

Handling Procedure For US DOT Specification 7A Type A Transportation Cask

TTS-14-212-001
Revision 1, 06/19/15

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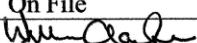
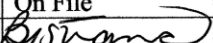
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1.0 Purpose and Scope

- 1.1. The purpose of this procedure is to provide handling and operational instructions for loading / unloading a US Department of Transportation (DOT) Specification 7A, Type A Transportation Cask (TAG Technical Solutions, Inc., Model: 14-212).
- 1.2. This procedure covers specific steps for:
 - 1.2.1. Empty cask receipt preliminaries
 - 1.2.2. Empty cask receipt inspection
 - 1.2.3. Preparing the cask for payload
 - 1.2.4. Loading the cask cavity
 - 1.2.5. Preparing the cask and vehicle for shipment
 - 1.2.6. Loaded cask receipt inspection and payload unloading
 - 1.2.7. Gasket repair and replacement
 - 1.2.8. Gasket sealing surface repair
- 1.3. This procedure may be used in its entirety as is or incorporated into the user's procedures.

2.0 References

- 2.1. Code of Federal Regulations, Title 49
- 2.2. TAG Technical Solutions, Inc. Quality Assurance Manual
- 2.3. TTS Procedure No. TTS-14-212-002, Annual Inspection, Maintenance, Repair and Storage For US DOT Specification 7A, Type A Transportation Cask
- 2.4. TTS Procedure No. QAP-2.1, Personnel Training, Indoctrination and Qualification
- 2.5. TTS Procedure No. QAP-9.1, Control of Special Processes
- 2.6. TTS Procedure No. QAP-4.1, Procurement Control
- 2.7. TTS Procedure No. QAP-12.1, Control of Measuring and Test Equipment
- 2.8. TTS Procedure No. QAP-17.1, Quality Records
- 2.9. TAG Technical Solutions, Inc. Drawing Number TTS-0001A and TTS-0001B
- 2.10. TAG Technical Solutions, Inc. Document Number TTS-ENG-14-212-001, Test and Evaluation Document for US DOT Specification 7A, Type A Packaging for 14-212 Transportation Casks.

3.0 Definitions

- 3.1. **TTS:** TAG Technical Solutions, Inc.
- 3.2. **Transport Operator:** A person qualified and designated as the individual(s) responsible for the operation of over-the-road equipment for the conveyance of radioactive materials utilizing DOT Specification 7A Type A shipping casks and transport trailers.
- 3.3. **DOT Specification 7A Type A Transportation Cask(s):** The packaging utilized to contain and transport radioactive materials, which consists of a specific design qualified as meeting the Department of Transportation 49 CFR 178.350 requirements.
- 3.4. **Transport Trailer:** A dedicated trailer utilized to transport DOT Specification 7A Type A Transportation Cask.

4.0 Responsibilities

4.1. TTS General Manager

- 4.1.1. Responsible for interface with TTS customers regarding equipment conditions, operations, and utilization. If cask handling is to be performed by TTS personnel, responsible for implementation of this procedure and for ensuring that personnel performing activities have been trained and qualified.
- 4.1.2. Responsible for the primary customer interface for shipments of radioactive materials for which a DOT, Specification 7A, Type A shipping cask is utilized.
- 4.1.3. Responsible for ensuring that TTS supplied equipment for the transportation of radioactive materials (DOT, Specification 7A, Type A shipping casks) has been properly inspected, maintained, and repaired. Responsible for ensuring conditions that may have a potential impact on DOT requirements are corrected and, or resolved prior to shipment.
- 4.1.4. Ensuring that unacceptable conditions identified during routine TTS inspection of the cask(s) are corrected and complete prior to the next scheduled shipment date.
- 4.1.5. If cask handling is performed by TTS personnel, ensuring that only qualified personnel perform activities associated with the implementation of this procedure.

4.2. TTS Cask Maintenance Technician

- 4.2.1. Responsible for performing activities associated with the inspection and, or handling and repair of DOT, Specification 7A, Type A shipping casks in accordance with the requirements of this procedure and for providing the results to the TTS General Manager and, or designate.
- 4.2.2. Notifying the TTS General Manager or designate and the transport company of any required maintenance on transport trailers found unacceptable during the course of implementing inspections in accordance with this procedure.
- 4.2.3. Notifying the TTS General Manager, or designate, to provide direction when conditions require input in accordance with this procedure.

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4.2.4. Notifying TTS QA personnel when conditions warrant QA involvement in accordance with this procedure.

4.2.5. Responsible for the maintenance of records in accordance with this procedure.

4.3. **TTS Quality Assurance (QA) Department**

Responsible for performing surveillance of activities associated with the handling of DOT, Specification 7A, Type A shipping casks as well as inspection of cask repairs. QA inspection and, or hold points are not required during activities involving gasket changes or replacement of components unless deemed necessary by nonconformance dispositions.

4.4. **Shipper**

4.4.1. Responsible for completing all paperwork required for the shipment of radioactive materials utilizing DOT, Specification 7A, Type A transportation casks and associated transport trailers.

4.4.2. Adhering to all DOT requirements regarding the conveyance of radioactive materials utilizing DOT, Specification 7A, Type A transportation casks and associated transport trailers.

