SEG
SCIENTIFIC ECOLOGY GROUP, INC.

STD-P-02-040

Operating Instructions for Loading and Unloading the 10-142A Cask

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☒ New Procedure ☐ Title Change ☐ Minor Revision ☐ General Revision ☐ Rewrite

This procedure supersedes LN Technologies Corp. procedure WM-021.

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1. PURPOSE AND SCOPE

The purpose of this procedure is to provide operating instructions for loading and unloading the Scientific Ecology Group, Inc. (SEG) 10-142A radioactive materials shipping cask.

2. APPLICABILITY

This procedure shall be followed when loading or unloading an SEG 10-142A shipping cask. This procedure may be used in its entirety as is or incorporated into the policies and procedures of a registered user.

3. DEFINITIONS

None

4. REFERENCES

4.1 Code of Federal Regulations, Title 10 Part 71

4.2 Code of Federal Regulations, Title 49

4.3 U. S. Nuclear Regulatory Commission Certificate of Compliance No. 9073.

4.4 SEG Quality Assurance Manual

4.5 SEG Procedure STD-P-02-038, Soap Bubble Leak Test for SEG Type A Shipping Casks

4.6 SEG Procedure STD-P-02-039, 10-142A Cask Maintenance

5. RESPONSIBILITIES

Users of the cask shall ensure the following:

5.1 A Certificate of Compliance (C of C) for this cask and all the documents referenced by the C of C which relate to the use and maintenance of the cask are on file.

5.2 User has registered as a user of this certified cask with the U. S. Nuclear Regulatory Commission (NRC) in accordance with References 4.1 and 4.2.

5.3 The cask has been inspected under a quality assurance (QA) program to verify its compliance with the terms and conditions of the issued C of C.

5.4 The cask is loaded and closed in accordance with a written procedure which documents the requirements and restrictions stated in the C of C.

5.5 The shipment meets all of the applicable requirements established by the Department of Transportation (DOT), NRC, burial site disposal criteria, and burial site licenses.

5.6 Lifting requirements of Enclosure 7.1 are reviewed.

6. PROCEDURE

6.1 Cask and Vehicle Receipt Inspection

6.1.1 Perform radiation and external contamination surveys on both the shipping cask and vehicle. Loose and fixed contamination levels shall comply with the requirements of Reference 4.4. In the event these specified levels are exceeded, immediately notify the Transportation Supervisor at SEG, (615) 481-0222.

6.1.2 Inspect tiedown lugs and shackles on cask and trailer for cracks and wear.

6.1.3 Inspect tiedown cables to ensure they are not loose or damaged (crimped, frayed, etc.). Tighten if necessary.

6.1.4 Inspect tiedown ratchets/turnbuckles to ensure they are in proper working condition.

6.1.5 Ensure cask ratchet binders and binder accessories are in proper working condition.

6.1.6 Ensure that impact limiter and secondary lid lifting lug covers are present.

6.1.7 If the cask assembly is to be removed from the transport trailer to facilitate loading, refer to step 6.2.

6.1.8 Remove cask upper impact limiter in accordance with step 6.3.2.

6.1.9 Inspect the primary lid test portal plug for the presence of thread sealant.

6.1.10 Remove cask primary lid in accordance with step 6.3.3.

6.1.11 Inspect primary lid gasket for cracks or tears which would affect proper sealing.

6.1.12 Inspect interior of cask for standing water. Water must be removed prior to shipment.

6.1.13 Inspect interior of cask for obstructions to loading.

6.1.14 Inspect interior of cask for defects which might affect cask integrity.

6.1.15 Inspect the secondary lid holddown nuts to ensure they are all present and not damaged.

6.1.16 If the secondary lid will be removed for loading the cask, or if the secondary lid security seal has been broken or is not installed, inspect the secondary lid outer and inner gaskets for cracks, nicks, or tears which would affect proper sealing. Inspection is not required if secondary lid has not been removed and security seal is in place.

a. Remove the secondary lid from the primary cask lid in accordance with steps 6.3.7.d through 6.3.7.f.

b. Inspect the secondary lid holddown studs for damage.

c. Inspect the two secondary lid gaskets for cracks or tears which would affect proper sealing.

d. Install secondary lid in accordance with step 6.3.9 unless loading requires the secondary lid to be removed.

6.2 Removal of Cask from Trailer

If it is necessary to remove the cask from the trailer to facilitate loading, proceed as follows:

6.2.1 If cask is equipped with raincover, remove the raincover from the cask.

6.2.2 The impact limiter may be removed before or after cask removal from trailer in accordance with step 6.3.2.

6.2.3 Loosen ratchet binders/turnbuckles as necessary to remove pins from tiedown shackles at cask end of tiedown system.

