ENERGYSOLUTIONS FO-AD-002

Revisions to this procedure must be evaluated per the requirements of SC DHEC License No. 097, Condition 12.

Operating Guidelines For Use Of Polyethylene High Integrity Containers

Revision 38

Authored By: Julien Jenkins, Project Manager — 08/25/20117 Date

Reviewed By: Danny Garner, Project Manager — 08/25/2017 Date

Approved By: Greg Lane, V P Field Services — 08/25/2017 Date

[X] Non-Proprietary	[ ] New
[ ] Proprietary	[ ] Title Change
[ ] Restricted Information	[X] Revision
[ ] Safeguards Information	[ ] Rewrite
[ ] Sensitive Security Information	[ ] Cancellation

Effective Date 08/25/2017

Table of Contents

1. SCOPE

1.1 Purpose

This procedure provides guidelines for the utilization of Energy*Solutions* polyethylene High Integrity Containers (HICs) for resin transfers, demineralization processes, interim storage, and other identified uses by Energy*Solutions*. Adherence to these guidelines serves to protect the integrity of the polyethylene HIC and ensure the HIC meets the requirements of Energy*Solutions'* South Carolina's Department of Health and Environmental Control's Certificate of Compliance.

1.2 Applicability

1.2.1 This procedure applies to all Energy*Solutions* personnel and Energy*Solutions* customers handling, using, storing or shipping polyethylene HICs.

1.2.2 This procedure is to be considered as an addendum to specific utility container handling and interim storage procedures.

2. REFERENCES

2.1 Energy*Solutions* Operating Procedures for Solidification Processes, Demineralization Processes, and Dewatering Processes as specified by the appropriate Energy*Solutions* Project Manager

2.2 Applicable Utility Handling and Storage Procedure(s)

2.3 ES-QA-PR-005, Records

3. DETAILED GUIDELINES

The Energy*Solutions* Technical Service Representative (TSR) or utility representative shall complete the User Checklist (Attachment 7.1) to ascertain compliance with Sections 3.1 through 3.4. It is the TSR's/utility representative's responsibility to sign, date and include the checklist with the shipment. The utility representative shall ensure the waste stream is compatible with applicable sections of this procedure.

3.1 General Storage and Handling

3.1.1 Polyethylene HICs shall be handled and stored in accordance with Reference 2.2 and this procedure.

3.1.2 Polyethylene HICs shall not be stored on or near sharp objects or protrusions that could scrape, cut, or puncture the container.

3.1.3 Each HIC shall be stored on a flat, smooth, supportive surface.

3.1.4 As much as practical, the HICs should be kept out of direct sunlight to prevent ultraviolet light degradation.

3.1.4.1 No polyethylene HIC shall be stored in direct sunlight for a period greater than one year.

3.1.4.2 At the utility's request, Energy*Solutions* shall supply a statement indicating the maximum length of time the HIC may be exposed to direct sunlight. Period will be calculated by subtracting from 365 days the number of days the polyethylene HIC is exposed to sunlight between the date of manufacture and the date it is shipped.

3.1.4.3 When the HIC is ready for shipment, the utility must enter on the User's Checklist (Attachment 7.1) the number of days the HIC was stored in direct sunlight. This number must not exceed the maximum time span allotted for the HIC.

3.1.5 Exposure of the polyethylene HICs to chemicals listed in Attachment 7.4 must comply with the following:

3.1.5.1 No surface contact with organic solvents or oils including gasoline. If contact should occur, rinse off immediately and contact Energy*Solutions* for guidance.

3.1.5.2 No exposure to sensible (detectable by human senses) vapors of the organic solvents.

3.1.5.3 If it is necessary to store polyethylene HICs in the same room with organic solvents, the HICs should be stored in a manner such that, should leaks of the solvent containers occur, the solvents would not come into contact with the HIC surfaces.

Note: Any leakage of organic solvents should be cleaned up immediately to prevent accidental contamination of the HIC surfaces.

3.1.6 When loading or transporting the HIC with a forklift, a flat, smooth, supportive surface must be placed under the HIC.