4.4.3. Notifying all pertinent parties of unacceptable conditions discovered as a result of implementing a pre-delivery inspection in a timely manner and implementing instructions as provided by TTS, Inc.

4.5. **Driver**

4.5.1 Responsible for completing the Attachment B “Verification of Proper Markings, Labeling & Placarding & Cleanliness” checklist after receipt of the cask for transporting.

4.6. **Health Physics Department**

4.6.1 Responsible for providing incoming and release radiological surveys of DOT, Specification 7A, Type A transportation casks and associated transport trailers.

4.6.2 Providing guidance, direction, and instruction with regard to radiation protection for individuals implementing tasks in accordance with this procedure.

4.7. **User**

It is the responsibility of the user of a DOT, Specification 7A, Type A transportation cask to ensure the following:

4.7.1. They have a copy of the applicable requirements for the cask and the documents referenced therein that contain user-relevant information.

4.7.2. They are a valid user of the cask.

- 4.7.3. The cask has been inspected under a Quality Assurance (QA) Program to verify its compliance with the requirements of 49 CFR for US DOT, Specification 7A, Type A Transportation Casks.
- 4.7.4. All documentation required for the shipment is properly completed.
- 4.7.5. The cask is loaded in accordance with this procedure and the applicable regulatory requirements.
- 4.7.6. The shipment meets all the Department of Transportation, Burial Site Disposal Criteria and Burial Site License requirements.
- 4.7.7. The TTS Operations office is notified immediately if there is a problem meeting any of the requirements of this procedure.

5. Safety and Environmental Precautions

- 5.1 Observe all applicable safety precautions including proper lift, rigging, and handling in accordance with this procedure and all applicable site-operating procedures.
- 5.2 Technicians shall use proper radiological procedures and abide by Radiation Work Permits, if required, to minimize radiation exposure and the spread of contamination.
- 5.3 Technicians shall follow all safety rules in the course of their duties and use proper personnel protective equipment as required by Health and Safety requirements, or equivalent, for the task being performed.

6. Prerequisites

- 6.1 Prior to inspection or repair activities, ensure that a radiological survey of the equipment has been performed. Use proper personnel protective equipment and ALARA practices as required by health and Safety requirements for the task being performed.
- 6.2 Prior to the implementation of lifting/handling tasks, ensure that all equipment is properly rated for the loads to be handled.
- 6.3 Prior to implementing lifting/handling tasks, an inspection of all rigging and components shall be conducted to ensure the components are in good working order and free from defects and damage. Damaged or defective components must be replaced prior to use.
- 6.4 Ensure the crane being used is rated for the intended load.

7. Equipment

- 7.1 Slings or cables
- 7.2 Calibrated torque wrench, calibrated for the lowest and highest value required by this procedure.

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- 7.3 All Measuring and Test Equipment (M&TE) utilized shall be in accordance with Reference 2.7 or applicable site calibrated equipment requirements.
- 7.4 Components and, or services necessary for equipment repair and maintenance shall be procured in accordance with Reference 2.6.

8 Records

All documentation on the cask handling, component replacement, and repair are quality records and shall be maintained in accordance with Reference 2.8.

9 Procedure

9.1 Empty Cask Receipt Prerequisites

- 9.1.1 Ensure radioactive material to be shipped in the cask is a Type A quantity [49 CFR 173.403] of radioactive material and Low Specific Activity Material or Surface Contaminated Objects [49 CFR 173.403] or a Type A quantity [49 CFR 173.431(a)] of solid Normal or Special Form [49 CFR 173.403] radioactive material. The material may contain fissile material provided it satisfies one of the 49 CFR 173.453 Fissile Exemption conditions.
- 9.1.2 Ensure radioactive material is packaged or will be packaged in an acceptable manner in accordance with the Department of Transportation (49 CFR), U.S. Nuclear Regulatory Commission (10 CFR), and the applicable burial site requirements (Burial Site Disposal Criteria and/or Licenses).
- 9.1.3 Ensure all relevant procedures and documents for the cask containing user-relevant information are in your possession.
- 9.1.4 Ensure the site where this procedure is to be used has a valid Quality Assurance Program in accordance with the requirements for using the cask as Type A packaging in the transport of the radioactive materials

9.2 Empty Cask Receipt Inspection

9.2.1 Verifications upon receipt

- 9.2.1.1 Exterior nameplates, stencils, placards and other required identification are in place and legible.
- 9.2.1.2 All required documentation is completed and retained, displayed as specified by the regulatory authority and the user.

9.2.2 Radiation Survey

- 9.2.2.1 Survey the empty cask and the vehicle to determine the maximum external removable and fixed contamination levels.

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9.2.2.2 External loose contamination levels should be less than 2,200 DPM/100 cm² Beta-Gamma and less than 220 DPM/100 cm² Alpha.

9.2.2.3 External fixed contamination levels should be less than 0.5 mrem/hr.

NOTE: Fixed contamination greater than 0.5 mrem/hr, but less than 50 mrem/hr requires the cask to have a Yellow II label. Under such conditions the empty cask must be a Radioactive Shipment and be accompanied by properly completed Radioactive Shipment Records.

