable for a single drum (<150 g Pu).
- Drying (calcination)
- Segregation of different matrices

3.5 Approvals and Notifications

Not Applicable.

4.0 ACCEPTANCE CRITERIA

Prior to accepting the item for submittal for NDA, the CF inspector must verify the following conditions are met:

- Correct particle size (< 8 mesh - ½ inch) Visual determination is adequate; it is not necessary to use a calibrated screen to confirm this.
- Dry and free-flowing
- Single matrix (crucible acceptable as second matrix)

Prior to accepting the item for cementation, the generator must obtain and supply to the CF personnel a current Calorimetry/Isotopic (CAL/ISO) analysis. Verify that the following condition is met:

- The Pu content is low enough to result in a drum with ≤150 g Pu when added to the other wastes planned for the drum.

5.0 PERFORMANCE

NOTE The steps within each subsection, must be performed in order, but the subsections themselves may be performed out of order or may be skipped. Additionally, work covered by other procedures may be performed in between subsections.

5.1 Material Introduction

[1] IF introducing the item into the GB line (TA55-DOP-30, *Introducing Items Through a Pencil Drop or Hood Into Gloveboxes in PF-4*) and transferring it via trolley (TA55-DOP-024, *Trolley Hoist Conveying System*) to the appropriate GB location for inspection and certification or to a secondary location for pre-certification storage

* THEN perform the following according to TA55-AP-522 and TA55-DOP-016:

[a] Determine the quantity of SNM that is currently present in the destination. LANMAS may be used as an aid for this determination

* **[b]** Before physically moving fissile material, check that the transfer will not cause the criticality safety limits to be exceeded in the destination workstation or other workstations en route. Perform a LANMAS transaction to aid in determining compliance.

* **[c]** Ensure that the criticality tag board accurately represents the amount of SNM that is currently in the glovebox location to be used.

WARNING

Hazard: Ergonomic risk if moving items heavier than 15 lbs in glovebox.

Control: Consider assistive devices.

[d] Introduce the item and transfer the item to the destination box.

* **[e]** Update the criticality tag board to accurately represent the amount of SNM that is now in the glovebox location.

5.2 Pre-Inspection Options for Vault Residues

NOTE 1 The CF personnel are typically considered the generator for vault residues.

NOTE 2 For vault items, preliminary information may exist (process knowledge, feed list or LANMAS information), from which the Subject Matter Expert (SME) can judge with reasonable confidence without an inspection how the item should handled prior to cement fixation.

NOTE 3 The following actions accept some risk that the decision based on preliminary information is in error.

NOTE 4 Use Guidance in TA55-DOP-016 when crossing MBA boundaries.

[1] IF the items cannot be easily sized-reduced
THEN contact Waste Services for instructions
AND send them to Waste Services for disposal in a solid waste drum.

[2] IF the item ID indicates the item probably contains “rocks” that cannot be manually size-reduced by the CF generator (pyro salts),
THEN introduce the item into the GB line per TA55-DOP-030,
AND using the trolley per TA55-DOP-024, transfer the item to room 420 to be mechanically crushed per PMT2-DOP-CLO-001.

[3] IF the vault feed list indicates the residue contains too much Pu grams for a single drum ($\geq$ 150 g Pu),
THEN introduce the item into the GB line per TA55-DOP-030,
AND using the trolley per TA55-DOP-024 transfer it a GB location to be split by the CF generator.

[4] IF the SME determines that an item needs no physical alteration to meet the acceptance criteria listed in Section **0**,

[5] *Acceptance* Criteria,
THEN transport the item directly to the NDA laboratory for CAL/ISO analysis.

[6] IF the NDA indicates the item is discardable,
THEN send it to Waste Services or subMBA CF for disposal.

[7] IF the NDA indicates the item is NOT discardable,
THEN send it to the vault of the subMBA of origin.

[8] IF the preliminary information is found to be in error,
THEN go back to the beginning of section **5.2**, *Pre-Inspection Options for Vault Residues*.

[9] IF not already done
THEN introduce the item into the GB line per TA55-DOP-030
AND using the trolley per TA55-DOP-024 transfer the item to a GB location at which the inspection and certification is to take place.

5.3 Inspecting and Certifying Particulates

NOTE 1 For items already in-line due to recent generation, the following inspection and certification of an item typically takes place in the generator's GB.

NOTE 2 For items that are coming from outside the GB system (vault) that must be introduced into the GB system, the inspection and certification operation typically takes place in a GB used by the CF personnel. CSLA-approved locations for this activity are DB424 and GB 434.

NOTE 3 The NDA laboratory will enter the assay into WCATS.

[1] Record in the CF logbook (based on information obtained from the generator, or in the case that CF is the generator, from LANMAS or the vault feed list) all identifying information for the item including ID #, Process/Status, matrix, RCRA-hazardous characteristics and generator contact information.

[2] Have the generator open the item container and manipulate the item to permit its inspection by the CF personnel.

[3] Confirm that the item meets the following acceptance criteria for cement fixation:

- Correct particle size (< 8 mesh - ½ inch diameter). Visual determination is adequate; it is not necessary to use a calibrated screen to confirm this.
- Dry and free-flowing (to permit inspection for foreign objects)
- Single matrix (crucible acceptable as second matrix)

[4] IF the item requires further physical alteration (segregation, drying, size-reduction) to meet the acceptance criteria,
THEN proceed as follows:

WARNING 1

Hazard: Using hands to size reduce the item present an ergonomic risk and a risk of being injured by sharps.

Control: Use a tool for breaking up clumps instead of hands.

WARNING 2

Hazard: Using tools for breaking up clumps may present an ergonomic risk and a risk of being injured by the blunt force of the tool (mortar and pestle).

Control: Wear heavy gloves (Hexarmor or equivalent) as needed. Use caution with handling tools. Frequent breaks are recommended to avoid fatigue

5.3 Inspecting and Certifying Particulates, (Continued)

NOTE 1 The particles only need to be small enough to ensure that the material remains non-attractive from a safeguards and security standpoint and that the particle size does not interfere with the mixing blades. The most desirable particle size is minus 8 mesh, however, sizes as large as ½ inch diameter may be accepted at the discretion of the CF personnel.

NOTE 2 Materials that are not amenable to screening, such as fibrous material and filter paper, must be manually size reduced to approximately 1-inch diameter sizes.

[a] IF the item requires size-reduction that cannot be accomplished by the generator,
THEN proceed as stated above in step **5.1[2]** for size-reduction at a GB location in room 420.

[b] IF the physical alteration can be performed by the generator,
THEN proceed using the suitable tool(s).

- Use a furnace, oven or air drying to dry damp material.
- Use a mortar and pestle for size reduction of rock.
- Use scissors (preferred for ergonomic safety) or tearing by hand for size reduction of paper or rags.

