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Shielded Container Assembly Handling and Operation Manual

Cognizant Department: Packaging Integration

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1.0 SCOPE 1, 2, 3

This document provides an outline of recommended procedures for the safe handling, effective operation, and proper maintenance of the Shielded Container Assembly (SCA). The SCA is not currently authorized for use at the Waste Isolation Pilot Plant (WIPP).

2.0 GENERAL DESCRIPTION

The SCA was developed to package and transport transuranic waste with gamma-emitting radiation as contact-handled (CH-TRU) waste to the WIPP utilizing the HalfPACT (Type B) shipping packaging, or to be used as a stand-alone U.S. Department of Transportation (DOT) 7A, TYPE A, packaging.

The SCA is approximately the size of a 55-gallon drum and consists of a twin-shelled carbon steel cylindrical structure and a lid. Nominally, 1-inch of lead shielding is contained between the 7-gauge inner shell and 11-gauge outer shell. The shells are welded to an upper flange and a 3-inch thick solid steel bottom. The 3-inch thick solid steel lid integrates a silicone rubber gasket, fifteen 1/2-inch alloy steel closure bolts (flange hex head cap screw), two alignment pins to facilitate remote assembly, and a lead-shielded filter port. The lead-shielded filter port is comprised of a 7/8-inch thick lead filter shield plug and a 7-gauge carbon steel filter shield cap. Three threaded holes in the lid are available to interface with a lifting fixture for lifting and handling the SCA. One threaded hole in the bottom (base) is available for lifting and handling the SCA during fabrication but is subsequently plugged with a 1/2-inch alloy steel socket set screw. The lid, body, inner shell, body flange, body base, closure bolts, gasket and user-supplied, gasketed vent filter form the confinement boundary. The SCA is designed to carry one 30-gallon vented payload drum, in which all contents shall be contained. In addition to the various payload forms allowed within the drum, the SCA may optionally contain a mesh bag to facilitate remote loading of the drum into the SCA. The SCA has an approximate empty weight of 1,726 lb., and is designed for a maximum gross shipping weight of 2,260 lb. The maximum content weight is 450 lb.

Material content forms authorized for transport in the SCA are:

- Material Form No. 1: Direct load: Solids, any particle size (e.g., fine powder or inorganic particulate)
- Material Form No. 2: Direct load: Solids, large particle size (e.g., sand, concrete, or debris)
- Material Form No. 3: Direct load: Solids, large objects (e.g., metal cans containing waste)

3.0 REFERENCE DOCUMENTS

The following documents apply to performing various handling and operational activities. These documents shall be referred to during the applicable operations of this procedure.

3.1 WTS/WIPP Construction Drawings and Specifications

- WTS Drawing 165-F-026: Shielded Container Assembly
- WTS Drawing 163-L-024: Shielded Container Lift Assembly
- WTS specification E-I-478, Specification for Fabrication of the Shielded Container Assembly
- WTS Specification E-I 474, Specification for RH-TRU Drum Handling Bag

3.2 U.S. DOT 7A Compliance Documents

- Title 49 of the Code of Federal Regulations (CFR), Part 173, Section 173.474 (49 CFR §173.474), Quality Control for Construction of Packaging
- Title 49 of the *Code of Federal Regulations* (CFR), Part 178, Section 178.3 (49 CFR §178.3), *Marking of Packagings*
- Title 49 of the Code of Federal Regulations (CFR), Part 178, Section 178.350 (49 CFR §178.350), Specification 7A; General Packaging, Type A

3.3 WIPP Shipment Compliance Documents

- Certificate of Compliance 71-9279 for Model No. HalfPACT Shipping Package
- Safety Analysis Report for the HalfPACT Shipping Package
- 163-008, Shielded Container SAR Drawing
- DOE/WIPP 90-45, Remote-Handled Transuranic Content Codes (RH-TRUCON)
- Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC)
- DOE/WIPP 02-3122, Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant
- PE-08-0001, Q-List and Quality Category Assessments for Shielded Container Components

- Shielded Container Type A Evaluation Report, Washington TRU Solutions, ECO 11834
- DOE/WIPP 08-3384 Waste Isolation Pilot Plant Approved Filter Vents

4.0 SAFETY PRECAUTIONS

4.1 General Safety Precautions

Only approved payloads, as defined in Section 2.0, are to be transported in the SCA when used as a DOT 7A, Type A packaging. During use and handling of the packaging, safety precautions in accordance with this manual as dictated by individual site procedures must be observed. Precautions include, but are not limited to the following:

- Structural modifications shall not be made to the SCA.
- If hardware replacement is required, replacement hardware shall meet the requirements of the assembly/manufacturing drawing.
- Procedures and recommendations in this document shall be followed when
 lifting and handling the SCA. The user shall assume the responsibility for
 safely performing all hoisting and rigging operations. Only qualified personnel
 shall be permitted to handle, rig, transport, or otherwise use the packaging.
 The user shall be responsible for determining qualifications of personnel.
- Observers shall be kept at a safe distance from the SCA while it is being lifted or moved.
- The SCA shall not be used to store, contain, or transport contents other than the contents for which the packaging was designed.
- Use only recommended solvents and adhesives, or as approved by the Type A Packaging Engineer. Ensure the products are site-approved. Follow product manufacturer's health and safety guidelines for the use of their product, as well as site-specific health and safety guidelines.
- SCAs should be stored indoors whenever possible. If outdoor storage is unavoidable, then the SCAs shall be covered and stored on blocks to prevent rusting and the ingress of water. In addition, the filter port shall be vented in a way which precludes the ingress of water and debris.

4.2 Warnings

Detailed safety warnings are used to promote personnel safety and are denoted by the prefix **WARNING**. Such warning statements and procedures shall be followed. A **WARNING** means **FAILURE TO HEED SUCH PROCEDURES COULD RESULT IN SERIOUS INJURY TO PERSONNEL**.

4.3 Cautions

Cautions before a step are denoted by the prefix **CAUTION**. Cautions alert personnel that a failure to comply with the caution **COULD RESULT IN DAMAGE TO CONTENTS OR PACKAGING**.

5.0 PRELOADING TOOLS, SUPPLIES AND SPARE PARTS

The following items may be either manual tools or service powered devices. The user shall verify, or show evidence, that the items used meet the capability and stated certification requirements as applicable in accordance with site-specific procedures.

5.1 Required Tools

- 3/4-inch socket (for closure bolts)
- 6 or 12-point socket (appropriate size for filter installation)
- Ratchet drive wrench
- Calibrated torque wrench
- SCA Lift Assembly (WTS Drawing 163-L-024)
- RH-TRU Drum Handling Bags

Recommended Spare Parts (Available from Seller, referenced drawing 165-F-026)

- Closure bolts (½-13UNC hex head cap screw, Item 15)
- Lid seal (gasket, Item 7)
- Protective plugs (Items 14 &16)
 - Touch-up paint (aerosol enamel, gloss white)

5.3 Recommended Supplies (Commercially Available)

- Denatured alcohol
- General purpose adhesive remover containing a mixture of Naphtha and Xylene (commonly available at automotive parts stores)

5.4 Approved Filters

The SCA shall be equipped with one user-supplied filter vent per DOE/WIPP 08-3384 in accordance with Section 2.5 of the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC)⁵.

6.0 HANDLING PREREQUISITES

6.1 Initial Inspection

NOTE

New SCAs shall be shipped from the fabricator assembled on a shipping pallet with six (6) of the closure bolts installed wrench-tight in the lid, one on either side of the three lift interface points on the lid. The balance of the closure bolts and the gasket are bagged separately and shipped inside the SCA.

NOTE

Additional inspection guidance is provided in Subsection 9.1. Pre-use inspection of the SCA (See Subsection 6.3) may take place at any time and in any sequence prior to using the SCA, providing all applicable inspection criteria are met. Handling of empty SCAs shall be performed in accordance with Subsection 7.1.

- 6.1.1 Ensure both lid and body serial numbers match and are traceable to the fabricator's Certificate of Conformance required by specification E-I-478. If the lid and body serial numbers do not match, or are not traceable to the fabricator's Certificate of Conformance, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.
- 6.1.2 Inspect the SCA for signs of damage, distortion or corrosion. If such conditions exist to the extent that confinement or shielding could be compromised, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.

6.2 Lid Removal

NOTE

The SCA is designed to be lifted only with the SCA Lift Assembly, including when removing the SCA from the shipping pallet. The user shall be responsible for ensuring all other rigging is properly rated for lifting a fully loaded SCA.

NOTE

Removal of the SCA Lift Assembly from the SCA is the reverse of Steps 6.2.3 and 6.2.4, and may be performed as needed.