9.2.2.4 If removable radioactive contamination in excess of 22,000 DPM/100 cm² is found on the external surfaces of the cask and, or transport trailer, immediately notify the final delivering carrier and, as required, the appropriate U.S. Department of Transportation office.

9.2.3 Inspect Tie-downs

9.2.3.1 Inspect tie-down lugs and shackles on casks and trailer for cracks and wear which would affect their strength.

9.2.3.2 Inspect tie-down cables to ensure that they are not loose or damaged (crimped, frayed, etc.).

9.2.3.3 Inspect tie-down ratchets/turnbuckles to ensure that they are in proper working condition.

9.2.4. Inspect cask

9.2.4.1. If cask is equipped with a rain-cover, remove it.

9.2.4.2. Inspect ratchet binders that hold the primary cask lid to the body of cask to ensure that they are in proper working condition.

9.2.4.3. Inspect exterior of cask, including any drain or vent port plugs, for defects that might affect the cask integrity or shielding.

NOTE: Vent and, or drain plug(s), if so equipped, need not be removed. Visual inspection is adequate.

9.2.4.4 Inspect the primary cask lid hold-down mechanism to ensure that they are all present and not damaged (i.e., severely corroded, cracked, or deformed).

9.2.4.5 Inspect thread-less bolts and lock pins for cracks and wear which would affect their strength.

9.2.4.6 If provided, ensure that the secondary cask lid lifting lug covers are secured.

9.2.4.7 Inspect the secondary cask lid hold-down nuts and flat washers (if present)

to ensure that they are all present and not damaged (i.e., severely corroded, cracked, or deformed).

NOTE: If a discrepancy is found during the course of inspecting the cask or a repair or replacement is performed, document the findings / repairs and immediately notify TTS.

9.3 Removing Cask From Trailer

If required, remove the cask from the trailer as follows.

- 9.3.1. Loosen tie-down ratchets/turnbuckles as necessary to remove pins from shackles at cask end of tie-down system.
- 9.3.2. Remove pins from shackles.
- 9.3.3. If applicable, loosen cask shear ring as necessary.
- 9.3.4. Using all the cask lifting lugs and suitable rigging, lift cask off trailer and place cask in proper position for loading.

NOTE 1: Empty Cask Weight (with lids installed) is given in Appendix A.

NOTE 2: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection certification for use.

NOTE 3: Do **NOT** use the primary cask lid or secondary cask lid lifting lugs to lift cask.

9.4 Loading the Cask Cavity

9.4.1 If the primary cask lid is to be removed, proceed as follows.

- 9.4.1.1 If cask is equipped with a rain cover, remove the rain cover from the cask.
- 9.4.1.2 Release each ratchet binder handle from its storage position.
- 9.4.1.3 Engage the flip block to the sprocket wheel in the direction necessary to loosen the ratchet binder.

<p>CAUTION: Ratchet binder handle rotation can become tight when loosening or tightening a ratchet binder.</p>

9.4.1.4 Loosen the ratchet binder by pulling the handle in the appropriate direction.

9.4.1.5 Remove the retaining lock pin from the thread-less bolt.

9.4.1.6 Remove the thread-less bolt by pulling the bolt through the holes in the upper ratchet binder connector and lid closure lug.

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9.4.1.7 Using the three (3) primary cask lid lifting lugs, suitable rigging, and exercising caution in the handling of the cask lid due to possible contamination of the underside of the lid, remove the primary cask lid.

NOTE 1: Primary Cask Lid Weight (with secondary cask lid installed) is given in Appendix A.

NOTE 2: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection/certification for use record

NOTE 3: Care shall be exercised to prevent physical damage to the lid (e.g., bracings/blockings/cushioning).

9.4.1.8 Inspect primary cask lid gasket for damage, including cuts, gouges or loss of resiliency that would affect proper sealing. Also inspect the gasket-sealing surface for loose, chipped, or scratched painted surfaces, which would affect proper sealing.

NOTE: Refer to Step 9.7 if gasket repair or replacement is required and 9.8 if sealing surface repair is needed.

9.4.1.9 Inspect interior of cask for standing water and foreign material and remove if present.

NOTE: Water and foreign material must be removed prior to cask loading.

9.4.1.10 Inspect interior of cask for obstructions to loading and remove if present.

9.4.1.11 Ensure through inspection that interior of cask is free of defects that might affect the cask integrity or shielding.

9.4.2. If the secondary cask lid is to be removed, proceed as follows.

9.4.2.1. Remove the secondary cask lid hold-down nuts

9.4.2.2. If provided, remove the secondary cask lid lifting lug cover.

9.4.2.3. Using the secondary cask lid lifting lugs, suitable rigging, and exercising caution due to possible contamination of the underside of the secondary cask lid; remove the secondary lid.

NOTE 1: Secondary Cask Lid Weight provided in Appendix A.

NOTE 2: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection/certification for use record.

NOTE 3: Care shall be exercised to prevent physical damage to

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the lid (e.g., bracing/blocking, cushioning).

9.4.2.4. Inspect secondary cask lid gasket for damage, including cuts, gouges or loss of resiliency that would affect proper sealing. Also inspect the gasket-sealing surface for loose, chipped, or scratched painted surfaces, which would affect proper sealing.