NOTE Whenever items are split into multiple containers (the following two bullets) the subsequent steps in this section are performed for each item. Each container should contain an estimate of no more than 100 grams Pu

- Manually pour items to be split into an additional container(s).
- Use forceps to handle Sharps requiring segregation.

[5] Have the generator obtain the tare weight of the item's container using a calibrated weigh scale per TA55-DOP-026.
IF the container to be tared already contains material,
THEN the generator must pour the particulate material into a temporary second container while the original container is tared. The particulate material is returned to the original container after the tare weight has been obtained.

[6] Have the generator determine the gross weight of the waste item and its container.

[7] Have the generator estimate the volume of the container and waste item.

[8] Record (upon agreement that the values are correct) the values in the CF logbook and on the container.

[9] Have the generator close the container, tape the top of the container closed with vinyl tape, and label the container with the item ID.

5.3 Inspecting and Certifying Particulates (Continued)

[10] Initial (CF examiner) the tape where it overlaps.

NOTE The following WCATS information may be performed at a later time, but before the actual cementation of the item.

[11] Enter the item into WCATS and indicate the visual inspection (VI) was performed. Enter all descriptive information for the item requested by WCATS. Electronically attach a discard justification memo if necessary.

[12] Ensure the item information (location, SNM, IDES) on WCATS matches that on LANMAS.

[13] IF the item has not been NDA'ed in step **5.2[4]**,
THEN have the generator transfer and submit the item to the NDA laboratory for CAL/ISO analysis.

[a] Have the generator retrieve the item from the NDA laboratory.

[b] Have the generator transfer the item to the appropriate GB location for storage or to the CF location for cement fixation per step **5.1**.

5.4 Adding Particulate Wastes to the Drum

NOTE 1 All particulates, soluble or insoluble are added to the waste drum before the evaporator (EV) bottoms waste, non-evaporator waste solution, water, and sodium hydroxide are added. As the acidic EV Bottoms is added to the drum, this results in dissolution and dispersion of particulates that are soluble in acid, such as hydroxide cakes. Any material that is re-precipitated as a result of the subsequent pH adjustment into the basic pH range is suspended and dispersed in the liquid by the stirring action of the mixer, and micro-encapsulation in the cement is ensured.

NOTE 2 This procedure assumes the primary waste being cemented is EV Bottoms liquid. If this is not the case, consult with the SME for instructions.

NOTE 3 If the CF process was assigned as the generator (for example, the item was retrieved from the vault), then the confirmatory re-weighing in step **5.4[1]** below is not required. If the item has not left the custody of the CF personnel since inspection, then re-weighing is not required.

[1] IF the item has had a previous gross weight obtained during step **5.3[6],** THEN verify that the gross weight of the item is within 10 grams of the weight obtained at the original certification.

[a] IF there is a discrepancy greater than ±10 grams, THEN the item must be re-NDA'ed and recertified.

[2] Record the weight in the CF Logbook and in the Note Field Box on WCATS.

[3] Place all particulates for the drum close to the drum, but where they will not be accidentally knocked into the drum.

[4] Before adding the particulates to the drum, open the cans and inspect the contents for potentially diverted material or unusual objects.

[5] In association with adding the particulate to the cement drum, perform the following according to TA55-AP-522 and TA55-DOP-016:

[a] Determine the quantity of SNM that is currently present in the drum.

* **NOTE** The criticality limit for the cement drum is ≤200 grams Pu in any form per the CSLA (see section **10.0**, *References*).

[b] Before physically moving fissile material, check that the transfer will not cause the criticality safety limits to be exceeded in the drum.

5.4 Adding Particulate Wastes to the Drum (continued)

NOTE The criticality tag board reflects GB and drums combined.

* **[c]** Ensure that the criticality tag board accurately represents the amount of SNM that is currently in the GB and drums.

[6] Add the particulate by slowly pouring it out of the container into the drum.

NOTE The drum is now ready for the next phase of the operation, which is adding the liquid wastes to the drum. See PMT2-DOP-CF-005 and/or PMT2-DOP-CF-006.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not Applicable.

6.2 Restoration

[1] Return the empty container to the generator for reuse or disposal.

6.3 Results

[1] Record information for the item and the drum in the CF logbook and in WCATS.

6.4 Independent Verification

Not Applicable.

6.5 Records Processing

See Section **11.0**

7.0 CONTINGENCIES

Not Applicable.

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
ALARA	As Low As Reasonably Achievable
CAL/ISO	Calorimetry/Isotopic
CCP	Central Characterization Project
CF	cement fixation
CFR	code of federal regulations
CSLA	Criticality Safety Limit Approval
DOE	Department of Energy
DOP	detailed operating procedure
EV	evaporator
GB	glovebox
ID	identifier
IDES	Item Description Number
LANMAS	Local Area Nuclear Material Accountability Software
MET-1	Actinide Processing Support group
NCO-2	Actinide Process Chemistry group
NDA	nondestructive assay
NMED	New Mexico Environmental Department
PMFD	Process Monitoring Flow Diagram
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RWP	radiological work permit
SME	subject matter expert
SNM	special nuclear material
TRU	transuranic
TSD	Treatment, storage and disposal
VI	Visual inspection
WIPP	Waste Isolation Pilot Plant
WCATS	Waste Compliance and Tracking System

9.0 RESPONSIBILITIES

9.1 Waste Generator

- Responsible for providing the particulate item
- Responsible for providing the characterization data for the particulate item to the CF Process Operator.
- Responsible for presenting the particulate item to the CF Process Operation for visual inspection and weighing.

9.2 CF Process Operator

- Responsible for serving as Waste Generator in cases of vault items.
- Responsible for safely performing the steps per this procedure and pausing or stopping work if the procedure cannot be completed as written.
- Performing LANMAS transactions

9.3 NCO-2 First Line Manager (FLM)

- Responsible for ensuring workers are properly trained.
- NCO-2 FLM may also be an operator.

