

CHAPTER 8: ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

8.0 INTRODUCTION

This chapter identifies the acceptance tests and maintenance program to be conducted on the HI-STAR ATB 1T Package to verify that the structures, systems and components (SSCs) classified as *important-to-safety* have been fabricated, assembled, inspected, tested, accepted, and maintained in accordance with the requirements set forth in this Safety Analysis Report (SAR), all applicable regulatory requirements, and the Certificate of Compliance (CoC). The acceptance criteria and maintenance program described in this chapter is in full compliance with the requirements of 10CFR Part 71 Subpart G [8.0.1].

8.1 ACCEPTANCE TESTS

In this section the inspections and acceptance tests to be performed on the HI-STAR ATB 1T Package prior to its use are summarized. These inspections and tests provide assurance that the HI-STAR ATB 1T Package has been fabricated, assembled and accepted for use and loading under the conditions specified in Chapter 7 of this SAR and the USNRC issued CoC in accordance with the requirements of 10CFR Part 71.

8.1.1 Visual Inspections and Measurements

The HI-STAR ATB 1T Packaging (including waste packaging with important to safety function) shall be assembled in accordance with the drawing package referenced in the CoC. Dimensional tolerances that define the limits on the dimensions critical to the licensing basis analysis are included in these drawings. Fabrication drawings provide additional dimensional tolerances necessary to ensure fit-up of parts as well as compliance with the design conditions. A shop *traveller* including an inspection plan shall be prepared and controls shall be implemented to ensure that the packaging conforms to the dimensions and tolerances specified on the licensing drawings. These dimensions are subject to independent confirmation and documentation in accordance with the Holtec QA program approved in NRC Docket No. 71-0784.

For BFA Tanks and BFA Tank Cassettes an approach other than that outlined in the previous paragraph can be used if those components have not been fabricated under Holtec's QA program. In that case, verification that the characteristics of those components meet those specified on the licensing drawings can be based solely on the inspection documents from the manufacturing of those components.

The following shall be verified as part of visual inspections and measurements:

- Visual inspections and measurements shall be made to ensure that the packaging effectiveness is not significantly reduced. Any *important-to-safety* component found to be under the minimum thickness requirement shall be repaired or replaced as required.
- The packaging shall be visually inspected to ensure it is conspicuously and durably marked with the proper markings/labels in accordance with 10CFR71.85(c).
- The packaging shall be inspected for cleanliness and preparation for shipping in accordance with written and approved procedures.

The visual inspection and measurement results for the HI-STAR ATB 1T Packaging shall become part of the final quality documentation package.

8.1.2 Weld Examination

The examination of HI-STAR ATB 1T Package (except [**Text Withheld in Accordance with 10 CFR 2.390**]) welds shall be performed in accordance with the drawing package referenced in the CoC and applicable codes and standards in Table 8.1.2, including alternatives as

specified in Table 8.1.3. Weld examinations and repairs shall be performed as specified below. All inspections of structural code welds shall be performed in accordance with written and approved procedures by personnel qualified in accordance with SNT-TC-1A [8.1.2]. All required inspections, examinations, and tests specified in this chapter shall become part of the final quality documentation package.

The following specific weld requirements shall be followed in order to verify fabrication in accordance with the drawings.

1. Containment boundary welds including any attachment welds (and temporary welds to the containment boundary) shall be examined in accordance with ASME Code Section V, with acceptance criteria per ASME Code Section III, Subsection NB, Article NB-5300. Examinations, Visual (VT), Radiographic (RT), and Liquid Penetrant (PT) or Magnetic Particle (MT), apply to these welds as defined by the code. These welds shall be repaired in accordance with the requirements of the ASME Code Section III, Article NB-4450 and examined after repair in the same manner as the original weld. If used, weld overlays for cask sealing surfaces shall be VT and PT examined. Although ASME Code Section III, Subsection NB does not require visual examination of welds, the welds will be visually examined to ensure conformance with the fabrication drawings (e.g. proper geometry, workmanship etc.).
2. ITS welds in the cask DBS shall be examined in accordance with ASME Code Section V, with acceptance criteria per ASME Code Section III, Subsection NF, Article NF-5300. These welds shall be repaired in accordance with ASME Code Section III, Article NF-4450 and examined after repair in the same manner as the original weld. These weld requirements are not applicable to not *important-to-safety* (NITS) welds (e.g. seal welds) on the cask.
3. NITS welds shall be examined and repaired in accordance with written and approved procedures.