3.1.7 Only the manufactured metal lifting device supplied with the HIC is acceptable. Contact Energy*Solutions* if the lifting device has been damaged or shows signs of deterioration prior to shipment. Other metal cables, chains, or wire ropes shall not be used unless they are specifically approved by Energy*Solutions*.

3.1.8 A fillhead or Energy*Solutions*-approved items are the only objects to be placed or stored on the HIC, with the exception of Step 3.1.9.

Note: When fillheads are utilized, hoses and other related attachments shall be supported to ensure undue stress is not placed on the HIC fillplate.

3.1.9 Two empty HICs may be stacked for storage provided the diameter of the bottom HIC is equal to or greater than the diameter of the top HIC.

3.1.10 No objects or materials shall be placed into the HIC for ultimate disposal that may cause chemical (see Attachment 7.4) or physical damage to the HIC.

3.1.11 All due care and caution should be taken upon physical entry or in handling of these HICs to ensure that the HIC is not damaged.

3.1.12 Lifting a HIC that contains enough media/water to cover the lowest dewatering lateral(s) may result in lateral damage. It is strongly recommended that the HIC be completely filled and dewatered prior to lifting. Should it become necessary to move a HIC prior to dewatering, contact Energy*Solutions* for guidance.

3.1.13 Waste filled HICs may be shipped to various facilities for processing, storage, disposal, etc. Since these facilities may have differing acceptance requirements, the HIC user should ensure that each HIC and its waste contents meet the applicable acceptance requirements for that receiving facility at the time of shipment.

3.1.14 Each user shipping a HIC to Barnwell Waste Management Facility for waste disposal shall have on file within the Licensing Department a "Polyethylene High Integrity Container Certification Statement" (Attachment 7.2).

3.1.15 If the dewatering process for dewatered waste has been completed and the HIC has not been shipped for disposal within a reasonable time frame (e.g. 6 months), Energy*Solutions* recommends that a dewatering verification evolution be performed at the time of shipment.

3.1.16 When storing HICs, ensure the lid is fully installed.

3.1.17 PL 14-170 and PL 14-215 HICs equipped with the modified baskets for compatibility with a Radlok 179/195 grapple are limited to maximum gross weights of 10,800 lbs and 13,000 lbs respectively.

3.2 **Preliminary Inspection**

Prior to using the HIC, the TSR or utility representative shall:

3.2.1 Perform a visual inspection of HIC internals where feasible to verify component parts are intact.

3.2.2 Perform a visual inspection of HIC externals for obvious flaws or defects.

3.2.3 Record HIC serial number on attached User's Checklist (Attachment 7.1).

3.2.4 Confirm the serial numbers on the HIC side, top and lid match.

3.2.5 Confirm lifting sling with cables attached are fitted into the grooves of the HIC with all components intact.

Note: Some HICs do not have grooves. Bail orientation is not critical for these HICs.

3.2.6 Confirm HIC lid closing tool is available for lid installation after processing.

3.2.7 Inspect lid tool for sharp edges/loose fittings prior to use.

3.2.8 Confirm the HIC lid is equipped with a vent and that the vent orifice and vent holes are clear of any obstructions.

3.3 **Process Controls**

3.3.1 Waste streams shall not contain materials listed in Attachment 7.4 except as noted. If such materials are noted, contact Energy*Solutions* prior to proceeding. (Document Energy*Solutions* contact on User's Checklist)

3.3.2 The waste stream temperature should be kept as low as practical. The maximum measured acceptable temperature is 140°F.

3.3.3 Complete operation per References 2.1, if applicable.

3.3.4 Manual Lid Installation:

3.3.4.1 Spray threads with silicone lubricant, or apply a thin coating of petroleum jelly to the threads.

3.3.4.2 Align lid mark with HIC "START" mark. Rotate lid clockwise until lid match mark and HIC "SEAL" mark align (minimum rotation of 270°).

Note: Lid may rotate beyond seal mark. Contact Energy*Solutions* if 270 degree rotation is not achieved or match marks fail to align.

3.3.5 Remote Pneumatic Lid Installation (Attachment 7.5)

3.3.5.1 Spray threads with silicone lubricant, or apply a thin coating of petroleum jelly to the threads.

Note: EnergySolutions recommends torqueing the four (4) drive spud bolts to approximately 10 ft. lbs. after the four (4) lock levers have been engaged in the step below.