9.4 MET-1 Responsible Engineer

- Responsible for technical support
- The engineer may also be an operator

10.0 REFERENCES

Document Number	Title
NMCA-FSD-001	Material Control and Accountability Plan
10 CFR 830	Code of Federal Regulations - Nuclear Safety Management Assurance
20 NMAC 4	New Mexico Hazardous Waste Act (NMHWA)
40 CFR, Parts 260 - 273	Code of Federal Regulations - Solid Waste
CCP-QP-016	CCP Control of Measuring, Testing, and Data Collection Equipment
DOE/WIPP-02-3122	Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant
NCS-CSLA-10-061	Criticality Safety Limit Approval for *FT Tanks at Location CF*
NCS-CSLA-10-062	Criticality Safety Limit Approval for *Cementation Glovebox GB454* (GB454)
NCS-CSLA-10-124	Criticality Safety Limit Approval for *Inspection Activities of PF-4 Vault Particulate Waste Items* (DB424)
NCS-CSLA-11-122	Criticality Safety Limit Approval for *Staging, Splitting, Combining, Weighing, Inspection, and Sampling* (GB434A)
P101-18	Pause/Stop Work Procedure
P409	Waste Management
PMT2-DOP-CF-005	Non-evaporator Solution Operations for Cement Fixation
PMT2-DOP-CF-006	pH Adjustment of Evaporator Bottoms for Cement Fixation
PMT2-DOP-CF-009	Inspection of PMT-2 Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage
PMT2-DOP-CLO-001	Size Reduction
TA55-AP-522	Nuclear Criticality Safety
TA55-AP-585	Nuclear Materials Control and Accountability Implementation Plan
PA-AP-01020	Pre-Job Briefing and Post-Job Review
TA55-DOP-024	Trolley Hoist Conveying System,
TA55-DOP-026	Operating Electronic Balances
TA55-DOP-030	Introducing and Removing Items From Gloveboxes in PF-4
TA55-PLAN-046	Quality Management Plan (QMP)
TA55-PMFD-01030	Cement Fixation (CF) MBA 743
TA55-RD-539	TA-55 Waste Management

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
CF Logbook	Process Data Record	Supervision shall implement a reasonable level of protection to prevent loss and degradation. Records shall be maintained in a metal file cabinet when not in use.	When the records are ready for final disposition, the record is transferred to Records Management and processed in accordance with procedure.
Attachment A, *Performance Checklist*	Training Record	Maintain in training file	Record shall be maintained by the Training Coordinator upon completion of training and qualification. When no longer in use transfer to the DCC for archiving.

12.0 APPENDICES AND ATTACHMENTS

Attachment	Title
A	*Performance Checklist*

Attachment A, Performance Checklist

Page 1 of 2

Procedure Number: PMT2-DOP-CF-008,R4 Title: Particulate Waste Certification and Cementation

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following training prerequisites _____
(Verifiers name and Z number)

The worker must be qualified on the following procedures and training plans.

☐ _____
☐ _____
☐ _____
☐ _____
☐ _____
☐ _____
☐ _____

Qualification Requirements

Task #	Emergency Actions	Instruction	Evaluation
1	Describe the response to an emergency shutdown.	☐	☐
	Comments	☐	☐
Task #	**Hazards and Controls**	**Instruction**	**Evaluation**
1	Describe the hazard associated with nuclear criticality and how to minimize it.	☐	☐
2	Describe the hazard associated with ionizing radiation and how to minimize it.	☐	☐
3	Describe the hazard associated with alpha contamination and how to minimize it.	☐	☐

Attachment A, Performance Checklist

Page 2 of 2

Task #	Hazards and Controls	Instruction	Evaluation
4	Describe the hazard associated with the elevated work platform and how to control it.	☐	☐
5	Describe the hazard of working with hazardous chemicals and how to control it.	☐	☐
6	Describe the ergonomic hazard and how to control it.	☐	☐
	Comments	☐	☐
Task #	**Procedural Steps**	**Instruction**	**Evaluation**
1	Describe the acceptance criteria for particulates to include in a cement drum.	☐	☐
2	Demonstrate or discuss how to verify the item weight and the acceptable limits.	☐	☐
3	Demonstrate or discuss when the particulate wastes are added to the drum.	☐	☐
4	Demonstrate or discuss when the evaporator bottoms are added to the drum.	☐	☐
	Comments	☐	☐

Signature Approvals

Worker's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates you are confident the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	**Signature**	**Z #**	**Group**	**Date**

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely

ENCLOSURE 8

PMT2-DOP-CF-009, R3 Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage

ENV-DO-14-0145

LA-UR-14-24635

Date: JUL 0 2 2014

MET-1

Detailed Operating Procedure

Approval Cover Sheet

Document Number: PMT2-DOP-CF-009, R3
Effective Date: 3/6/2014
Next Review Date: 3/6/2017
Supersedes:

Title: Inspection of Treatment, Storage, and Disposal Units for Cement Fixation and Tank Storage

Status:	Hazard:	For Document Control Use Only:
☐ New	☒ Low-hazard	
☒ Major revision	☐ Moderate-hazard	
☐ Minor revision	☐ High-hazard/complex	
	Use Type: ☒ Reference ☐ Use every Time	

	Organization	Date	Signature
Written By: David Kimball	MET-1		
Approved for Use By: Document Owner: Kent Abney, *Group Leader*	MET-1	3/5/14	Signature on File
Authorized for Use By: FOD: Charles Tesch, *Operations Manager*	TA55-OPS	3/6/14	Signature on File
Released: FOD: Charles Tesch, *Operations Manager*	TA55-OPS	3/6/14	Signature on File

Derivative Classification Review			
☒ UNCLASSIFIED ☐ Export Controlled Information ☐ Official Use Only ☐ Unclassified Controlled Nuclear Information Guidance Used: N/A		☐ CONFIDENTIAL ☐ SECRET ☐ Restricted Data ☐ Formerly Restricted Data ☐ National Security Information Guidance Used:	
DC/RO Name/Z Number: Keith Fife/095877	Organization: MET-1	Signature: Signature on File	Date: 3/5/14

Revision History

Document Number	Effective Date	Action	Description
PMT2-DOP-CF-009, R3	3/6/14	Major Revision	• Formatting changes throughout to match latest guidance. • Removed spills/leaks from Hazards and Controls table and expounded in Contingencies. • Changes in **5.0** Performance for compliance for Conduct of Operations.
PMT2-DOP-CF-009, R2	6/6/13	Major Revision	• Performed Periodic Review • Updated and modified to match PA-AP-01016 template and to comply with P315; Expanded Applicability, Hazards and Controls, and Planning and Coordination to clarify. • Removed performance checklist and directed trainees to new OJT curriculum. • Inserted new sample IRF and renumbered appendices. • Updated names on call-out list
PMT2-DOP-CF-009, R1	12/13/11	Major Revision	• Updated group names. • Added NMED Permit considerations
PMT2-DOP-CF-009, R0		New Procedure	• Reformatted to IMP 300. • Supersedes NMT2-WI-009-CF-917,R1 and NMT2-IWD-WI-009-CF-917,R0.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This procedure provides instructions for performing an inspection of the Cement Fixation (CF) and Evaporation (EV) processes to validate compliance with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) regulations in order to operate as a Treatment, Storage, and Disposal (TSD) Unit.

1.2 Scope

This Detailed Operating Procedure (DOP) describes the requirements and steps for conducting an inspection of the TSD Unit, the hazards and controls for the inspection, and how to document the inspection. This document is NOT intended to address the hazards and controls inherent in the cleanup of spills or leaks. This DOP is performed at TA-55, PF-4, Room 401, locations CF and EV, and the secondary containment area. The inspection portion of this procedure must be performed daily. Daily is defined as every day that Room 401 is in Mode 1 or Mode 2, including weekends and holidays, but not when it is red lit.