8.1.3 Structural and Pressure Tests

The cask containment boundary will be examined and tested by combination of methods (including leak tightness test, MT, and/or PT, as specified in the licensing drawing and this Chapter) to verify that it is free of cracks, pinholes, uncontrolled voids or other defects that could significantly reduce the effectiveness of the packaging.

8.1.3.1 Trunnions

Eight trunnions (4 pairs) near the top of the cask on opposing long sides are provided for vertical lifting and handling of the loaded or empty cask during loading and unloading operations. Trunnions of a pair are on either side of the cask in the configuration indicated in the drawing package in Section 1.3. The four pairs of trunnions constitute two load paths for lifting and handling. The inner-most/centrally located two pairs of trunnions constitute the

inner path and the two outer-most pairs of trunnions define the outer path. Four of the eight trunnions (one load path) are effectively in use when the cask is lifted. The other four trunnions (second load path) are connected redundantly to the cask lift yoke. The trunnions are required to be designed in accordance with NUREG-0612 [1.2.3], and tested and inspected in accordance with ANSI N14.6 [1.2.2].

At least two pairs of lifting trunnions (one load path) shall be tested for vertical lifting and handling of the package in accordance with ANSI N14.6 at 300% of the maximum design-basis lifting load (Table 7.1.1) in the configuration matching the lifting equipment. The second pair (second load path) of lifting trunnions may be tested in accordance with ANSI N14.6 at either 150% or 300% of the maximum design basis lifting load (150% if used as redundant lifting appurtenances). Load tests may be performed in excess of the test loads specified above provided an engineering evaluation is performed to ensure trunnions or other cask components will not be damaged by the load test. The test load shall be applied for a minimum of 10 minutes. After the load test, a PT or MT examination shall be performed on all accessible parts of the trunnions in accordance with ASME Code Section V, with acceptance criteria per ASME Code Section III, Subsection NB, Article NB-5300. The accessible parts of the top trunnions (areas visible outside the cask), and the local cask areas shall then be visually examined to verify that no deformation, distortion, or cracking has occurred. Any evidence of deformation (other than minor localized surface deformation due to contact pressure between lifting device and top trunnion), distortion or cracking of the trunnion or adjacent cask areas shall require replacement of the trunnion and/or repair of the cask. Trunnion weld repair, if required, shall comply with the requirements of the ASME Code Section III, Article NF-4450. Following any replacements and/or major repair, as defined in ANSI N14.6, the load testing shall be re-performed and the components re-examined in accordance with the original procedure and acceptance criteria. Testing shall be performed in accordance with written and approved procedures. Certified material test reports verifying trunnion material mechanical properties meet ASME Code Section II requirements provide further verification of the trunnion load capabilities. Test results shall be documented and shall become part of the final quality documentation package.

8.1.3.2 Pressure Testing

Pressure testing of the HI-STAR ATB 1T package is not required. The Maximum Normal Operating Pressure (MNOP) for the HI-STAR ATB 1T package does not exceed the 5 psig threshold in 10 CFR 71.85(b).

8.1.4 Leakage Tests

Leakage rate tests on the cask containment system shall be performed per procedures written and approved in accordance with Chapter 7 of this SAR and the requirements of ANSI N14.5, [8.1.4] *specified in this chapter. Table 8.1.1 specifies the leakage test method, allowable leakage rate and test sensitivity for fabrication and pre-shipment leakage rate tests.*

A pre-shipment leakage rate test of cask containment seals is performed for each loading prior to transport. This pre-shipment leakage rate test is valid for 1 year as long as the seals are not disturbed by disengaging the CLLS or as justified by the requirements in SAR Paragraph 8.2.4(v).