9.4.2.5. Inspect the secondary cask lid hold-down studs for damage, including deformed, scored, or stripped threads, or severe corrosion.

NOTE: Refer to Step 9.7 if gasket repair or replacement is required and Step 9.8 if sealing surface repair is needed.

9.4.3. Loading drums: pallets inside cask.

NOTE 1: Review Suggested Pre-Release Checklist or similar site document and shipping papers to ensure that required inspections are performed during the cask loading process and that the information required on the shipping papers is determined.

NOTE 2: The total weight of all items placed inside the cask must not exceed the payload limit given in Appendix A.

NOTE 3: All pallet types should use the same drum-loading pattern.

NOTE 4: For maximum shielding, load higher dose rate drums in the center position and the positions toward the front and rear of the trailer.

9.4.3.1 Inspect pallet slings for damage or wear. Using the slings and exercising caution in the handling of the Pallet due to possible contamination, remove the top pallet from the cask.

NOTE: Do **NOT** use suspect slings.

9.4.3.2 Place pallet into cask ensuring all pallet lift slings are positioned to a void damage.

9.4.3.3 Exercising caution to avoid placing drums on the pallet lift slings, load drums on the pallet in the cask

9.4.3.4 When loading is complete, install the primary cask lid.

NOTE: Cask must be properly sealed prior to shipment.

9.4.3.5 Proceed to section "Preparing Cask and Vehicle for Shipment."

9.4.4. Loading drums: pallets outside the cask.

NOTE 1: Review Suggested Pre-Release Checklist or similar site document and

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shipping papers to ensure that required inspections are performed during the cask loading process and that the information required on the shipping papers is determined.

NOTE 2: The total weight of all items placed inside the cask must not exceed the payload limit given in Appendix A.

9.4.4.1. Inspect pallet slings for damage or wear. Using slings and exercising caution in the handling of the pallet due to possible contamination, remove both the pallets from the cask.

NOTE: Do **NOT** use suspect slings.

9.4.4.2. Load drums onto each pallet.

9.4.4.3. Lift one of the loaded pallets and place it inside the cask. For maximum shielding, ensure proper orientation of pallet. Ensure all pallet slings are positioned to avoid damage.

9.4.4.4. Lift the other loaded pallet and place it inside the cask on the top of the first pallet. For maximum shielding, ensure proper orientation of pallet. Ensure all pallet slings are positioned to avoid damage.

9.4.4.5. Ensure easy access to the pallet lifting slings for removal of pallet.

9.4.4.6. When loading is complete, install the primary cask lid.

NOTE: Cask must be properly sealed prior to shipment.

9.4.4.7. Proceed to section “Preparing Cask and Vehicle for Shipment.”

9.4.5. Loading a container to be processed in the cask.

NOTE 1: Review Suggested Pre-Release Checklist or similar site document and shipping papers to ensure that required inspections are performed during the cask loading process and that the information required on the shipping papers is determined.

NOTE 2: The total weight of all items placed inside the cask must not exceed the payload limit provided in Appendix A.

9.4.5.1. Inspect container slings for damage or wear. Using the slings, place the container in the cask.

NOTE 1: Do **NOT** use suspect slings.

NOTE 2: Shoring and bracing between the container and the cask is not required for close fitting containers.

9.4.5.2. Load the waste into the container through the secondary cask lid

opening. Once loading is complete, in a manner consistent with ALARA, inspect the cask cavity for foreign matter (e.g., water, solids) and remove if present.

NOTE: The total weight of the waste loading, container (including lid, plugs, caps, or other attachments) shoring, shielding, and any other items present in the cask cavity after the cask is closed and ready for shipment must not exceed the payload limit given in Appendix A.

9.4.5.3. Install the container lid, plugs or caps onto the container.

9.4.6. Loading a Preprocessed Container Into the Cask

NOTE 1: Review Suggested Pre-release Checklist (Attachment A) or similar site document and the shipping papers to ensure that required inspections are performed during the cask loading process and that information required on the shipping papers is determined.

NOTE 2: The total weight of all items placed inside the cask must not exceed the payload limit given in Appendix A.

9.4.6.1. Ensure that the container lid, plugs or caps are installed on the container.

9.4.6.2. Inspect container slings for damage or wear. Using the lifting slings, place container into the cask.

NOTE 1: Cask Payload Weight Limit is given in Appendix A.

NOTE 2: Shoring and bracing between the container and cask is not required for close fitting containers.

9.4.6.3. Install the primary cask lid.

NOTE: Cask must be properly sealed prior to shipment.

9.4.7 Installation of Primary Cask Lid

9.4.7.1 Prior to installation of the primary cask lid, inspect the primary cask lid gasket and sealing surface for the following.

9.4.7.1.1 Gasket fully secured to the cask

9.4.7.1.2 Gasket not cut, ripped or gouged.

9.4.7.1.3 Gasket is resilient

9.4.7.1.4 Gasket is free of debris, dirt and, or grease

NOTE: Refer to section 9.7 if gasket repair or replacement is required. Refer to section 9.8 if gasket sealing surface

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repair is required.