1.3 Applicability

This procedure complies with the WIPP WAC as defined in *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, for contact-handled waste.

This procedure complies with regulations governed by the Resource Conservation and Recovery Act (RCRA), definitions of a non-mixed waste as defined 40 CFR, Parts 260 through 273, *Solid Waste,* as amended by the Hazardous and Solid Waste Amendments. Hazardous waste regulation and enforcement in New Mexico is performed by the New Mexico Environmental Department (NMED) under 20 NMAC 4, New Mexico Hazardous Waste Act.

1.4 Technical Safety Requirements

Not Applicable.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 General

A. Pause/Stop Work

All workers are responsible for pausing or stopping work when they have a reasonable belief that quality, work risks or hazards are not effectively controlled and workers have the right to do so without fear of reprisal. Los Alamos National Laboratory (LANL) Policy P101-18, *Procedure for Pause/Stop Work*, provides more information on the differences between pausing or stopping work and the process for resuming work in either case.

If this procedure cannot be completed as written or abnormal conditions are encountered, PAUSE WORK, place the work in a safe configuration if possible, and notify the Operations Center (OC) and Responsible Line Manager (RLM).

B. Hazards and Controls

Hazards and controls that are associated with this DOP are embedded in the procedural steps. The following table identifies those hazards and controls that are not tied to a specific step:

Hazard	Controls
Ionizing Radiation and Contamination	• Radiation Protection Requirements are detailed in TA55-RD-555, *TA-55 Radiation Protection Requirements.* • Follow radiological postings. • Radiological Control Technicians (RCTs) are notified to perform a radiation survey when transferring radioactive material that could cause a new radiation area or high radiation area to be created. • As Low as Reasonably Achievable (ALARA) principles are to be used (time, distance, and/or shielding) to minimize dose to workers. • Correct personal protective equipment (PPE) is to be used. • Radiation Work Permits (RWPs) are required when dose rates $\geq$ 75 mrem/hr at 30 cm or $\geq$ 700 mrem/hr on contact.

2.1 General (continued)

Hazard	Controls
Hazardous chemicals	To minimize the hazards from dangerous chemicals: • Emergency shower is located in an area that requires no more than 10 seconds to reach. Shower location is in a well-lit area and identified with a sign. • Engineered containment (gloveboxes, pipes). • Frequent inspections of the TSD area keep workers abreast of changing conditions. • During walk-arounds, watch for evidence of leaks. • Hazardous and toxic materials are stored in appropriate containers with proper labels. • Observe barriers in hazardous waste areas. • Follow guidelines in TA55-RD-539, *TA-55 Waste Management Requirements* and P409, *Waste Management.* • Formal hazardous waste training is mandatory (curriculum 256).
Elevated workspace: Personnel may be required to use an elevated platform during the inspection from which a fall can occur.	• Signs are posted to alert personnel to tripping hazards. • Personnel should use appropriate caution in these areas. • Use hand rails on any elevated platform used.

C. Unique Entry Conditions

Not Applicable.

D. Basis for Use Categorization/Sequence of Steps

This procedure is routinely used and was determined to be a Reference Use category.

The steps and sections in the Performance section are to be performed in sequence unless otherwise stated.

*** E. Criticality Safety Limit Approval (CSLA) Requirements**

In this DOP, steps associated with criticality issues are marked with an asterisk (*) in the margin.

No CSLA requirements are applicable to the performance of this DOP.

2.1 General (continued)

F. Required Permits

Los Alamos National Laboratory Hazardous Waste Facility Permit, EPA ID No. NM0890010515.

A Radiation Work Permit (RWP) is required when dose rates ≥75 mrem/hr at 30 cm or ≥700 mrem/hr on contact.

G. Training and/or Qualifications

This procedure must be performed by a qualified PF-4 Aqueous Nitrate Operator (WQAS #1450) or one complete in the On-the-Job training (OJT), *PF-4 Aqueous Nitrate Ops – Cement Fixation* (OJT 17730). At a minimum, performers of this procedure must have a complete curricula 256, *RCRA Hazardous Mixed Waste Worker*. Provisional authorization is allowed, and must be documented in WQAS.

H. Cautions

Not Applicable.

I. Material Control and Accountability

Not Applicable.

2.2 Additional Requirements and Conditions (WR Use)

Not Applicable.

3.0 PREREQUISITE ACTION

The sections and the steps in the Prerequisite Action Section are not required to be performed in sequence, unless otherwise stated.

3.1 Planning and Coordination

[1] Ensure that a pre-job brief has been conducted in accordance with PA-AP-01020, *Pre-Job Briefing and Post Job Review*.

[2] Schedule the work with the Facility Operations Director (FOD) organization.

[3] The Operation Responsible Supervisor (ORS)/Person In Charge (PIC) is responsible for ensuring that the work **shall** be performed to the most current procedure and associated performance documents.

* **[4]** The PIC, in consultation with workers, is responsible for ensuring that the planned process can be executed in compliance with relevant safety management program (e.g. Criticality Safety, MC&A, Material At Risk (MAR), RadCon, etc.) requirements prior to releasing the work.

[5] Notify the OC before entering PF-4 during off-hours and off-days.

[6] IF PF-4 is in Mode 2,
THEN do NOT enter PF-4 unless approved by the OC.

3.0 PREREQUISITE ACTION (continued)

3.2 Performance Documents

- P101-18, *Procedure for Pause/Stop Work*
- P409, *Waste Management*
- PA-AP-01020, *Pre-Job Briefing and Post-Job Review*
- TA55-RD-555, *TA-55 Radiation Protection Requirements*
- TA55-RD-539, *TA-55 Waste Management Requirements*

3.3 Special Tools, Equipment, Parts, and Supplies

Not Applicable.

3.4 Field Preparation

NOTE When using the call-out list (Appendix 3, *TSD Inspection Notifications*), the first person on the call-out list should be contacted first, working down the list until someone is contacted. Leaving a message on someone's telephone voice message system does NOT constitute a notification.

- IF the team assigned cannot perform a daily inspection,
  THEN notify a person in Appendix 3, *TSD Inspection Notifications*.

3.5 Approvals and Notifications

NOTE Failure to conduct an inspection is an example of a non-compliance with the LANL Hazardous Waste Permit and requires reporting.

[1] IF an inspection is NOT conducted,
THEN notify the TA-55 Resource Conservation and Recovery Act (RCRA) Compliance/Permit Environmental Representative.

4.0 ACCEPTANCE CRITERIA

Not Applicable.

5.0 PERFORMANCE

5.1 Conducting the Inspection and Completing the Checklist

NOTE 1 The TSD area must be inspected every day. The TSD Unit is defined as the Evaporator Glovebox Tank Component, the external CF feed storage (FT) tanks, and the CF processing equipment. The inspection will occur even when the tanks are not storing waste during holidays and Laboratory closures. The inspection can be performed weekly with the approval of the RLM if the tanks will not be storing waste for an extended period.