In case of an unsatisfactory leakage rate, weld repair, seal surface repair/polishing and/or seal change, retesting shall be performed using the same test method as the original test until the test acceptance criterion is satisfied.

Leakage rate testing procedures shall be approved by an American Society for Nondestructive Testing (ASNT) Level III Specialist. The written and approved test procedure shall clearly define the test equipment arrangement. Leakage rate testing shall be performed by personnel who are qualified and certified in accordance with the requirements of SNT-TC-1A [8.1.2]. Leakage rate testing shall be performed in accordance with a written quality assurance program.

Fabrication leakage rate test results shall become part of the final quality documentation package. The pre-shipment leakage rate test shall be documented in accordance with the user's quality assurance program.

8.1.5 Component and Material Tests

8.1.5.1 Containment Seals

Cask containment seals are elastomeric seals that are specified to provide a high degree of assurance of leak tightness under normal and accident conditions of transport. Seal tests under the most severe package service conditions including performance at pressure under high and low temperatures will not challenge the capabilities of these seals and thus are not required.

8.1.5.2 Impact Testing

The HI-STAR ATB 1T Cask employs important-to-safety components made from materials that are not susceptible to brittle fracture and therefore exempt from brittle fracture testing. Brittle fracture testing of the BFA-Tanks and BTCs is not required.

Test results shall become part of the final quality documentation package.

8.1.6 Shielding Tests

Post Fabrication Testing

The total wall/shielding material thickness is equal to or greater than the thickness in the drawing package.

An inspection using a calibrated radiation detector and a Co-60 source will be performed. Acceptance criteria will be defined by comparative measure on mock-up or reference blocks produced using the casting technique used for the as-built cask components and having calibrated defects.

Pre-Shipment Testing after First Loading

A shielding effectiveness test shall be performed prior to the first shipment as specified in the following paragraph.

Following the first waste loading of each HI-STAR ATB 1T package, a shielding effectiveness test shall be performed using written and approved procedures. Calibrated radiation detection equipment shall be used to take measurements at the surface of the HI-STAR package. Measurements shall be taken at locations specified by the User's radiation protection program for comparison against calculated values for the specific loaded contents and BFA-Tank/BTC combination (**when applicable**) to assess the continued effectiveness of the shielding. If the measured dose rates are higher than the calculated values, then the cask shall not be shipped until the root cause is determined, appropriate corrective actions are completed, and the cask is re-tested with acceptable results.

Measurements shall be documented and become part of the final quality documentation package.

8.1.7 Thermal Tests

Thermal acceptance testing for the HI-STAR ATB 1T is not required. Due to the low design basis heat load package components temperatures are maintained significantly below specified temperature limits.

8.1.8 Miscellaneous Tests

No additional tests are required prior to using the packaging.

**Table 8.1.1 (Sheet 1 of 2):
Containment System Leak Test Specifications**

Leakage Test	Components Tested	Type of Leakage Test (from ANSI N14.5-2014, App. A) See Note 1	Leakage Rate Acceptance Criterion at Reference Conditions	Leak rate sensitivity (½ of leakage rate acceptance criterion per ANSI N14.5)
Fabrication (Factory) Acceptance Test	<ul style="list-style-type: none"> • Containment Base Plate • Containment Wall Plates • Top Flange • Closure Lid • Containment Boundary Welds 	A.5.3	1×10^{-4} atm-cm ³ /s, Air (1×10^{-5} Pa-m ³ /s, Air)	5×10^{-5} atm-cm ³ /s, Air (5×10^{-6} Pa-m ³ /s, Air)
	<ul style="list-style-type: none"> • Closure Lid Inner Seal 	A.5.1, A.5.2, <i>A.5.3 and A.5.4</i>		
Pre-Shipment Acceptance Test <i>(Note 2)</i>	<ul style="list-style-type: none"> • Closure Lid Inner Seal 	A.5.1, A.5.2, <i>A.5.3 and A.5.4</i>		