9.4.7.2 Before sending a cask to a user, TTS checks to ensure that the annual gasket inspection is on file and in compliance. Copies of documentation are available electronically; see title page for contact information.

9.4.7.3 Using the three (3) lifting lugs on the primary cask lid to accommodate suitable rigging, place primary cask lid on cask using alignment pins or alignment marks to ensure proper positioning. Take care to avoid gasket damage.

NOTE 1: Primary Cask Lid Weight (with secondary cask lid installed) is provided in Appendix A.

NOTE 2: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection / certification for use record.

9.4.7.4 Secure the primary cask lid to the cask using ratchet binders.

NOTE: Appendix A gives the specific hold-down mechanism information applicable to the cask.

9.4.7.5 Install each thread-less bolt through the upper ratchet binder connector and the lid closure lug

9.4.7.6 Install each retaining/lock pin through the hole in the thread-less bolt.

9.4.7.7 Tighten each ratchet binder by engaging the flip block to the sprocket wheel and rotating the ratchet binder. Pull the handle away from the cask in the direction of tightening.

CAUTION: Ratchet binder handle rotation can become tight when loosening or tightening a ratchet binder.

Visual inspection is necessary to ensure that the ends of the ratchet binder are moving together when the handle is rotated to tighten the primary lid. Ensure that all ratchet binders are equally tensioned as tightly as can be achieved without the use of mechanical aids such as “Cheater Bars,” or ratchet handle extensions.

9.4.7.8 Tighten ratchet binders so lid is snug against gasket without compressing it. The sequence of tightening the binders is provided in Appendix B.

9.4.7.9 Once all binders are snug, torque using a ratchet binder torque adapter provided with the cask. Torque the binders as follows, using the same tightening sequence provided in Appendix B.

9.4.7.10 Slide the ratchet binder torque adapter over the end of the ratchet binder handle until it can be slid no further. Install torque adapter lock

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pin (if provided).

- 9.4.7.11 Calculate the maximum and minimum torque wrench settings or dial readings (Appendix C) required by substituting the cask specific required torque value (Appendix D) and wrench lengths in the equation.
- 9.4.7.12 Torque the ratchet binder to the determined wrench setting or dial readings.
- 9.4.7.13 Visually inspect the primary cask lid to verify uniformity of closure.
- 9.4.7.14 Disengage each flip block and rotate and secure the handle to its storage position and install lock pin.
- 9.4.7.15 Install the primary cask lid lifting covers.
- 9.4.7.16 Install a shipping security wire through the hole at end of one ratchet binder handle, and then around handle on second ratchet binder. In addition to this security wire, the cask user has the option to place a second security wire on another ratchet binder located on the opposite side of the cask.

9.4.8 Installation of Secondary Cask Lid

- 9.4.8.1 Prior to installation of the secondary cask lid, inspect the secondary cask lid gasket and sealing surface for the following.

- 9.4.8.1.1 Gasket fully secured to the secondary cask lid

- 9.4.8.1.2 Gasket not cut, ripped or gouged

- 9.4.8.1.3 Gasket is resilient

- 9.4.8.1.4 Gasket is free of debris, dirt and/or grease

- 9.4.8.2 Inspect hold-down studs for thread imperfection, galling, or other damage.

- 9.4.8.3 Inspect lid hold-down flat-washers (if present) for damage. Replace if necessary.

- 9.4.8.4 Inspect the lid hold-down nuts for damage, gouges, or thread damage. Replace if damage is found.

- 9.4.8.5 Inspect the gasket-sealing surface for loose, chipped, or scratched painted surfaces that would affect proper sealing.

NOTE: Refer to Step 9.7 if gasket repair or replacement is required and Step 9.8 if sealing surface repair is needed.

- 9.4.8.6 Before sending a cask to a user, TTS checks to ensure that the

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annual gasket inspection is on file and in compliance. Copies of documentation are available electronically; see title page for contact information.

- 9.4.8.7 Using the secondary cask lid lifting lug and suitable rigging, lift and place lid into the opening on the primary cask lid. Use alignment pins to ensure proper positioning. Take care not to damage gasket.

NOTE 1: Secondary Cask Lid Weight is provided in Appendix A.

NOTE 2: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection /certification for use record.

- 9.4.8.8 Ensure that all threaded surfaces and seating areas are coated with an anti-seize compound. Tighten the secondary cask lid stud nuts hand tight.

- 9.4.8.9 Tighten each nut in the sequence provided in Appendix B until each has attained the torque the value specified in Appendix D.

- 9.4.8.10 Install shipping security wires on the secondary lid through the hole provided in one of the secondary lid stud nuts.

NOTE: Cask must be properly sealed prior to shipment.

- 9.4.8.11 Proceed to “Preparing Cask and Vehicle for Shipment.”

9.5 Preparing the Cask and Vehicle for Shipment

- 9.5.1 If cask was removed from trailer, use the four (4) cask lifting lugs and suitable rigging to lift cask and place cask in proper position on trailer. Alignment marks, if present, should be used to ensure proper orientation on trailer.
- 9.5.2 Inspect tie-down lugs and shackles on cask and transport trailer for cracks and wear which would affect their strength.
- 9.5.3 Inspect cask trailer tie-down cables to ensure they are not loose or damaged (crimped, frayed, etc.)
- 9.5.4 Inspect cask cable tie-down ratchets/turnbuckles to ensure they are in proper working condition.
- 9.5.5 Install a shackle through the end of each tie-down cable and attach to cask tie-down lug by screwing pin through shackle and hole in lug.
- 9.5.6 If applicable, tighten the cask shear ring to secure the cask in position.
- 9.5.7 Tighten tie-down ratchets/turnbuckles as necessary to secure cask on trailer.