NOTE 2 The results of the inspection are recorded on the *Hazardous and Mixed Waste Facility Inspection Record Form* (IRF). The IRF consists of a checklist of conditions that are considered necessary for proper containment and control of RCRA hazardous wastes. Detailed definitions of the items contained on the IRF are found in Appendix 2, *Item Descriptions for the Hazardous and Mixed Waste Facility Inspection Record Form*.

NOTE 3 The secondary containment for the TSD Unit includes the floor of room 401 in which the TSD Unit is located.

NOTE 4 The EV bottoms are considered to be waste as soon as they are transferred to the EV bottoms storage tanks (TK) in the EV salt box, and after radiochemistry has been performed and the item is determined to be discardable through the CF process.

NOTE 5 A typical inspection does NOT require touching any surface on which radioactive or hazardous material may be contacted. Therefore, the inspection may be conducted wearing a lab coat. Consult the RCT for further guidance as needed.

NOTE 6 Hazardous Material Management (NPI-7) provides the IRF partially completed with standard information for the specific TSD being inspected.

[1] Obtain the week's IRF from NPI-7 and begin the inspection, using the IRF as a checklist.

5.1 Conducting the Inspection and Completing the Checklist (continued)

[2] Verify the appropriate information in boxes 1 through 5 of the IRF that describes the location and type of TSD Unit. Fill out these boxes as follows:

Box #	Title	Entry
1	Facility	TA55-4-401
2	Site ID #	481, 1225
		TSD
3	Start Date	Date of Monday
4	End Date	Date of Sunday
5		Check boxes for *Tank* and *Miscellaneous Unit (Open Burn/Open Detonation [OB/OD], Cementation)*

NOTE 1 Appendix 2, *Item Descriptions for Hazardous and Mixed Waste Facility Inspection Record Form*, provides descriptions of each inspection item on the IRF.

NOTE 2 Some items on the IRF may NOT apply to the CF/EV TSD Unit. Examples of possible non-applicable items are listed in the table below.

Table 1, Possible Non-applicable Items

Box #	Title	Entry
10	Security	Securing our country (SOC)
14	Wind Sock	Not Applicable (NA)
17	Run-on/off Control	NA
18	Covers/Lids of Containers	NA
20	Compatibility	NA
22	Aisle Space/Stacking	NA
23	Pallets and Raised Containers	NA
25	Shafts/Landfill Covers	NA
26	Open burning Units	NA
27	Open Detonation Units	NA
28	Cementation Units	NA when no treatment occurred that day and there is no un-cemented hazardous waste.

[3] IF room 401 is red lit,
THEN proceed to section **7.0 Contingencies**.

[4] Fill out the IRF as described below.

[a] Write OK in the box for all items inspected on a given day for which no deficiencies were noted.

[b] IF an observation cannot be clearly determined as a deficiency,
THEN consult your Waste Management Coordinator (WMC) before marking the IRF with an action required (AR).

5.1 Conducting the Inspection and Completing the Checklist (continued)

NOTE For each AR noted, additional information to clarify the AR must be noted, including work orders, small-job tickets, and memos. Include the type of problem, action required, and date and time that action was taken.

[c] Write AR in the box of any item for which a deficiency was noted.

1. Complete Part II of the IRF to explain the AR entry.

2. IF more than one AR is required,
THEN identify each AR with a sequential number.

3. IF an emergency equipment deficiency is found,
THEN stop work immediately, notify management, and wait for instructions.

4. Enter the AR on subsequent inspection dates until the deficiency is corrected.

5. WHEN the deficiency has been corrected,
THEN state the details in Part II of the IRF.

[d] Enter the date, time, printed name and signature in the IRF in boxes 29 through 31.

[e] Enter document informational comments associated with the current inspection that do NOT require specific regulatory action or remedies in Part III of the IRF.

NOTE The following steps are performed at the end of the IRF inspection period (weekly).

[5] Photocopy the completed IRF and keep the copy for your records.

[6] Submit the original to NPI-7.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Testing

Not Applicable.

6.2 Restoration

Not Applicable.

6.3 Results

- Ensure results are recorded on the IRF.
- Complete the Post-job Review as per PA-AP-01020, *Pre-Job Briefing and Post Job Review*.

6.4 Independent Verification

Not Applicable.

6.5 Records Processing

See Section 11.0

7.0 CONTINGENCIES

- IF room 401 is red lit
  THEN perform the following actions:

  [a] On the IRF, in the specific column for the date of the event, write the words "Red Lit" or a descriptor of the event preventing the inspection.

  [b] In Part III of the IRF, state why the room is not accessible (for example, "Room not accessible due to Continuous Air Monitor (CAM) alarm" or "Room rad contaminated from glove breach").

  [c] Enter the date, time, and inspector signature in Part I of the IRF.

  [d] Process the IRF according to **5.1** steps **[5]** and **[6]**.

NOTE The Evaporator Glovebox Tank Component comprises the glovebox that houses the individual TK tanks. Only leaks from the glovebox are required to be remediated within 24 hours (including weekends), NOT the individual TK tanks.

- IF there is a spill/leak
  THEN perform the following actions:

  [a] IF it is safe to do so,
  THEN note the extent, source and/or characteristics of the spill/leak.

  [b] Contact the OC and report the abnormal condition.

  [c] Evacuate the room and post barriers to alert personnel.

  [d] Contact the TA-55 RCRA Compliance/Permit Environmental Representative as soon as possible.

8.0 DEFINITIONS AND ACRONYMS

Term	Definition
AK	acceptable knowledge
ALARA	as low as reasonably achievable
AR	action required
CAM	continuous air monitor
CF	cement fixation
CFR	Code of Federal Regulations
CSLA	criticality safety limit approval
DOE	Department of Energy
DOP	detailed operating procedure
EPA	Environmental Protection Agency
EV	evaporator
FOD	Facility Operations Director
FT	Stabilization Unit Pencil Tanks
IRF	Inspection Record Form
LANL	Los Alamos National Laboratory
NA	Not Applicable
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act
OB/OD	open burn/open detonation
OC	operations center
PIC	Person In Charge
PPE	personal protective equipment
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RLM	Responsible Line Manager
RWPs	radiological work permits
SOC	Securing our country
TK	EV bottoms storage tanks
TSD	treatment, storage, and disposal
UET	Use every time
WMC	waste management coordination

9.0 RESPONSIBILITIES

9.1 NPI-7/WMC

- Supplies IRF
- Receives the completed IRF and maintains IRF storage

9.2 Inspection Staff

9.2.1 Normal Operations

- NCO-2: Aqueous Nitrate Operators are the primary inspectors.
- NPI-7: Waste and Decontamination Services are the backup inspectors.

