WESTINGHOUSE RADIOLOGICAL SERVICES INCORPORATED	Document Number: STD-P-02-002
	Title: LEAK TEST PROCEDURE FOR CASKS WITH A VENT AND/OR DRAIN

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LEAK TEST PROCEDURE

FOR CASKS WITH A VENT AND/OR DRAIN

1.0 SCOPE

This procedure shall be utilized to perform scheduled, periodic leak tests on the Westinghouse HN-190-1, HN-190-2, HN-194S, and HN-215H casks as required by their respective certificates of compliance.

2.0 PURPOSE

The purpose of this procedure is to describe the steps required to leak test Westinghouse transportation casks which have vent and/or drain lines.

3.0 REFERENCES

3.1 RAD Services Manual for HN-190-1 Shielded Transportation Cask, Westinghouse Document No. RSM-003.

3.2 RAD Services Manual for HN-190-2 Shielded Transportation Cask, Westinghouse Document No. RSM-020.

3.3 RAD Services Manual for HN-194S Shielded Transportation Cask, Westinghouse Document No. RSM-005.

3.4 RAD Services Manual for HN-215H Shielded Transportation Cask, Westinghouse Document No. RSM-018.

4.0 EQUIPMENT

4.1 Cask leak test fixture with 0-15 psig gauge (graduations $\leq$ 0.2 psig and a calibration accuracy of at least $\pm$ 2.5% at full scale) and 10 psig relief valve (See Figure 1).

4.2 Bubble test solution as described below or an equivalent one of an ethylene glycol base:

Sherlock Gas & Air Leak Detector (Low-Temp)
Winton Products Company, Inc.
Charlotte, North Carolina

4.3 Time piece.

4.4 Adequate lighting and portable light sources to ensure good lighting for joint inspections.

4.5 Torque wrench with a calibration accuracy of at least $\pm$4% of the indicated load.

5.0 SETUP PROCEDURE

5.1 Prerequisites

5.1.1 Equipment specified in Section 4.0 is available.

5.1.2 ENSURE that the cask is fully assembled in the shipping configuration as specified in the applicable cask handling procedure (See Section 3.0).

5.1.3 ENSURE that all cask closures are properly made in accordance with applicable cask handling procedure (see Section 3.0), including studs, bolts, and ratchet binders properly torqued.

5.2 Precautions

5.2.1 Proper radiological precautions shall be taken during all phases of this leak test.

5.3 Assembly

5.3.1 When pressurizing cask through drain line, proceed per this section:

5.3.1.1 REMOVE drain line plug.

5.3.1.2 INSPECT drain line to ensure no obstructions are present.

5.3.1.3 CONNECT leak test fixture to drain line opening, using appropriately-sized fittings (as required) and pipe thread sealant.

5.3.2 When pressurizing cask through vent line, proceed per this section:

5.3.2.1 REMOVE vent line plug(s) and stepped shielding plugs (as applicable).

5.3.2.2 For all casks, except the HN-215H cask, CONNECT leak test fixture to the inner (smaller) vent line connection, using appropriately sized fittings (as required) and pipe thread sealant. For the HN-215H cask, CONNECT the leak test fixture to the vent line connection, using appropriately sized fittings and pipe thread sealant.

5.3.3 ENSURE manual air isolation valve on leak test fixture is closed.

5.3.4 CONNECT regulated air supply to the air inlet of the leak test fixture.

6.0 LEAK TEST PROCEDURE

6.1 Precautions

6.1.1 Stable environmental conditions are essential for this test. Perform test when ambient temperature and barometric conditions will be stable. Cask temperature must be at ambient temperature as well.

6.1.2 Though relatively low air pressures are utilized in this procedure, the volume of air involved warrants special care when connecting, disconnecting, and venting air lines.

6.1.3 Always apply bubble test solution in such a manner as to minimize the formation of bubbles in its application. Follow manufacturer's recommendations for application (e.g., spray on or brush).

6.1.4 Any air vented from the cask should be treated as if it was radioactive.

6.2 Procedure

6.2.1 PRESSURIZE air supply line to leak text fixture.

6.2.2 OPEN manual air isolation valve gradually to pressurize cask at a rate not exceeding 1/2 psig/min.

6.2.3 CLOSE manual air isolation valve when pressure is indicated at 8.0 psig (+ 1.00,-0.00 psig) on leak test fixture gauge.