3.3.5.2 Place the closure tool on the HIC lid and ensure the drive spud clips are within the HIC lid drive cavities. Engage the four lock levers (horizontal position). It may be necessary to loosen the four drive spud adjustment bolts in order to set the locks.

3.3.5.3 Tighten the drive spud adjustment bolts sufficiently enough to hold the HIC lid securely when the tool is lifted.

Caution: Check dose rate on top of HIC and take all precautionary measures to guard against unnecessary exposure.

3.3.5.4 Place the HIC lid tool with lid on the HIC and bump the air motor counter-clockwise to align with "START" match mark.

Caution: Do not exceed the maximum air pressure rating of the closure tool motor. High torque is generated by the closure tool motor, and failure to adequately restrain the lid closure tool handles with a fixed support, or by manual resistance, may result in personal injury.

3.3.5.5 Brace the HIC lid tool handle against an unyielding support, or have each handle held by a technician/helper, and operate the air motor in a clockwise direction until the "SEAL" match mark aligns (minimum rotation of 270°).

Note: Lid may rotate beyond seal mark. Contact Energy*Solutions* for guidance if 270 degree rotation is not achieved or match marks fail to align.

3.3.5.6 Use a remote handling tool to release the four lock levers (vertical position).

3.3.5.7 Remove the HIC lid closure tool.

3.4 **Post-Operational Guidelines**

3.4.1 A loaded HIC shall not be lifted or moved until:

3.4.1.1 The external surface temperature is equal to or less than 140°F.

3.4.1.2 The internal temperature of the contents is equal to or less than 140°F.

3.4.2 Complete User's Checklist (Attachment 7.1) and forward with shipment.

4. MECHANICAL FILTER STORAGE AND DISPOSAL

Users of the polyethylene High Integrity Containers may utilize the HICs for mechanical filter storage and disposal under the conditions described below:

4.1 Notify Energy*Solutions* Liner Operations of the proposed use of the HIC for filter storage.

4.2 Supply Energy*Solutions* Liner Operations with pertinent details of the filter assemblies as requested. These details will include the dimensions and weight as a minimum. Any details/dimensions on sharp edges or protrusions will also be supplied. A sketch may be required.

4.3 The shipper is responsible for ensuring that mechanical filters or other hardware are adequately secured to prevent damage to the HIC during shipping and disposal. If applicable, record compliance with this requirement under Step 13 of Attachment 7.1.

4.4 Complete Steps 3.3.4 or 3.3.5 as appropriate.

5. STACKABLE AND STEEL ENCASED HICS

Energy*Solutions* has two designs for Stackable HICs.

5.1 One design incorporates a heavy duty lifting basket, which can be identified by its one inch thick vertical basket supports. This design allows HICs to be stacked two high. A base plate between the HICs must be used when stacking heavy-duty basket stackable HICs.

5.1.1 Place the base plate on top of the lower HIC, the centering lugs must be inside the grapple ring.

5.1.2 Place the second HIC on the base plate, making sure that all four legs are on the base plate and the HIC is centered.

5.2 The second design of Stackable HICs incorporates a steel shell, which encloses the HIC. This design permits HICs to be stacked four high. Options for the steel encased stackable HIC include self centering guides, remote grapple handling and a stacking pallet which is used when stacking a small HIC upon a larger HIC.

5.2.1 The preferred method of moving the steel encased stackable HICs is with an Energy*Solutions* liner grapple. Lifting cables need to be requested at the time of ordering the steel encased HIC if a grapple is not available. However, there are two types of lifting cable arrangements. One type uses lifting eyes, which thread vertically into the grapple ring, and the other type uses lifting eyes, which thread horizontally into the side of the steel shell.

Note: The lifting eyes that thread into the grapple ring vertically can only be used to move an empty HIC. The lifting eyes that thread into the steel shell horizontally can be used to move both empty and full HICs.

Note: Steel encased HICs using horizontally mounted lift cable eyes cannot be loaded into a comparable size transport cask with the lifting cable assembly installed.