6.2.4 Remove pins from tiedown shackles.

6.2.5 Loosen cask shear blocks or ring if installed on trailer.

CAUTION

Do not use impact limiter lifting lugs to lift cask.

6.2.6 Use three primary lid lifting lugs and suitable rigging to lift cask off trailer and place cask in proper position for loading. Empty cask weight with primary lid and secondary lid in place is 51,000 lbs. Empty cask weight with primary lid, secondary lid, and upper impact limiter in place is 54,000 lbs. Maximum loaded cask weight, with upper impact limiter is 66,000 lbs.

6.3 Loading Cask

Remove the primary full diameter cask lid as follows:

6.3.1 If cask is equipped with a raincover, remove the raincover from the cask.

6.3.2 Disconnect and remove the impact limiter as follows:

a. Remove the eight spring clip pins from the upper impact limiter attachment tabs by pulling the pin out through the hole in the attachment tabs and primary attachment lugs.

b. Remove the impact limiter lifting lug covers.

c. Connect a suitable lifting cable to the three impact limiter lifting lugs in the center ring of the impact limiter.

d. Lift the impact limiter away from the cask. The upper impact limiter weighs 3,000 lbs.

6.3.3 Disconnect the cask primary lid from the cask as follows:

a. Release the ratchet binder handle from its storage position.

b. Engage the flip block to the sprocket wheel in the direction necessary to loosen the ratchet binder.

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

d. Remove the eight spring clip pins by pulling the pin through the hole in the threadless bolt.

e. Remove the eight threadless bolts by pulling the bolt through the holes in the upper ratchet binder connector and primary lid closure lug.

CAUTION

Whenever the cask lid is moved on or off the cask, treat the underside of the lid as a contaminated surface until a contamination survey can be made to verify its status.

Also, ensure that the cask lid is moved high enough above the cask top to avoid damage to the cask lid attachment lugs when the lid is moved away from or over the cask.

f. Remove the cask lid using the three lifting lugs on the cask lid to accommodate suitable rigging. The cask lid weighs 6,990 lbs.

g. Inspect interior of cask for free standing water. All water must be removed prior to loading and shipping.

h. Inspect interior of cask for obstructions which could affect loading or proper placement of drum pallets and/or liners.

i. Inspect the interior of the cask for defects which might affect the cask integrity.

6.3.4 Load five-drum pallets into the cask as follows:

a. Using the slings provided and exercising caution in the handling of the pallet due to possible contamination, remove the top pallet from the cask. Inspect slings on both pallets for damage or conditions which could affect safety.

NOTE

Empty pallet weight is approximately 300 lbs.

b. Exercising caution to avoid placing drums on the pallet lift slings, load five drums on the lower pallet left in the cask.

c. Place the top pallet into the cask. Ensure lower pallet slings are accessible for retrieving pallet when off-loading.

d. Exercising caution to avoid placing drums on the pallet lift slings, load five drums on the top pallet in the cask.

e. Install primary lid in accordance with step 6.3.8.

6.3.5 Load the five-drum pallets outside the cask as follows:

a. Using slings provided and exercising caution in the handling of the pallet due to possible contamination, remove both the pallets from the cask.

b. Inspect slings on both pallets for damage or conditions which would affect safety.

c. Load five drums onto each pallet. For maximum shielding, load higher dose rate drums toward the front and rear of the trailer.

d. Lift one of the loaded pallets and place it inside the cask. Ensure slings of lower pallet are accessible for relieving when off-loading.

e. Lift the other loaded pallet and place it inside the cask on top of the first pallet. Ensure easy access to the pallet lifting slings for removal of pallet at burial site.

f. Install primary lid in accordance with step 6.3.8.

6.3.6 Load a prefilled liner into the cask as follows:

a. Ensure lid and all plugs or caps are installed on liner.

b. Using the lifting slings provided, place liner in the cask.

c. Install shims/shoring or liner inserts between liner and cask as necessary to secure in position.

d. Install primary lid in accordance with step 6.3.8.

6.3.7 Install and load empty liner in cask as follows:

a. Using the slings provided, place liner in the cask.

b. Install shims/shoring or liner inserts between liner and cask as necessary to secure in position.

c. Install primary lid in accordance with step 6.3.8.

d. Remove the eight secondary lid holddown nuts.

e. Remove the secondary lid lifting cover and connect appropriate lifting sling (weight 1,750 lbs).

CAUTION

Whenever the cask secondary lid is moved on or off the cask, treat the underside of the lid as a contaminated surface until a contamination survey can be made to verify its status.