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9.5.8 Ensure that the primary cask lid, secondary cask lid, and cask lifting lugs are covered for transit.

9.5.9 Ensure all tamper-proof seals are installed and intact.

NOTE: For casks with a drain or vent port plug, if the drain or vent port has been used, or if its tamper-proof seal has been disturbed, the plug shall be removed, reinstalled with a pipe joint sealing compound, and torque to 25 (± 2) ft-lbs. A new tamper-proof seal shall then be installed.

9.5.10 Survey the loaded cask to ensure compliance with receiving facility requirements. Inspect for surface contamination per the site release requirements.

9.5.11 If the cask is equipped with a rain-cover, install rain-cover

9.5.12 Placard vehicle and label cask as necessary

9.5.13 Recheck all cask tie-down devices for proper security

9.5.14 Complete the necessary shipping papers, certifications, and Pre-Release Checklist, (Attachment A), or site equivalent.

9.5.15 The driver of the transportation cask shall complete Attachment B “Verification of Proper Markings, Labeling & Placarding & Cleanliness” checklist.

9.6 Loaded Cask Receipt Inspection and Payload Unloading

9.6.1 Survey the cask and trailer in accordance with applicable site requirements and criteria provided in Section “Empty Cask Receipt Inspection.”

9.6.2 Perform an external inspection of the unopened cask. Record any significant or potentially significant observations.

9.6.3 If cask is equipped with a rain-cover, remove it.

9.6.4 Remove the primary cask lid in accordance with this procedure.

9.6.5 Exercising caution in accordance with ALARA, connect slings from the container or pallet to a suitable lifting device. To the extent feasible and consistent with ALARA, inspect the slings for damage or wear.

NOTE 1: Prior to use of rigging, verify its suitability for the load being lifted and that it has an up-to-date inspection/certification for use record.

NOTE 2: Do **NOT** use suspect slings.

9.6.6 Exercising caution in accordance with ALARA, lift the payload (e.g., container or pallet) clear of the cask and place in site assigned location.

NOTE: Care should be taken to avoid damage to primary cask lid gasket.

- 9.6.7 Repeat, as necessary, for multiple payload packages.
- 9.6.8 After unloading the cask, the interior and exterior shall be visually inspected to ensure that they have not been significantly damaged (i.e., no cracks, punctures, holes, or broken welds). Inspect for water and foreign material and remove if present.
- 9.6.9 Ensure exterior nameplates, stencils, placards and other required identification is in place and legible.
- 9.6.10 Ensure ratchet binders, stud nuts, thread-less bolts, and gaskets are in place, in good condition and free of defects.

NOTE: If significant damage is found, notify TTS.

9.7 Gasket Repair and Replacement

9.7.1 Gasket Repair

9.7.1.1 Gaskets shall be resilient and completely adhered to the appropriate surface.

9.7.1.2 Gaskets in good condition but not adhered to the appropriate surface shall be reattached as follows.

9.7.1.3 Gently pull gasket away from its normally secured location until it cannot be removed further without damaging the gasket.

9.7.1.4 Remove the residual adhesive from the appropriate surface with solvents recommended by 3M Co. (for the CA-40 adhesive used) or mechanical means (fine steel wool).

9.7.1.5 Apply 3M Co. CA-40 adhesive or equal to the gasket and reattach.

9.7.1.6 Hold gasket in place for initial set.

9.7.2 Gasket Replacement

9.7.2.1 Gaskets that are damaged, including for example, nicks, cuts, chips, or indentations, may be replaced in their entirety as follows.

9.7.2.2 Remove old gasket.

9.7.2.3 Remove the residual gasket and adhesive from the appropriate surface with solvents recommended by 3M Co. or equivalent (for the CA-40 adhesive or equivalent used) or by mechanical means (careful scraping followed by fine steel wool).

9.7.2.4 Check fit of new gasket in its normally secured location.

9.7.2.5 Apply 3M Co. CA-40 adhesive or equivalent to the new gasket and attach

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it to the appropriate surface.

9.7.2.6 Hold gasket in place for initial set.

9.7.2.7 Perform a visual inspection of the gasket.

9.8 Gasket Sealing Surface Repair

- 9.8.1 Any surface in contact with the gasket must be maintained in good condition. Any loose, chipped, or scratched surface must be repaired if sealing integrity is reduced.
- 9.8.2 Large surfaces needing repair may be steam or pressurized hot water cleaned using standard commercial equipment, chemical solutions, and procedures. Appropriate contamination controls need to be used in performing the cleaning and collecting of the resultant waste.
- 9.8.3 Chipped or scratched gasket sealing surfaces shall be repaired or repainted as follows.
- 9.8.4 Remove any rust or loose coatings and sand edges so they flair into sound coating/surface.
- 9.8.5 For painted surfaces, prime bare surfaces with a good commercial quality red oxide primer or Tnemec 66-AA90 self-priming epoxy (or equivalent). Paint primed surface with Tnemec Series 73-AA90 Endura-Shield high build polyurethane or equivalent.