5.3 Whenever possible, the horizontally installed lifting cable assembly should be attached to the HIC prior to processing waste. To install the lifting cable assembly, thread a lifting eye into the side of the HIC shell at four places. Torque the lifting eye to 90 foot pounds. Attach the lifting cables.

5.4 Remove the lifting cable assembly prior to loading the HIC into a comparable size transport cask.

5.5 If self-centering hardware is utilized, take the following precautions:

5.5.1 Whenever possible, install the self-centering hardware prior to adding waste to the HIC.

Note: Do not hammer, drive or use any unreasonable force to insert the self centering hardware as this hardware must be removed prior to the HIC being loaded into a transport cask.

5.5.2 Use the Energy*Solutions* provided tool, or equivalent, to remove the self centering hardware prior to placing the HIC into a transport cask.

Note: Be aware that during the stacking process a self centering wedge may have become jammed.

5.5.3 A stacking pallet must be used when placing a small HIC upon a larger HIC.

5.6 If self-centering hardware is not utilized, stackable HICs must be stacked within approximately ½ inch of center.

6. RECORDS AND REPORTS

6.1 Liner Operations shall ensure that each customer of an Energy*Solutions* polyethylene IC has the effective revision of the C of C and this procedure.

6.2 The user has on file with Energy*Solutions* Liner Operations Department a "Polyethylene High Integrity Container Certification Statement" (Attachment 7.2).

6.3 The user has completed and submitted with the shipment documents a "Certification Statement for Disposal of Polyethylene High Integrity Container" (Attachment 7.3).

6.4 The user has correctly completed the "User's Checklist" (Attachment 7.1), which may be used as an inspection form, and submitted with shipment.

6.5 All applicable records generated for HICs being shipped to the Barnwell Waste Disposal Facility for disposal shall be maintained in accordance with Reference 2.3.

7. ATTACHMENTS

7.1 User’s Checklist

7.2 Polyethylene High Integrity Container Certification Statement

7.3 Certification Statement for Disposal of Polyethylene High Integrity Containers

7.4 Non-Compatible Materials for HICs

7.5 Sketch

Attachment 7.1
USER'S CHECKLIST

	Item	Section Reference	Initials	Date
1.	HICs Stored Properly	(3.1.1-3.1.4, 3.1.12)		
2.	Proper Lifting Devices Used	(3.1.7)		
	Note: Only the manufactured metal lifting device supplied with the HIC is acceptable. Contact Energy*Solutions* if the lifting device has been damaged or shows signs of deterioration prior to shipment.			
3.	Internals Inspected (where feasible)	(3.2.1)		
	Note: For FEXM HICs, ensure internal hose is reinforced and properly connected.			
4.	Externals Inspected	(3.2.2)		
	Note: If HIC arrives at the utility in a shipping cask to be processed and shipped in the same cask, the external inspection may be N/A.			
5.	HIC Serial Number _____	(3.2.3)		
6.	Serial numbers on HIC side, top and Lid match	(3.2.4)		
7.	Lifting Sling Properly Fitted	(3.2.5)		
8.	Lid Vent in Place	(3.2.8)		
9.	Lid Vent Orifice and Lid Vent Holes Free of Debris	(3.2.8)		
10.	Lid Tool Available and Acceptable	(3.2.6 - 3.2.7)		
11.	Waste Stream Sample OK	(3.3.1)		
12.	Waste Stream Temperature _____°F	(3.3.2)		
13.	Mechanical Filters or Other Hardware Stabilized, if Applicable	(4.3)		
14.	Step 3.3.4 or 3.3.5 is complete			
15.	HIC Surface Temperature is less than 140°F	(3.4.1.1)		
16.	Contents Less Than 140°F	(3.4.1.2)		
17.	Total Cumulative Days of Sunlight (UV) Exposure_____	(3.1.4.2 & 3.1.4.3)		
18.	Manufactured Date of Polyethylene High Integrity Container _____			
19.	Polyethylene High Integrity Container Certification Statement on File with Energy*Solutions*	(Attachment 7.2)		
20.	Completed "Certification Statement for Disposal of Polyethylene High Integrity Containers" Forwarded with Shipment	(Attachment 7.3) (6.3)		
21.	HIC weight is within limits specified in 3.1.17, if applicable.	(3.1.17)		

Note: When the HICs are used under a broker's quality assurance program, identify the broker in the comment section.