**Table 8.1.1 (Sheet 2 of 2):
Containment System Leak Test Specifications**

Leakage Test	Components Tested	Type of Leakage Test (from ANSI N14.5-2014, App. A) See Note 1	Leakage Rate Acceptance Criterion at Reference Conditions	Leak rate sensitivity (½ of leakage rate acceptance criterion per ANSI N14.5)
Maintenance Acceptance Test	<ul style="list-style-type: none"> • Containment Base Plate • Containment Wall Plates • Top Flange • Closure Lid • Containment Boundary Welds 	A.5.3	1×10^{-4} atm-cm ³ /s, Air (1×10^{-5} Pa-m ³ /s, Air)	5×10^{-5} atm-cm ³ /s, Air (5×10^{-6} Pa-m ³ /s, Air)
	<ul style="list-style-type: none"> • Closure Lid Inner Seal 	A.5.1, A.5.2, <i>A.5.3 and A.5.4</i>		
Periodic Leakage Acceptance Test	<ul style="list-style-type: none"> • Closure Lid Inner Seal 	A.5.1, A.5.2, <i>A.5.3 and A.5.4</i>		

Notes:

1. For helium as the tracer gas, the Leakage Rate Acceptance Criterion and Test Sensitivity are multiplied by a factor of 2.
2. *Per ANSI N14.5 (para. 7.6.4), an alternative pre-shipment leakage rate acceptance criterion that may be used in lieu of the reference air leakage rate L_R is “No Detected Leakage” when tested to a sensitivity of 1×10^{-3} ref-cm³/s. The following conditions apply to the testing of gasketed joints:*
 - a. *The joint gasket must be reusable (e.g. elastomeric seals).*
 - b. *The gasket was previously installed and the gasketed joint qualified to a leak rate not more than the reference air leakage rate L_R as specified in the table above (i.e. the prequalified gasket was never replaced).*

3. Purpose of Leakage Rate Tests per ANSI N14.5:

- a. Fabrication Leakage Rate Test: To demonstrate that the containment system, as fabricated, will provide the required level of containment.*
- b. Pre-shipment Leakage Rate Test: To confirm that the containment system is properly assembled for shipment.*
- c. Maintenance Leakage Rate Test: To confirm that any maintenance, repair, or replacement of components has not degraded the containment system.*
- d. Periodic Leakage Rate Test: To confirm that the containment capabilities of the packaging built to an approved design have not deteriorated during a period of use.*

**Table 8.1.2 (Sheet 1 of 2): ASME Code Boiler & Pressure Vessel Code and Other Standards
Applicable to HI-STAR ATB 1T**

Component ID	Material Procurement	Component Design Acceptance Criteria	Stress and Deformation Analysis Criteria	Welding (Fabrication and Qualification)	Inspection	Testing
Cask Containment boundary (except closure seals)	ASME Code Section III Subsection NB-2000	ASME Code Section III Subsection NB-3000 [Withheld in Accordance with 10 CFR 2.390]	ASME Code Section III Subsection NB-3000 [Withheld in Accordance with 10 CFR 2.390]	ASME Code Section III Subsection NB-4000 and Chapter 8 of this SAR	ASME Code Section III Subsection NB-5000 and Chapter 8 of this SAR	ASME Code Section III Subsection NB-6000 and Chapter 8 of this SAR
Trunnions	Note 1	NUREG-0612	NUREG-0612	Not Applicable	Chapter 8 of this SAR	Chapter 8 of this SAR
Locking Wedge Locking Pin, Locking Pin Lock and Locking Pin Insert	ASME Section II	No gross yielding or buckling	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Strongback Lifting Attachments and Maintenance Cover	ASME Section II	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Cask Dose Blocker Structure (DBS)	ASTM	[Withheld in Accordance with 10 CFR 2.390]	Not Applicable	ASME Code Section IX and Chapter 8 of this SAR	ASME Code Section V	Chapter 8 of this SAR
Cask Lid Spacer Bar	ASME Section II	No gross failure	Not Applicable	ASME Code Section IX and Chapter 8 of this SAR	ASME Code Section V	Not Applicable