Also, ensure that the cask secondary lid is moved high enough above the cask top to avoid damage to the cask secondary lid guide pins.

f. Remove the secondary lid from the cask and move to suitable storage area.

g. Load the radioactive material into the liner through the cask secondary opening.

h. Install the liner lid, plugs, or caps, as appropriate, onto liner.

i. Reinstall secondary lid in accordance with step 6.3.9.

j. If required by Reference 4.6, perform Soap Bubble Leak Test (Reference 4.5). Test may be performed before or after cask is placed on transport trailer. However, it must be performed before reinstallation of upper impact limiter.

k. If the cask was removed from the transport trailer to facilitate loading, reinstall in accordance with step 6.3.10.

l. Install the upper impact limiter in accordance with step 6.3.12.

m. If the cask is equipped with a raincover, reinstall.

6.3.8 Install primary cask lid as follows:

a. Inspect primary lid gasket for cuts, nicks, or other damage which may affect the sealing capabilities. Replace if necessary (Reference 4.6).

CAUTION

Whenever the cask lid is moved on or off the cask, treat the underside of the lid as a contaminated surface until a contamination survey can be made to verify its status.

Also, ensure that the cask lid is moved high enough above the cask top to avoid damage to the cask lid attachment lugs when the lid is moved away from or over the cask.

b. Use the three lifting lugs on the cask lid and suitable rigging to lift the cask primary lid and place it on the cask. Use the alignment index lug and guide plates for proper positioning. Conduct a visual inspection to ensure that the painted lid index lug on the cask lid lines up between the painted guide plates on the cask body. Adjust the lid position as necessary to accomplish proper alignment.

c. Install the threadless bolt through the upper ratchet binder connector and the primary lid closure lugs on all eight ratchet binders.

d. Install the eight spring clip pins by inserting the pin through the hole in the threadless bolt.

CAUTION

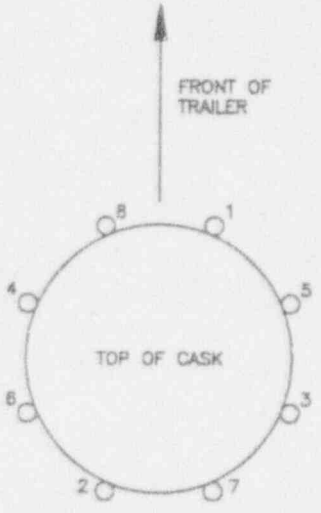
Ratchet binder handle rotation can become tight when loosening or tightening a ratchet binder; therefore, visual inspection is necessary to ensure that the ends of the ratchet binder are moving together when the handle is rotated to tighten the primary lid. Ensure that all ratchet binders are equally tensioned as tightly as can be achieved without the use of mechanical aids (such as "cheater bars" or ratchet handle extensions).

e. Tighten all ratchet binders by hand by engaging the flip block to the sprocket wheel and rotate the ratchet binder handle in the direction necessary to tighten the ratchet binder (80 ft-lbs minimum).

f. Calculate and record the adjusted values of the torque wrench setting in accordance with Enclosure 7.2 for torque value of 80 ft-lbs.

g. After all ratchet binders are hand tightened, torque all ratchet binders in sequential order (see Figure 1) to 80 ft-lbs of torque.

h. After all ratchet binders are torqued to 80 ft-lbs in step 6.3.8.g, use rotational tightening (see Figure 1) to ensure that all ratchet binders are at 80 ft-lbs of torque loading. Two complete passes are required.



Sequential Order	Rotational Order
1 - 2	1
3 - 4	5
5 - 6	3
7 - 8	7
	2
	6
	4
	8

Figure 1

i. Disengage the flip block and rotate and secure the handle to its storage position.

j. Install a shipping security wire through hole at end of one ratchet binder handle, and then around handle on second ratchet binder. Install a second security wire on the ratchet binders on opposite side of cask in the same manner. 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.

6.3.9 Install secondary lid as follows:

a. Inspect the two secondary lid gaskets for cuts, nicks, or other damage which may affect the sealing capabilities. Replace, if necessary (Reference 4.6).

b. Using the one lifting lug on the secondary lid to attach suitable rigging, lift and place secondary lid into the secondary lid opening on the primary lid. Use alignment guide pins to ensure proper lid alignment. If the alignment guide pins are damaged, verify proper lid alignment using the paint alignment markers on the secondary lid and the cask primary lid. Be careful not to damage the gaskets during installation.

c. Secure the secondary lid by installing and tightening the secondary lid stud nuts in accordance with the following torquing sequence:

- Coat all threaded surfaces with an anti-seize compound.
- Install and hand-tighten all fasteners.
- Number fasteners 1 through 8 in a clockwise pattern.
- Torque all fasteners to 20 ft-lbs using the following tightening sequence: 1, 5, 3, 7, 2, 6, 4, 8.
- Torque all fasteners to 40 ft-lbs using the following tightening sequence: 2, 6, 4, 8, 3, 7, 1, 5.
- Torque all fasteners to 55 ft-lbs using the following tightening sequence: 3, 7, 1, 5, 4, 8, 2, 6.
- Check tightness of all fasteners to 55 ft-lbs: 4, 5, 6, 7, 8, 1, 2, 3.

d. Install the secondary lid lifting lug cover.