- 6.2.1 With the SCA staged within an overhead crane envelope, remove all closure bolts from the lid, and store the closure bolts in a manner that will preclude damage or loss.
- 6.2.2 Remove the protective plugs from each of the three lifting point threaded holes on the SCA lid, and inspect the condition of the threads. If any threads have minor deformation or discontinuity (foreign material, burrs, cross thread, weld spatter, etc.), the user may correct the condition by using a ½-13 UNC-2B bottoming tap, or plug tap to a minimum depth of 3/4-inch.
- 6.2.3 Attach the SCA Lift Assembly to the lid by inserting each of the three lift studs into each of the threaded lift interface points on the SCA lid.
- 6.2.4 Rotate each lift stud handle in the clockwise direction until hand-tight.
- 6.2.5 Attach the crane hook, or suitable rigging to the SCA Lift Assembly.

WARNING

Pinch points are present between lid and body. In order to avoid injury, hands and fingers must be kept clear of these areas.

- 6.2.6 Raise the crane to lift the SCA lid straight up from the SCA body.
- 6.2.7 Stage the lid in a manner that will preclude damage to the lid.

6.3 Pre-use Inspection

6.3.1 Ensure all assembly components are present: Body assembly (1 each), lid assembly (1 each), gasket assembly (1 each), closure bolts (15 each), protective plugs for lifting points (3 each), and protective plug for vent port.

- 6.3.2 Retrieve the gasket and the closure bolts from the interior of the SCA. The gasket is supplied as a continuous circular ring. Inspect the lid gasket. Replace it with a new gasket if the gasket is damaged or shows signs of deformation or deterioration.
- 6.3.3 Inspect the condition of the threads in each of the 15 closure bolt holes in the body flange. If any threads have minor deformation or discontinuity (foreign material, burrs, cross thread, weld spatter, etc.), the user may correct the condition by using a ½-13 UNC-2B bottoming tap, or plug tap to full depth.
- Inspect the condition of the threads in each of the 3 lifting points on the SCA lid. If any threads have minor deformation or discontinuity (foreign material, burrs, cross thread, weld spatter, etc.), the user may correct the condition by using a ½-13 UNC-2B bottoming tap, or plug tap to a minimum depth of 3/4-inch.
- 6.3.5 Inspect all interior and exterior surfaces of the SCA for signs of damage, distortion or corrosion. If such conditions exist to the extent that confinement or shielding could be compromised, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.

7.0 LIFTING, HANDLING AND PREPARATION

7.1 Handling Empty SCAs

7.1.1 An empty SCA shall remain on the shipping pallet during storage, and while being transported to the area of intended use. The SCA shall be lifted using the SCA Lift Assembly only. A minimum of six (6) closure bolts shall be installed in the lid, one bolt on either side of the three lift points. The closure bolts shall be wrench tight at a minimum.

7.2 Handling and Storage of Loaded SCAs

7.2.1 Loaded SCAs shall be lifted only with the SCA Lift Assembly and shall be stored only in the vertical position in accordance with site-specific procedures.

7.3 Overhead Lifting

The SCA is designed to be lifted only with the SCA Lift Assembly. The user shall be responsible for ensuring all other rigging is properly rated for lifting a fully loaded SCA.

- 7.3.1 With the SCA lid installed in accordance with Subsection 7.7, attach the SCA Lift Assembly to the lid by inserting each of the three lift studs into each of the threaded lift interface points on the SCA lid.
- 7.3.2 Rotate each lift stud handle in the clockwise direction until hand-tight.

7.3.3 Attach the crane hook, or suitable rigging to the SCA Lift Assembly.

WARNING

Failure to perform a short test lift to verify all rigging and attachments are adequate before lifting the SCA to the intended lift height could result in serious personnel injury.

WARNING

Failure to keep all personnel a safe distance from the suspended load could result in serious personnel injury.

CAUTION

Abrupt stops or starts while lowering or raising the SCA MUST be avoided to prevent damage to the SCA or SCA Lift Assembly.

- 7.3.4 Lift the SCA a few inches to ensure all rigging connections and/or attachments are satisfactory.
- 7.3.5 After verifying that all rigging is secure, lift the SCA to the required height.

7.4 Forklifts

The SCA is not designed to interface with a forklift, and should only be lifted or transported by forklift when on a shipping pallet.

7.5 Lid Gasket Installation

NOTE

Prior to gasket installation, it must be verified that the gasket shelf life has not expired.