**Table 8.1.2 (Sheet 2 of 2) : ASME Code Boiler & Pressure Vessel Code and Other Standards
Applicable to HI-STAR ATB 1T**

Component ID	Material Procurement	Component Design Acceptance Criteria	Stress and Deformation Analysis Criteria	Welding (Fabrication and Qualification)	Inspection	Testing
BFA-Tanks	Note 1	<u>Walls, Top Cover and Base Plate</u> [Withheld in Accordance with 10 CFR 2.390] <u>Welds</u> [Withheld in Accordance with 10 CFR 2.390]	Not Applicable	Not Applicable	Not Applicable	Not Applicable
BTC	Note 1	<u>Corners Tie Rods</u> [Withheld in Accordance with 10 CFR 2.390] <u>Top and Bottom</u> [Withheld in Accordance with 10 CFR 2.390]	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Spacers for top and bottom of BFA-Tanks	ASTM or ASME Section II	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Note 1: See drawing package referenced in the CoC for material requirements.

Table 8.1.3: ASME Code Requirements and Alternatives for the HI-STAR ATB 1T Package

Component	Code Section	Code Requirement	Alternative, Justification & Compensatory Measures
Cask Containment System	NB-1000	Statement of requirements for Code stamping of components.	Cask containment boundary is designed, and will be fabricated in accordance with ASME Code, Section III, Subsection NB to the maximum practical extent, but Code stamping is not required.
Cask Containment System	NB-2000	Requires materials to be supplied by ASME-approved material supplier.	Holtec approved suppliers will supply materials with CMTRs per NB-2000.
Cask Containment System	NB-7000	Vessels are required to have overpressure protection.	The cask is not a pressure vessel. No overpressure protection is provided.
Cask Containment System	NB-8000	States requirements for name, stamping and reports per NCA-8000.	HI-STAR ATB 1T is to be marked and identified in accordance with 10CFR71. Code stamping is not required. QA data package prepared in accordance with Holtec's approved QA program.

Table 8.1.4 : Intentionally Deleted



Table 8.1.5 : Intentionally Deleted



8.2 MAINTENANCE PROGRAM

8.2.1 Overview

An ongoing maintenance program for the HI-STAR ATB 1T Package will be prepared and issued prior to the delivery and first use of the HI-STAR ATB 1T Package as a part of its O&M Manual. This document shall delineate the detailed inspections, testing, and parts replacement necessary to ensure continued radiological safety, proper handling, and containment performance of the HI-STAR ATB 1T Package in accordance with 10CFR71 regulations, conditions in the Certificate of Compliance, and the design requirements and criteria contained in this Safety Analysis Report (SAR).

The HI-STAR ATB 1T package is totally passive by design. There are no active components or systems required to assure the continued performance of its safety functions. Furthermore, the cask is almost entirely fabricated from stainless steel material. As a result, only minimal maintenance will be required over its lifetime, and this maintenance would primarily result from weathering effects, and pre- and post-usage requirements for transportation. Typical of such maintenance would be seal replacement, and leak testing following seal replacement. Such maintenance requires methods and procedures no more demanding than those currently in use at nuclear power plants.

A maintenance inspections and tests program schedule for the HI-STAR ATB 1T Package is provided in Table 8.2.1.

8.2.2 Structural and Pressure Tests

No periodic structural or pressure tests on the packaging following the initial acceptance tests are required to verify continuing performance.

8.2.3 Leakage Tests

Leakage rate tests on the cask containment system shall be performed per procedures written and approved in accordance with Chapter 7 of this SAR and the requirements of ANSI N14.5, [8.1.4] specified in this chapter. Table 8.1.1 specifies the leakage test method, allowable leakage rate and test sensitivity for periodic and maintenance leakage rate tests.