9.2.2 Friday, Weekends, and Holidays

- TA55-OPS: Operations are the primary inspectors.
- NPI-7: Waste and Decontamination Services are the backup inspectors.
- NCO-2: Aqueous Nitrate Operators are backup inspectors.

10.0 REFERENCES

Document Number	Title
20 NMAC 4	*New Mexico Hazardous Waste Act (NMHWA)*
40 CFR, Parts 260 - 273	*Code of Federal Regulations - Solid Waste*
DOE/WIPP-02-3122	*Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
EPA ID No. NM0890010515	*Los Alamos National Laboratory Hazardous Waste Facility Permit*
P101-18	*Procedure for Pause/Stop Work*
P409	*Waste Management*
PA-AP-01020	*Pre-Job Briefing and Post-Job Review*
PA-AP-01040	*Records Processing Procedure for ADPSM Organizations*
TA55-RD-539	*TA-55 Waste Management Requirements*
TA55-RD-555	*TA-55 Radiation Protection Requirements*

11.0 RECORDS

Record Identification	Record Type Determination	Protection/Storage Methods	Processing Instructions
Hazardous and Mixed Waste Facility Inspection Record Form	Written process data record	Copy and retain the completed *Hazardous and Mixed Waste Facility Inspection Record Form*. Submit the original to the WMC office.	When the records are ready for final disposition, the record is transferred to Records Management and processed as per PA-AP-01040, *Records Processing Procedure for ADPSM Organizations*.

12.0 APPENDICES AND ATTACHMENTS

Appendix	Title
1	*Permit Considerations*
2	*Item Descriptions for the Hazardous and Mixed Waste Facility Inspection Record Form*
3	*TSD Inspection Notification Call-out List*
4	*Example of Hazardous and Mixed Waste Facility Inspection Record Form*

Appendix 1, Permit Considerations

The following are pertinent excerpts from the Permit:

- **Section 1.9.14 | General Conditions**
  Requires the reporting of noncompliance with the permit; an example of a non-compliance would be failure to conduct an inspection. Your procedure could require that the TA-55 RCRA Compliance/Permit Environmental Professional be contacted.

- **Section 2.4.7 | Waste Characterization Review**
  Requires an annual revaluation of all hazardous waste streams generated to verify the accuracy of initial and subsequent characterization results. This can be an acceptable knowledge (AK) revaluation or analytical based. Since our cementation drums are managed as non-hazardous, an annual analysis of the cement is recommended.

- **Section 4.3 | Replacement Tank System and Stabilization Unit Components**
  The Permittees shall ensure that prior to replacing a portion of the tank or stabilization unit systems, a registered engineer trained and experienced in the proper installation of tank systems or components inspects the system in accordance with the requirements of 40 CFR § 264.192(b). A record of this inspection shall be maintained in the Facility Operating Record.

  If the Permittees repair the storage tank unit or the stabilization unit systems, the Permittees shall certify that the system is capable of handling mixed wastes without release for the intended life of the system in accordance with the requirements of 40 CFR § 264.196(f). This certification must be submitted to the Department within seven days after returning the tank system to use.

  Replacement tanks, their ancillary equipment, and stabilization unit ancillary equipment shall be tested for tightness prior to being placed into use § 264.192(d)). If a replacement tank, tank ancillary equipment or the stabilization unit ancillary equipment is found not to be tight, all repairs necessary to remedy the leak(s) in the system shall be performed prior to the system being placed into use.

- **Section 4.4 | Tank System and Stabilization Unit Containment**
  All leaks and associated accumulated liquids from the Evaporator Glovebox Tank and Stabilization Unit Pencil Tanks (FT) must be removed within 24 hours including weekends. The NMED must be notified within 5 days of detection.

Appendix 2, Item Descriptions for Hazardous and Mixed Waste Facility Inspection Record Form

Part I

Daily inspection of TSDs will be conducted in accordance with the inspection plan in the most recent Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit. Not all items in this section will apply to all facilities. An "NA" (not applicable) is required if the item does not apply.

1. Location information, including TA, building, room (if applicable), and any other location descriptors that may be necessary (*e.g.*, TA-59-3-114 or TA-59-1-S, Dock).
2. A site identification number is assigned to every facility by the Resource Conservation and Recovery Act (RCRA) compliance personnel. This allows for ease in identification.
3. Start date of Monday for the week of record.
4. End date of Sunday for the week of record.
5. Check the appropriate box for the type of operation. Several boxes may be checked, if necessary, for those locations where inspections are combined on a single sheet. You must have prior approval from RCRA compliance personnel to combine inspections for more than one unit.
6. These boxes are to be marked N/A. The TSD area must be inspected every day. The TSD Unit is defined as the TK tanks inside the EV salt box, the external CF FT tanks, and the CF processing equipment. As a best management practice the tanks will be inspected daily. The inspection will occur even when the tanks are not storing waste during holidays and Laboratory closures.
7. These Boxes are to be marked N/A (see 6).
8. Communication equipment must be inspected in order to ensure availability and proper operating condition for each piece of equipment (*e.g.*, telephones, radios, and alarms). Equipment must be present in accordance with the appropriate contingency plan.
9. Required signs must be legible and prominently posted in accordance with 40 CFR § 264.14(c) and/or the permit as applicable.
10. Site security must be verified. Items such as fences, gates, locks, and other access control equipment (as appropriate) should be checked for proper operating condition.
11. Roads, process floors, and other work surfaces at TSDs must be inspected for any conditions that could lead to a spill or an accident.
12. Hazardous or mixed waste TSDs must have fire control and spill control equipment. Equipment must be present, in proper operating condition, and appropriate for the material in question. Hose bibs, where present, should be inspected for proper operating condition and adequate pressure. Outdoor fire-water supply systems must be checked for freezing and damage. Equipment must be inspected and present in accordance with the appropriate inspection and contingency plans.