- 7.5.1 Invert the SCA lid, or place the lid on a suitably configured lid stand to gain access to the gasket recess.
- 7.5.2 Verify the gasket recess is clean, and free of foreign material. Refer to Subsection 9.2.3 (b) if the use of a solvent is necessary to obtain a clean surface.

- 7.5.3 Place the gasket in the gasket recess in the SCA lid with the protective tape side of the gasket against the lid.
- 7.5.4 Peel approximately four to six inches of the protective backing away from the gasket adhesive.
- 7.5.5 Tear the protective backing in two, and fold back in either direction away from the exposed adhesive.
- 7.5.6 Place the gasket (exposed adhesive side toward the lid) into the gasket recess in the lid. DO NOT stretch the gasket during installation.
- 7.5.7 Continue to peel the protective backing away from the gasket adhesive while guiding the gasket into the gasket recess until gasket installation is complete.
- 7.5.8 Once installed, ensure the gasket is in full contact with, and adhered to the lid with no detrimental buckling or creasing of the gasket that limits full adhesion.

7.6 Installation of Filter Vent

NOTE

The SCA requires a single filter vent. The filter vent shall meet the requirements of Subsection 5.4. Prior to filter installation, the protective plug in the vent port must be removed.

NOTE

Prior to filter vent installation, the condition of the filter gasket shall be inspected to verify the absence of cracking, checking or other signs of degradation. Thread sealant is not required for filter installation.

- 7.6.1 Install the filter into the threaded port of the lid. Hand-tighten until the filter is securely seated.
- 7.6.2 Torque the filter as recommended by the filter manufacturer using the appropriate socket and a calibrated torque wrench.

7.7 Lid Installation

NOTE

The SCA is designed to be lifted only with the SCA Lift Assembly. The user shall be responsible for ensuring all other rigging is properly rated for lifting a fully loaded SCA. All contents must be inside the SCA and below the body flange prior to lid installation.

NOTE

The SCA is designed with two alignment pins installed in the lid, with corresponding alignment marks on the lid and body. Corresponding alignment marks are identified on the lid and body such that the lid can be installed in one orientation only.

- 7.7.1 With the SCA Lift Assembly and crane/rigging attached to the lid (Subsections 6.2.3 through 6.2.5), lift the SCA lid and begin lowering it on to the SCA body.
- 7.7.2 Position the lid so that the alignment marks on the lid line up with the alignment marks on the body.

WARNING

Pinch points are present between lid and body flange. In order to avoid injury, hands and fingers must be kept clear of these areas.

- 7.7.3 Lower the lid onto the SCA body while maintaining alignment of the marks, until lid is fully seated on the body.
- 7.7.4 Install each of the 15 closure bolts in the lid, and tighten until wrench-tight.
- 7.7.5 Using a calibrated torque wrench torque the closure bolts to 85 +/- 10 lb-ft.
- 7.7.6 Apply a tamper indicating seal between the lid and body flanges, when the use of a tamper indicator is required.

7.8 Securing SCA to a Conveyance Vehicle

The SCA, when used as a stand-alone package, works well with most conveyance vehicles. The following steps describe how the package may be loaded and secured to a conveyance vehicle. The user shall be responsible for ensuring the methods and equipment are fit for the intended purpose and meet applicable DOT requirements for over-the-road transport.

- 7.8.1 Lift the SCA into position onto the conveyance vehicle according to Subsection 7.3, Overhead Lifting.
- 7.8.2 Use blocking and bracing as necessary to prevent longitudinal or lateral movement of the SCA.
- 7.8.3 Secure the SCA to the vehicle with webbing or other suitable tiedowns. The shipper is responsible for ensuring the tiedown and securement of the SCA.
- 7.8.4 Verify that all rigging and equipment are secure before shipment.

8.0 PAYLOAD HANDLING/LOADING

The 30-gallon payload drum shall be loaded, closed and vented in accordance with site operating procedures The following steps shall be followed in loading the SCA. The lid removal of the SCA is done as stated in Subsection 6.2, Lid Removal. Unless the SCA is intended to be used as a standalone DOT 7A Type A packaging, all payload configurations must comply with Section 2.9.10 of the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC).

8.1 Loading 30-Gallon Drums

NOTE

The use of drum handling bags is a recommended option to facilitate loading operations. Drum handling bags are an approved payload item.