If the pre-shipment leakage rate test expires (after 1 year), a *periodic* leakage rate test of the containment seals must be performed prior to transport. This periodic leakage rate test is valid for 1 year. *Also see Table 8.2.1.*

Maintenance leakage rate testing shall be performed prior to returning a package to service following maintenance, repair (such as a weld repair), or replacement of containment system components (such as containment seal replacement). Only that portion of the containment system that is affected by the maintenance, repair or component replacement needs to be leak tested.

In case of an unsatisfactory leakage rate, weld repair, seal surface repair/polishing and/or seal change and retest shall be performed using the same test method as the original test until the test acceptance criterion is satisfied.

Leakage rate testing procedures shall be approved by an American Society for Nondestructive Testing (ASNT) Level III Specialist. The written and approved test procedure shall clearly define the test equipment arrangement. Leakage rate testing shall be performed by personnel who are qualified and certified in accordance with the requirements of SNT-TC-1A [8.1.2]. Leakage rate testing shall be performed in accordance with a written quality assurance program.

The periodic and maintenance leakage rate test results shall be documented and maintained as required by the user's quality assurance program.

8.2.4 Component and Material Tests

(i) Shielding Materials

Periodic verification of the package shielding integrity shall be performed within 5 years of the last shielding effectiveness test prior to package transport using written and approved procedures. The periodic verification shall be performed by radiation measurements with either loaded contents or a check source using written and approved procedures and calibrated radiation detection equipment. Measurements shall be taken at locations designated by plant staff for comparison with calculated values to assess the continued effectiveness of the shielding. The calculated values shall be representative of the loaded contents and cooling time or the particular check source used for the measurements. If dose rates are higher than the calculated values, then the cask shall not be shipped until the root cause is determined, appropriate corrective actions are completed, and the cask is re-tested with acceptable results.

The tests results shall be documented and maintained as required by user's quality assurance program.

(ii) Packaging Surfaces

Accessible external surfaces of the packaging shall be visually inspected for damage prior to each waste loading to ensure that the packaging effectiveness is not significantly reduced. Visual inspections of the cask, the BFA-Tanks and BTCs shall be performed for surface coating and component damage including surface denting, surface penetrations, weld cracking, chipped or missing coating. Where necessary, coatings shall be reapplied. Damage shall be evaluated for impact on packaging safety and shall be repaired or replaced accordingly. Wear and tear from normal use will not impact cask safety. Repairs or replacement in accordance with written and approved procedures, as set down in the O&M manual shall be required if unacceptable conditions are identified.

Prior to installation or replacement of a closure seal, the cask sealing surface shall be cleaned and visually inspected for scratches, pitting or roughness, and affected surface areas shall be polished smooth or repaired as necessary in accordance with written and approved procedures.

(iii) Closure Lid Locking System:

The Closure Lid Locking System (CLLS), as shown in the Licensing drawing, is designed for rapid and remotely operated de-energizing of the seal and disassembly of the joint. The near ambient pressure environment in the cask eliminates the need for a large preload applied by the CLLS ensuring that the stress levels in fastening structure will remain well below the material endurance limit. Thus fatigue failure of the CLLS is ruled out as is creep because of near ambient temperature states in the CLLS. A periodic inspection of the CLLS is required to ensure that the structure has not been severely damaged by an inadvertent operation in service.

(iv) Cask Trunnions

Cask trunnions shall be inspected prior to each cask lifting. The accessible parts of the trunnions (areas outside the cask), and the local cask areas shall be visually examined to verify no deformation, distortion, or cracking has occurred. Any evidence of deformation (other than minor localized surface deformation due to contact pressure between lifting device and trunnion), distortion or cracking of the trunnion or adjacent cask areas shall require repair or replacement of the trunnion and/or repair of the cask.

Following any replacements and/or repair, the load testing shall be re-performed and the components re-examined in accordance with the original procedure and acceptance criteria.