Appendix 2, Item Descriptions for Hazardous and Mixed Waste Facility Inspection Record Form

13. Where present, eyewashes and safety showers must be inspected to ensure proper operating condition. Outdoor locations must be checked for freezing.
14. Wind socks, where present at outside TSDs, must be inspected to ensure that they are in proper operating condition/functional and checked for damage.
15. Secondary containment structures for hazardous or mixed waste operations must be inspected to verify proper operating condition and to ensure adequate capacity. Structures must also be inspected for the presence of standing water or hazardous/mixed waste or any other indication of a spill (*i.e.* discolored vegetation, soil, or concrete). For certain operations, secondary containment includes inspection of gloves, gloveboxes, hoods, and ventilation systems. For locations where inflatable "Porta Berms" are used, inspectors must ensure that they are adequately inflated. All monitoring and leak detection systems must also be checked.
16. Loading and unloading areas must be inspected daily when in use for signs of damage or deterioration that may lead to an accident or spill. This includes asphalt covered areas and areas where containers or tanks are handled or the contents thereof are transferred.
17. Run-on and runoff controls, wherever present, must be checked. The integrity should be inspected by looking for signs of damage, erosion, ponding, or any other conditions that could lead to a spill or an accident.
18. All tanks and containers used for storing hazardous or mixed waste must have the cover or lid securely in place. Containers are not considered to be closed until the lid/cover is fastened in the manner the manufacturer originally intended. However, the lid may be off of a tank or container while waste is being placed into or removed from a container. *Note: Mark as N/A since these tanks do not have lids.
19. All containers and tanks containing hazardous or mixed waste must be labeled with the words "HAZARDOUS WASTE," and Environmental Protection Agency (EPA) Hazardous Waste Numbers or hazardous waste constituents. They must also be marked with a legible accumulation start date. All containers must be dated when they arrive at the facility and no hazardous or mixed waste may be stored for over one year, unless specifically exempted.
20. All hazardous or mixed waste containers holding materials that may be incompatible with any other materials at that location must be separated from those materials by dikes, berms, or other physical barriers to prevent a possible reaction.
21. All containers and tanks must be checked for structural integrity, leakage, corrosion, or damage that may impact integrity. This includes checking the condition of all construction materials, fixtures, seams, and auxiliary equipment. There are special inspection criteria for tank systems (see Item 24 below).

Appendix 2, Item Descriptions for Hazardous and Mixed Waste Facility Inspection Record Form

22. Adequate aisle space must be maintained to allow for inspection and for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency. Containers of hazardous and mixed waste must be stored in a manner that ensures a minimum 2-foot aisle space and containers may not be stacked more than 3 high, unless otherwise specified for the facility (*i.e.* some units within the LANL Hazardous Waste Facility Permit must have an aisle space of 28 inches and only 55 gallon drums may be stored three high). Please consult RCRA compliance personnel for permit related questions.
23. Hazardous or mixed waste containers stored at TSDs must be on pallets, elevated, or otherwise raised to be protected from contact with accumulated liquid.

TANKS SYSTEMS:

24. For tank systems used for treatment or storage of hazardous or mixed waste, all aboveground portions of the tank system, including any and all ancillary plumbing, must be inspected for signs of leaking, corrosion, deterioration, or improper operation. Tanks must be operated with a minimum freeboard of 6 inches. If the tank system includes discharge controls, overtopping controls, tank level alarms, or other monitoring equipment, including leak detection equipment, all controls and relevant data must be checked to ensure they are operating properly and that operation is within design specifications for the system.

SHAFTS:

25. Shafts used for retrievable storage should have their covers securely in place and the surrounding area should show no evidence of erosion. Disposal shafts and shafts used for retrievable storage should have their covers securely in place and, during waste handling operations, guard rails must be installed and in good condition. Landfill covers must be inspected at least weekly and after storms for evidence of erosion, subsidence, and water intrusion.

OPEN BURNING UNITS:

26. Open burning units must be inspected for deterioration, leakage, vegetation in the immediate vicinity that could catch fire, and assure that the unit is covered when not in use. Inspectors must also look for explosives and debris not consumed during the burn.

OPEN DETONATION UNITS:

27. Open detonation units must be inspected for deterioration, leakage, or vegetation in the immediate vicinity that could catch fire. Inspectors must also look for explosives and debris not consumed by the detonation.

CEMENTATION UNITS:

28. The structural integrity and condition of equipment and systems must be inspected on stabilization units. Units must also be inspected for signs of leaking, corrosion, deterioration, or improper operation.

Appendix 2, Item Descriptions for Hazardous and Mixed Waste Facility Inspection Record Form

FOR ALL INSPECTIONS:

29. Record of the date of the current inspection. Only one date is given for each inspection, whether a team or an individual performs the inspection.
30. Record of the time of the current inspection. Only one time is given for each inspection, whether a team or an individual performs the inspection.
31. Legible and/or printed name of each inspector involved in the current inspection.

PART II

List any action required.

32. Document any action taken immediately and express any plans for future action to be taken. Also, ensure that previous ARs are closed out with completed actions described. If the AR has not been resolved, ensure that it is carried over to the current inspection. Status should be provided for both open and closed items. If necessary, attach additional sheets to inspection record form to efficiently cover the action taken or required. Initial any information or comments added, and if more than one action is required or conducted, assign a number to each AR.

PART III

Identify any comments.

33. Document informational comments and any status associated with the current inspection that does not require specific regulatory action or remedies.

Appendix 3, TSD Inspection Notifications

	Name	**Phone #**	**Pager #**
TA-55 Waste Management Coordinator	Egan McCormick	667-8158	664-6753
TA-55 RCRA Compliance/Permit Environmental Representative	Jeff Carmichael	665-2505	664-4220
TA-55 Operations Center	various	667-3330	
Cement Fixation Subject Matter Expert	Georgette Ayers (or current)	665-0443	664-3362
Aqueous Nitrate Processing First Line Manager	Ron Chavez (or current)	667-0220	664-3022

Appendix 4, Example of Hazardous and Mixed Waste Facility Inspection Record Form

HAZARDOUS WASTE FACILITY INSPECTION RECORD FORM

[1] FACILITY: TA55-4-401	[2] Site ID #: 481,1225	TREATMENT, STORAGE, OR DISPOSAL UNIT (TSD)	[3] START DATE:	[4] END DATE:

☐ Containers ☐ Landfill ☐ Chemical Treatment X Tank X Miscellaneous Unit (OB/OD, Cementation)

PART I- Enter condition of the item inspected (*i.e.* **OK, NA** [Not Applicable], or **AR** [Action Required]) in column for day inspected.

ITEM	INSPECTED FOR:	MON	TUE	WED	THU	FRI	SAT	SUN
[6] NO UNIT USE	No waste stored	N/A	N/A	N/A	N/A	N/A	N/A	N/A
[7] NO WASTE HANDLING	No waste handled (see instructions)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All TSDs								
[8] COMMUNICATIONS EQUIPMENT	Availability and proper operating condition							
[9] WARNING SIGNS	Posted, legible, and bilingual							
[10] SECURITY	Good condition of fences, gates, locks, and other access control equipment	SOC	SOC	SOC	SOC	SOC	SOC	SOC
[11] WORK SURFACES/ FLOORS/ROADS	Absence of conditions that could lead to an accident or spill							
[12] SPILL/FIRE EQUIPMENT	Present, appropriate, and in proper operating condition							
[13] EYEWASHES/ SAFETY SHOWERS	Proper operating condition							
[14] WIND SOCK	Proper operating condition and functional	NA	NA	NA	NA	NA	NA	NA
[15] SECONDARY CONTAINMENT	Integrity- No standing water/waste, erosion, or signs of a spill							
[16] (UN)LOADING AREA	No spills or deterioration							
[17] RUN-ON/OFF CONTROL	Integrity- no ponding, erosion, or damage	NA	NA	NA	NA	NA	NA	NA
Container Storage Units and/or Tanks (see instructions)								
[18] COVERS/LIDS OF CONTAINERS	Closed and secured properly	NA	NA	NA	NA	NA	NA	NA
[19] LABELS	Proper with start date, present & legible							
[20] COMPATIBILITY	Separated according to compatibility	NA	NA	NA	NA	NA	NA	NA
[21] INTEGRITY	No leakage, corrosion, or damage							
[22] AISLE SPACE/STACKING	Appropriateness and adequacy	NA	NA	NA	NA	NA	NA	NA