- 8.1.1 Ensure Pre-Use Inspection (Subsection 6.3) has been performed prior to transferring the SCA into the material loading area. General inspection and maintenance guidance is provided in Section 9.0.
- 8.1.2 Protect the sealing surfaces of the SCA from damage during loading.
- 8.1.3 Stage a drum handling bag designed for 30-gallon drums in a suitable drum bag rack, or equivalent apparatus that will hold the bag open, support rigging and keep it clear of the bag opening.
- 8.1.4 Lower the loaded 30-gallon drum into the drum handling bag.
- 8.1.5 Lift the drum handling bag containing the drum to the appropriate working height.
- 8.1.6 Lower the drum handling bag and drum into the SCA.

- 8.1.7 Release the rigging from the drum handling bag straps once the payload is fully lowered into the SCA. All contents must be inside the SCA and below the body flange prior to lid installation.
- 8.1.8 Refer to Subsection 7.7 for lid installation.

9.0 MAINTENANCE, INSPECTION AND REPAIR

Subsection 9.1, Maintenance and Inspection, shall be performed prior to loading the SCA.

9.1 Maintenance and Inspection

During the inspection of the SCA, if defective parts or components are found, they shall be dispositioned in accordance with Section 10.0. Replacement components shall meet original specification requirements to maintain DOT-7A certification. Replacement components are available from the fabricator.

- 9.1.1 Inspect the lid gasket. Replace it with a new gasket if the gasket is damaged or shows signs of deformation or deterioration. Before loading the contents into the container, either verify that the gasket shelf-life has not expired or replace gasket. (See Subsection 9.2.)
- 9.1.2 Verify the body flange gasket sealing surface is clean, and free of foreign material. Clean if needed. Refer to Subsection 9.2.3(b) if the use of a solvent is necessary to obtain a clean surface.

NOTE

Touch-up paint (aerosol enamel, gloss white) may be applied to external, non-sealing areas with minor surface corrosion that have been determined as NOT having an effect on the integrity of the packaging. The fabricator should be contacted for recommended procedures.

- 9.1.3 Inspect all interior and exterior surfaces of the SCA for signs of damage, distortion or corrosion. If such conditions exist to the extent that confinement or shielding could be compromised, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.
- 9.1.4 Verify the serial number on both lid and body are in place and in good condition. If the condition is not legible, tag or label the unit as unusable and segregate away from conforming units. Refer to Section 10.0 for disposition.

9.2 Lid Gasket Replacement

- 9.2.1 Remove the lid according to Subsection 6.2. Invert the SCA lid, or place the lid on a suitably configured lid stand to gain access to the gasket recess.
- 9.2.2 Remove the existing gasket, if present, by manually stripping the gasket from the lid flange.
- 9.2.3 If necessary, clean the gasket seating area as follows:
- a. Remove any residual gasket components or adhesive using a flexible spatula, putty knife, or similar tool, taking care not to scratch the sealing surface.
- b. Apply a liberal amount of low intensity cleaning solvent, such as denatured alcohol or a general purpose adhesive remover containing a mixture of Naphtha and Xylene. Use of acetone or other strong solvents should be avoided as they will remove the paint/coating.

NOTE

Prior to gasket installation, it must be verified that the gasket shelf life has not expired.

- 9.2.4 Place the gasket in the gasket recess in the SCA lid with the protective tape side of the gasket against the lid.
- 9.2.5 Peel approximately four to six inches of the protective backing away from the gasket adhesive.
- 9.2.6 Tear the protective backing in two, and fold back in either direction away from the exposed adhesive.
- 9.2.7 Place the gasket (exposed adhesive side toward lid) into the gasket recess in the lid. DO NOT stretch the gasket during installation.
- 9.2.8 Continue to peel the protective backing away from the adhesive while guiding the gasket into the gasket recess until gasket installation is complete.
- 9.2.9 Once installed, ensure the gasket is in full contact with, and adhered to the lid with no detrimental buckling or creasing of the gasket that limits full adhesion.

10.0 USER QUALITY ACCEPTANCE CRITERIA

If the requirements/criteria of Subsections 6.3 and 9.1 are **NOT** met, the user shall perform the corrective action(s) below following the user's Quality Assurance procedures.

10.1 Nonconformance Report

A nonconformance report (NCR) is a document that identifies and records a nonconforming condition and the action taken for the disposition of the nonconformance. Disposition of nonconforming items includes, accept, reject, rework, use-as-is, or repair using approved instructions.

10.2 Uncorrectable Conditions

Conditions found during visual inspection of the SCA in Subsections 6.3 and 9.1 that are **NOT** readily correctable shall be documented on a Nonconformance Report (NCR) and dispositioned following user's NCR procedures.