(v) Closure Seals

The HI-STAR ATB 1T Packaging is equipped with elastomeric seals on the closure lid to ensure leakage meets the criteria in Table 8.1.1. The closure seals are shipped from the factory pre-inspected and carefully packaged. Once installed *and compressed, the seals should not be disturbed by disengagement of the CLLS. Seals are considered to be reusable until pre-shipment leakage testing indicates that they can no longer meet the leakage criteria or they fail a visual inspection. Disengagement and removal of the CLLS requires that the seal be visually inspected to ensure it remains free of debris, does not exhibit damage (i.e. no tears or gouges), and does not exhibit excessive compression set (i.e. the seal projects past the plane of the top seating surface of the seal groove). If seals are deemed acceptable, they may be reused. Seals which have been in service for more than 12 months shall be replaced the next time that the CLLS is disengaged.* Closure seals are specified for long-term use and do not require additional maintenance.

(vi) Thermal Tests

Periodic thermal performance testing for the HI-STAR ATB 1T is not required. Due to the low design basis heat load package components temperatures are maintained significantly below

specified temperature limits. Furthermore, there are no special purpose materials of construction that could be affected in the long-term and therefore no credible mechanism for significant loss of heat rejection capacity in the HI-STAR ATB 1T cask.

(vii) Miscellaneous Tests

No additional tests are required for the HI-STAR ATB 1T Packaging, packaging components, or packaging materials.

**Table 8.2.1:
Maintenance Inspections and Tests Program Schedule**

Task	Schedule
Cask surface visual inspection. (See Paragraph 8.2.4(ii))	Prior to each Non-Fuel Waste (NFW) loading.
BFA-Tanks and BTCs accessible surfaces visual inspection (See Paragraph 8.2.4(ii))	Prior to emplacement into the cask.
CLLS visual inspection (See Paragraph 8.2.4(iii))	Prior to each transport.
Cask trunnion visual inspection (See Paragraph 8.2.4(iv))	Prior to each NFW loading.
Pre-shipment leakage test of containment system seal (Subsection 8.2.3)	Following each NFW loading.
Periodic leakage rate test of containment system seals (Subsection 8.2.3)	Prior to off-site package transport if period from last test exceeds 1 year.
Maintenance leakage rate test of containment system seals (Subsection 8.2.3)	Prior to returning package to service following maintenance, repair or replacement of containment boundary components.
Seal replacement for Closure Lid (See Paragraph 8.2.4(v))	<i>Following disengagement of the CLLS if the seal is not considered reusable (damaged, not free of debris, exhibits excessive compression set) or if seal fails to meet the leakage criteria for pre-shipment, periodic or maintenance during testing. Seals which have been in use for over one year shall be replaced during the next CLLS visual inspection cycle.</i>
Shielding Test (See Paragraph 8.2.4(i))	At the beginning of each licensing period.

CHAPTER 8 REFERENCES

The following generic industry references have been consulted in the preparation of this document. Where specifically cited, the identifier is listed in the SAR text or table.

- [8.0.1] U.S. Code of Federal Regulations, Title 10, "Energy", Part 71, "Packaging and Transportation of Radioactive Materials."
- [8.1.1] American Society of Mechanical Engineers, "Boiler and Pressure Vessel Code," Sections II, III, V, IX, and XI, 2007 Edition, 2008 Addenda (Section IX, 2013 for FSW only unless otherwise indicated).
- [8.1.2] American Society for Nondestructive Testing, "Personnel Qualification and Certification in Nondestructive Testing," Recommended Practice No. SNT-TC-1A, December 2006.
- [8.1.3] Regulatory Guide 7.8, "Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material", Revision 1, March, 1989, U.S. Nuclear Regulatory Commission.
- [8.1.4] *American National Standards Institute, Institute for Nuclear Materials Management, "American National Standard for Radioactive Materials – Leakage Tests on Packages for Shipment", ANSI N14.5, 2014.*