Appendix 4, Example of Hazardous and Mixed Waste Facility Inspection Record Form

FACILITY: TA55-4-401	Site ID #: 481,1225	START DATE:	END DATE:

ITEM	INSPECTED FOR:	MON	TUE	WED	THU	FRI	SAT	SUN
[23]PALLETS AND RAISED CONTAINERS	Absence of conditions that could result in failure	NA	NA	NA	NA	NA	NA	NA
[24]TANK SYSTEMS	Discharge controls and fill level and no corrosion or leakage							
Other TSDs								
[25]SHAFTS/LANDFILL COVERS	Presence and condition of cover	NA	NA	NA	NA	NA	NA	NA
[26]OPEN BURNING UNITS	Condition of cover, and no erosion, leakage, or damage	NA	NA	NA	NA	NA	NA	NA
[27]OPEN DETONATION UNITS	Unit and vegetation condition and no erosion	NA	NA	NA	NA	NA	NA	NA
[28]CEMENTATION UNITS	Structural integrity and condition of equipment and systems							

	MON	TUE	WED	THU	FRI	SAT	SUN
[29] DATE							
[30] TIME							
[31] INSPECTOR(S)							

Part II- For any AR (Action Required) in PART I, describe below: action required, action taken, status, date, and time of action. Attach additional sheets if necessary. If more than one action is required, number each AR.

[32]

Part III- Comments.

[33]

ENCLOSURE 9

Examples of data sheets filled out in accordance with PMT2-DOP-CF-006

ENV-DO-14-0145

LA-UR-14-24631

Date: JUL 0 2 2014

2/19/14 in WCATS (had issues)

Extended Until 6/24/15 per Memo MET-DO-13-08. Extension request was approved by Jeff Yarbrough on 06/24/13

CEMENT RUN SHEET

Date 2-10-14 Workers GH, CU, GO Drum # 65535

Tare 77.4 Filter GJ-800 Scale A

TK to FT Transfer EU DIST 799630

TK 1 to FTx 1-CF0214-A Vol 50 L TK 4 to FTy 2-CF0214-B Vol 25 L

EU DIST 799629

TK3 EU DIST 799356

Other waste ID# N/A Gross ____ Tare ____ Net ____

pH probe # 6

7 Lot # 127191 10 Lot # 126648

7 Exp date 11/14 10 Exp date 10/14

99.1 slope

Titration 1

5.1 L EV + total volume with NaOH 8.4 pH 9.63

Vol of NaOH 3.3 NaOH/EV ratio 0.65

Remainder FTx to drum 20+21 Total FTx to drum 49.1

Pu ~~6.72~~ 1.03 Am .65 1.10 2-10-14

Titration 2

~~7.8~~ 5.8 4.9 L EV + total volume with NaOH 9.1 pH 11.7

CA 152304 2/10/14

Vol of NaOH 3.3 NaOH/EV ratio 0.57

Remainder FTy to drum ~~25~~ 18.6 Total FTy to drum 24.4

CA 152304 2/10/14

Pu 6.72 Am .65

Drum pH adjust Final pH in drum 11.35

Cement

Starting vol 108.0 L Starting wt 348.0 Lbs.

Cement wanted: actual vol (L) x 1.1 kg/L x 2.2 lb/kg = 261 lbs

Expected final weight 609. lbs (8.4)

Timer: cement wanted lbs/___ lbs/min= 5.4 min 60.0

Additional time needed 3.0 Final weight ~~656~~ 654 2/11/14

Attachment C, Performance Checklist

Page 1 of 2

Course:	Session:

Procedure No.: PMT2-DOP-CF-006,R1 Title: pH Adjustment of Evaporator Bottoms for Cement Fixation

Task Hazard Level ☐ Minimal ☐ Low ☒ Medium ☐ High ☐ Mission-critical

Worker's Name: _____ Z number _____

☐ Worker has completed the following qualification prerequisites

_____
(Verifier's name and Z number)

☐ _____ ☐ _____

☐ _____ ☐ _____

☐ _____ ☐ _____

Qualification Requirements

Task #	Emergency Actions	Instruction	Evaluation
1	Discuss what to do in case of an emergency.	☐	☐
	Comments		
Task #	**Hazards and Controls**	**Instruction**	**Evaluation**
1	Describe the hazard associated with nuclear criticality and how to minimize it.	☐	☐
2	Describe the hazard associated with ionizing radiation and how to minimize it.	☐	☐
3	Describe the hazard associated with alpha contamination and how to minimize it.	☐	☐
4	Describe the hazard associated with air pressure and how to minimize it.	☐	☐
5	Describe the hazard associated with operating equipment and how to minimize it.	☐	☐
6	Describe the hazard associated with dangerous chemicals and how to minimize it.	☐	☐
7	Describe the hazard associated with working on elevated platforms and how to minimize it.	☐	☐
	Comments		

Attachment C, Performance Checklist

Page 2 of 2

Task #	Procedural Steps	Instruction	Evaluation
1	Discuss logging and inspecting the pH probe.	☐	☐
2	Discuss and/or demonstrate how to calibrate the pH probe to the pH 7 and pH 10 buffer solutions.	☐	☐
3	Discuss the difference between the first batch from a tank and any other batch from a tank.	☐	☐
4	Discuss the transfer of EV Bottoms solution to the glass column and drum.	☐	☐
5	Discuss adjusting and documenting the pH of a representative sample.	☐	☐
6	Discuss how to clear the lines and document the volumes on the STLS.	☐	☐
7	Discuss how to adjust the final pH in the drum.	☐	☐
	Comments		

Signature Approvals

Worker's Name (Last, First, Middle Init.)	Signature	Z #	Group	Date

(Your signature indicates that you are confident to safely and independently perform work relative to this procedure.)

Instructor's Name (Last, First, Middle Init.)	Signature	Z #	Group	Date

(Your signature indicates that you are confident that the worker indicated above is adequately prepared for a performance evaluation.)

Evaluator's Name (Last, First, Middle Init.)	Signature	Z #	Group	Date

(Your signature indicates that you are confident that the worker indicated above has been adequately trained to safely and independently perform work relative to this procedure.)