OPERATION COMPLETED: _____ _____
Signature Date

Comments: _____

_____

Complete form and forward with shipment.

Attachment 7.2

POLYETHYLENE HIGH INTEGRITY CONTAINER CERTIFICATION STATEMENT

_____ ("Company") hereby certifies that for each polyethylene High Integrity Container purchased directly or indirectly from Energy*Solutions*, and for which disposal is proposed, attempted, or completed, or for which any use in connection with the collection, storage, processing, or transportation of low-level radioactive waste is proposed, attempted, or completed, it has read and will comply with: (1) the effective Certificate of Compliance issued by the South Carolina Department of Health and Environmental Control, No. DHEC-HIC-PL-001 (the "C of C"), (2) the effective revision of Energy*Solutions* Procedure FO-AD-002, "Operating Guidelines for Use of Polyethylene High Integrity Containers," and (3) the effective Radioactive Materials License for the facility to which the HIC is to be shipped. Company further certifies that it will not make any modification or change in the polyethylene High Integrity Container design, materials, or usage from the design, materials, and usage described in the C of C without prior approval of Energy*Solutions*. Company understands that the polyethylene High Integrity Containers purchased either directly or indirectly from Energy*Solutions* will be maintained, stored, transported, and used in accordance with the above requirements. When the polyethylene High Integrity Container is disposed, Company will complete the Certification Statement for Disposal of polyethylene High Integrity Container (Attachment 7.3) prior to such disposal.

Date: _____

Company: _____

By: _____

Its: _____

Attachment 7.3

**CERTIFICATION STATEMENT FOR DISPOSAL
OF
POLYETHYLENE
HIGH INTEGRITY CONTAINERS**

For the Polyethylene High Integrity Container identified by serial numbers _____,
(Company)_____
hereby certifies that its use of such HICs is in compliance with (1) the effective Certificate of Compliance issued by the South Carolina Department of Health and Environmental Control, No. DHEC-HIC-PL-001; (2) the effective revision of Energy*Solutions* Procedure FO-AD-002, "Operating Guidelines for Use of Polyethylene High Integrity Containers," and (3) the effective Radioactive Materials License for the facility to which the HIC is being shipped.

Date: _____

Company: _____

By: _____

Its: _____

Note: Complete and return with shipment.

Attachment 7.4

NON-COMPATIBLE MATERIALS FOR HICs

Acetone
Amyl Acetate
Amyl Chloride
Aqua Regia
Benzene
Bromine Liquid
Camphor Oil
Carbon Disulfide
Carbon Tetrachloride
Chlorine Liquid
Moist Chlorine Gas
Chlorobenzene
Chloroform
Chlorosulfonic Acid
Cyclohexanone
Dimethylamine
Ethyl Acetate
Ethyl Butyrate
Ethyl Chloride
Ethyl Ether
Ethylene Chloride
Ethylene Chlorohydrin
Ethylene Dichloride
Fluorine
Furfural
Furfuryl Alcohol
Fuel Oil
Gasoline
Hydrofluoric Acid (Concentrated)
Methyl Bromide
Methyl Chloride
Methyl Ethyl Ketone (MEK)
Methylene Chloride
Nitric Acid (Concentrated)
Nitrobenzene
Octyl Cresol
Oleic Acid
Oleum
Petroleum Ether
Phenol
Propylene Dichloride
Sulfuric Acid (60%)
Tetrahydrofurane
Tetralin
Titanium Tetrachloride
Toluene
Trichloroethylene
Turpentine
Xylene

Note: Polyethylene high integrity containers shall not be subjected to concentrated free standing oil. However, this does not prohibit the materials in the HIC from containing incidental or trace amounts of oil or petroleum based materials which have absorbed in the waste materials, provided that the amount of absorbed oil and petroleum based materials does not exceed one percent (1%) by waste volume in the HIC.

Attachment 7.5
SKETCH