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

6.3.10 Move cask to trailer as follows:

CAUTION

Do not use the cask secondary lid lifting lug or the upper impact limiter lifting lugs to lift the cask.

a. Use the three cask primary lid lifting lugs and suitable rigging to lift the cask and place it in the proper position on the transport trailer. The lower impact limiter fits over a position ring mounted on the transport trailer.

b. Inspect tiedown lugs and shackles on cask and transport trailer for cracks and wear which would affect their strength.

c. Inspect cask trailer tiedown cables to ensure they are not loose or damaged (crimped, frayed, etc.).

d. Inspect cask cable tiedown ratchets/turnbuckles to ensure they are in proper working condition.

e. Install shackles through the end of the cask tiedown cables and attach to cask tiedown lugs by screwing pin through shackle and hole in lug.

f. Tighten cask cable ratchet binders/turnbuckles as necessary to secure cask on transport trailer.

6.3.11 If required by Reference 4.6, perform leak test (Reference 4.5). Test may be performed before or after cask is placed on transport trailer; however, it must be performed before reinstallation of upper impact limiter.

6.3.12 Install upper impact limiter as follows:

a. Connect suitable rigging to the upper impact limiter lifting lugs and position impact limiter above cask primary lid.

b. Prior to lowering upper impact limiter onto primary lid, align index attachment tab with alignment index lug on cask primary lid.

c. Lower upper impact limiter onto cask primary lid.

d. Install the eight spring clip pins into the attachment tabs.

e. Disconnect lifting cables from upper impact limiter.

f. Install the impact limiter lifting lug covers.

6.3.13 Display proper labels on cask (Reference 4.2).

6.4 **Unloading Cask**

Remove the container(s) from inside the cask as follows:

6.4.1 If the cask is equipped with a raincover, remove the raincover from the cask.

6.4.2 Disconnect and remove the upper impact limiter as per step 6.3.2.

6.4.3 Disconnect and remove the primary lid as per step 6.3.3.

6.4.4 Remove contents from inside cask, being careful not to damage inside of cask lining.

6.4.5 Perform survey of interior of cask and cask pallets if used. Contamination should not exceed limits of Reference 4.2.

6.4.6 Install pallets, if removed.

6.4.7 Reinstall cask primary lid as per step 6.3.8.

6.4.8 Reinstall upper impact limiter as per step 6.3.12.

6.4.9 Ensure all lifting lug covers are accounted for and installed properly.

6.4.10 If cask is equipped with a raincover, reinstall on cask upper impact limiter and attach tiedowns.

6.4.11 Prepare empty cask for transport as per Reference 4.2.

7. ENCLOSURES

7.1 **Type of Lifting**
7.2 **Primary Lid Torque Calculations**

ENCLOSURE 7.1
Type of Lifting

Item	Fixture Required	Item Weight
Secondary Lid	1 point	1,750 lbs
Upper Impact Limiter	3 point	3,000 lbs
Primary Lid with Secondary Lid Installed	3 point	7,000 lbs
Primary Lid with Secondary Lid and Upper Impact Limiter Installed	3 point	10,000 lbs
Cask Assembly without Upper Impact Limiter or Contents	3 point	51,000 lbs
Cask Assembly with Upper Impact Limiter Installed No Contents	3 point	54,000 lbs
Cask Assembly without Upper Impact Limiter but with Maximum Contents	3 point	63,000 lbs
Cask Assembly with Upper Impact Limiter and with Maximum Contents	3 point	66,000 lbs

ENCLOSURE 7.2
Primary Lid Torque Calculations

The Certificate of Compliance requires that all ratchet binders be torqued to a final value of 80 ft-lbs. It is necessary to adapt a standard torque wrench to the ratchet binder handle (a 1/2-in. drive stud, non-ratcheting torque wrench is recommended). The adapter extends the effective length of the torque wrench, therefore, the torque value setting of the wrench must be adjusted to account for the extra length.

$$\frac{B}{B+A} \times C = \textit{Torque Wrench Setting}$$

A = Distance (in inches) from the center of the ratchet binder barrel to the 1/2-in. driver stud socket when the adapter is installed on the ratchet handle.

B = Distance (in inches) from the torque wrench driver stud to the end of the wrench handle.

C = Desired torque value of 80 ft-lbs.

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