NOTE 1: These coating numbers designate a white color and paint brands that are the standard TTS color and paint system. If the user has ordered another color or paint system, that shall be used for the re-coat as appropriate.

NOTE 2: Dulled or oxidized surface finishes may be restored via the use of normal automotive finishes and waxes.

***** End of Procedure *****

**ATTACHMENT A
Suggested Pre-release Checklist**

Handling Procedure For US DOT Specification 7A, Type A Transportation Cask: TTS-14-212-001, Rev. 1

Pre-Release Checklist

Inspection Date:		Inspection Location:	
Cask Model Number:		Cask Serial Number:	
Shipment Number:		Transport Company:	
Trailer Number:		Driver Name:	

Arrival on Site				Departure from Site			
Date:		Time:		Date:		Time:	

Item	Description	Initials
1.	Inner Container(s) Sealed (i.e., lids, vents installed)	
2.	Inner Container(s) Secured in Place	
3.	No Free Standing Water, Obstructions, or Significant Damage in Cask Interior	
4.	No Significant Damage to Cask Exterior	
5.	All Gaskets and Gasket Sealing Surfaces Inspected and Satisfactory for Use	
6.	Primary Cask Lid and, or Secondary Cask Lid Hold-down Nuts/Ratchet Binders Properly Torqued	
7.	Drain and Vent Port Plugs Installed and Properly Torqued	
8.	Tamper-proof Seals Installed and Inspected	
9.	Lifting Lug Covers Installed	
10.	Cask Tie-downs Inspected	
11.	Cask Properly Labeled	
12.	Vehicle Properly Placarded	
13.	Surveys Completed and Recorded	
14.	Shipping Papers Properly Filled Out and Signed	

Denote items not applicable with "N/A".

APPROVALS			
Inspected By (Print):		Title	
Inspected By (Signature):		Date:	
Verified By (Print):		Title:	
Verified (Signature):		Date:	

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**APPENDIX A
Cask Weight, Torque and Shipping Information**

Handling Procedure For US DOT Specification 7A, Type A Transportation Cask: TTS-14-212-001, Rev. 1

Attachment B

VERIFICATION OF PROPER MARKINGS, LABELING & PLACARDING & CLEANLINESS

This diagram is to be used for any TAG Type A, Type B or Empty Cask shipment.
For example, if a label or panel is not used for your shipment, please cross out on this diagram. Include with manifest, return to VS LLC with driver.

Driver Initials - Initial after each completed task.

_____* Have the shipper fill out the diagram prior to leaving the site and verify
(Initials) that the cask is labeled and marked per diagram.

_____* Ensure the shipper gives you spare labels and markings prior
(Initials) to leaving the site.

_____*At each stop, walk around the cask to ensure markings are
(Initials) still on the cask. Check each tiedown to ensure nuts and bolts are tight, lockwires are in place and cables. Correct any deficiencies.

_____*Stop within a short distance (i.e. <1/2 mile) of the receiving facility
(Initials) to inspect the cask and markings. Verify all labels and marking are per diagram prior to entering the burial site.

_____*Please replace all labels, orange panels, placards
(Initials) or weights stickers. If you do not have a replacement, please call your dispatcher, immediately.

Shipper

Interior Cleanliness (if lid removed) 7 visual photo
(Initials) time/date stamp → yes/no yes/no

Diagram of a cask with marking locations:

- 1: USA DOT 7A Type A Radioactive Material
- 2: Orange Panels (Bulk Packaging Marking)
- 3: Radioactive Label-W-I, Y-I, Y-II 2-Labels
- 4: Radioactive Placards-4 Placards
- 5: Weight
- 6: Package Type
- 7: Interior Cleanliness (if lid removed)

Additional markings on the diagram:

- ID # _____
- # of panels _____
- Type _____
- Weight _____
- Type A

I certify this cask has the same number of labels, orange panels, weight stickers and placards as the shipper placed on the cask at time of shipment. All labels, placards stickers and markings are legible and not torn or damaged.

Date: _____ Cask Number: _____ Unit No. _____

Driver Signature (Sign at Final Inspection): _____

FOR INFO

APPENDIX A
Cask Weight, Torque and Shipping Information

Handling Procedure For US DOT Specification 7A, Type A Transportation Cask: TTS-14-212-001, Rev. 1

Cask Weight and Torque Information for Model 14-212 Casks

1.0 WEIGHT DATA: Approximate Weight in Pounds (lbs.)

Component	Weight
Empty Cask (primary & secondary lids installed)	38,400
Primary Lid (secondary lid installed)	6,600
Secondary Lid	1,150
Payload Limit (sum of all items in the cask cavity)	20,000
Loaded Cask Limit (primary & secondary lids installed)	58,400

2.0 PRIMARY LID TORQUING REQUIREMENTS

- 2.1 The torque sequence is provided in Appendix B, General Torque Sequence.
- 2.2 The equation in Appendix C, General Method for Determining Torque Wrench Values, is to be used.
 - 2.2.1 To determine the torque wrench setting or dial reading D:
 $C = 100, \pm 10 \text{ ft-lbs}$
Range = $\pm 10\%$ (90 to 110 ft-lbs)
 - 2.2.2 Torque each location; use 40 ft-lb increments, until the final calculated torque value D is attained.

3.0 SECONDARY LID TORQUING REQUIREMENTS

- 3.1 The torque sequence is provided in Appendix B, General Torque Sequence
- 3.2 Final Secondary Lid Torque = $100, \pm 10 \text{ ft-lbs}$
- 3.3 Torque each location, use 40 ft-lb increments, until the final calculated torque value D is attained

NOTE: If flat-washers are not present and nut torque is difficult to verify install approved flat-washers under each hold-down nut prior to final torque.

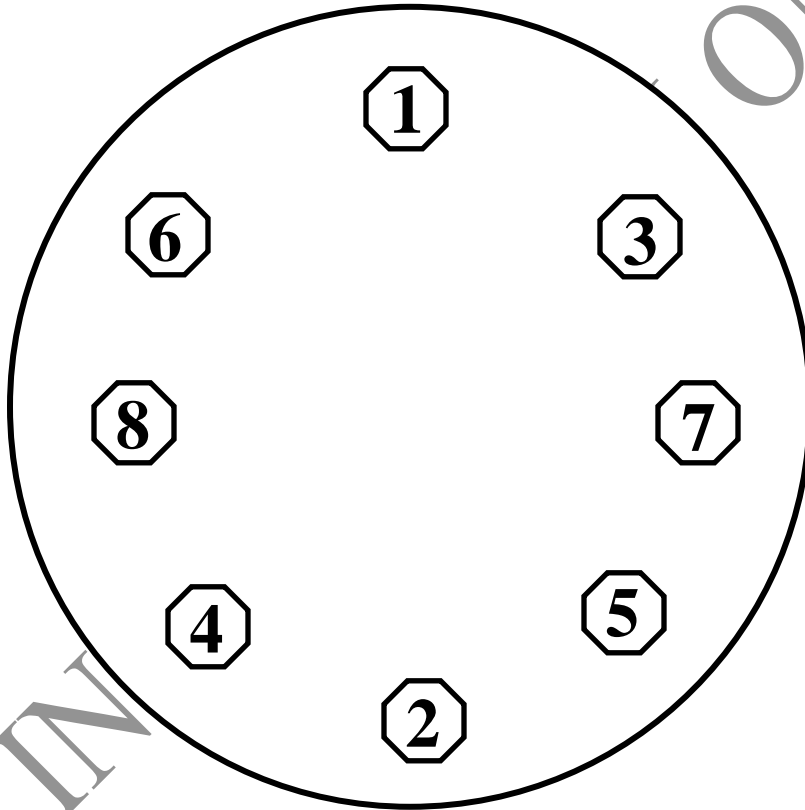
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APPENDIX B
General Torque Sequence

Handling Procedure For US DOT Specification 7A, Type A Transportation Cask: TTS-14-212-001, Rev.0

General Torque Sequence

- 1.0 The proper torque of lid fasteners on the cask is the responsibility of the equipment user. The lid fastener installation and torque sequence shall be accomplished in accordance with the following.
- 2.0 The load tightening and torque sequence shall be consistent with the sequence shown in 3.0.
- 3.0 SKETCH: Torque Sequence



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APPENDICES C & D
General Method for Determining Torque Wrench Values
Required Torque Values

Handling Procedure For US DOT Specification 7A, Type A Transportation Cask: TTS-14-212-001, Rev. 0

Appendix C

General Method for Determining Torque Wrench Values

- 1.0** Determine the required torque wrench reading D to attain the required ratchet binder torque value “C” using the following formula.

$$D = \frac{B}{(A + B)} \times C$$

- 2.0** A = Length from center line of the torque wrench adapter ½" drive socket to the center line of the ratchet binder retaining screw
- 3.0** B = Length of torque wrench from center line of ½" drive to the center of the grip area
- 4.0** C = Required torque for the applicable ratchet binder (see “Cask Weight and Torque Sheet”).
- 5.0** D = Calculated final setting or reading of the torque wrench required to attain “C”
- 6.0** As an example: using a torque wrench with measured length (B) of 18 inches from ½ inch drive socket to center of gripper, a measured length (A) of 12 inches from the centerline of the torque wrench adapter ½ inch drive socket installed on the handle to the centerline of the ratchet binder retaining screw, and a required torque reading of 100 ft-lbs.

$$D = \frac{18"}{18" + 12"} \times 100 \text{ ft-lbs.} = 60 \text{ ft-lbs.} = \text{calculated final torque reading to attain "C"}$$

$$\text{Range} = 60 \pm 10\% = 54 \text{ to } 66 \text{ ft-lbs}$$

- 7.0** The “Cask Weight and Torque Sheet” provides the required ratchet binder torque values.

Appendix D

Required Torque Values

Cask	Required Torque C (ft-lb) and Range (%)	
	Primary Lid	Secondary Lid
14-212	100, ±10 (±10%)	100, ±10 (±10%)

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