6.2.4 RECORD time and pressure gauge reading of Step 6.2.3 on test report sheet.

6.2.5 ISOLATE and DISCONNECT air supply line from leak test fixture.

6.2.6 On the leak test fixture and at its connection to the cask only, APPLY bubble test solution to all joints, connections, and valve seats. INSPECT for leaks.

6.2.7 If air bubbles are observed, ABORT test and GO to Step 6.2.14. Following repairs/corrections to the fixture, BEGIN leak test procedure again.

6.2.8 Fifteen (15) minutes after attaining 8.0 psig (+1.00, -0.00 psig) in the cask, BEGIN bubble test solution application to all gasketed joints and other connections at cask pressure boundary (e.g., drain line, if applicable). APPLY solution around all alignment pins and lid bolts and studs that are inside the outer edge of the closure gasket.

6.2.9 RECORD time of start of Step 6.2.8 on test report sheet.

6.2.10 At joints where sealing surfaces are not directly visible, FLOOD entire area between joint obstructed from view and visible opening with solution to achieve meaningful results.

NOTE: Use temporary dams sparingly, as necessary, to contain the solution in the flooded area. Dams should not be configured so as to effectively move the "visible opening" away from the sealing joint. A continuous film of solution across the entire visible opening shall be established before, and maintained during, the inspections for bubble formation. INSPECT all joints and flooded visible openings for bubble formation, indicating leakage across joints.

NOTE: Air bubbles will generally occur within 5 seconds of application of the solution to a joint. At visible openings where bubble migration from a joint to the opening would be required for it to appear, ALLOW a minimum of 30 seconds between the time that a continuous solution film is established and the inspection is made.

6.2.11 Any leakage in evidence at any joint shall constitute failure of this test. RETEST completely in the event of any observed leak, however, COMPLETE the bubble solution check so that other leakage areas, if present, may be identified. PROCEED to Step 6.2.14 if retest is required.

6.2.12 Following all satisfactory joint leak testing, NOTE time and RECORD on test report sheet. STOP: Do not proceed to next step unless 30 minutes or more have elapsed since time recorded in Step 6.2.4.

6.2.13 RECORD leak test fixture gauge pressure. If gauge pressure is less than the pressure recorded in Step 6.2.4 that test was started with, test shall be considered to have failed and a retest is required.

6.2.14 Gradually OPEN manual air isolation valve on the test fixture to vent air from the cask. DEPRESSURIZE at a rate that does not exceed 2 psig/min.

6.2.15 If a retest is required, PROCEED to Step 5.3.4 following repairs/corrections to the observed problem.

6.2.16 DISCONNECT leak test fixture from cask. STOP: If cask has been tested through vent line, PROCEED per Steps 6.2.17 through 6.2.26 (except HN-215H cask). If the cask has been tested through the drain line or if the HN-215H cask is being tested, PROCEED to Step 6.2.27.

6.2.17 REPLACE inner (smaller) vent line threaded plug using pipe thread sealant.

6.2.18 CONNECT appropriate transition fittings to leak test fixture and connect fixture to cask at the outer (larger) vent line connection.

6.2.19 REPEAT Steps 5.3.3 and 5.3.4, then 6.2.1.

6.2.20 Crack OPEN manual air isolation valve to pressurize vent line cavity.

6.2.21 CLOSE manual air isolation valve when pressure is indicated at 8.0 psig (+1.00, -0.00 psig) on leak test fixture.

6.2.22 RECORD time and pressure gauge reading of Step 6.2.21 on test report sheet.

6.2.23 ISOLATE and DISCONNECT air supply line from leak test fixture.

6.2.24 Fifteen (15) minutes after attaining 8.0 psig (+1.00, -0.00 psig) reading, OBSERVE gauge reading. If gauge pressure is less than the pressure gauge reading recorded in Step 6.2.22 that the test was started with, the test on the vent line cavity shall be considered to have failed. RETEST in accordance with Steps 6.2.16 through 6.2.24, checking and resealing the inner (smaller) vent line threaded plug carefully and inspecting for any other leakage paths.

6.2.25 RECORD gauge reading observed in Step 6.2.24 on test report sheet.

6.2.26 DISCONNECT leak test fixture from cask.

6.2.27 REPLACE vent or drain line plugs in reverse order of their removal in Step 5.3.1 or 5.3.2 in accordance with the appropriate cask handling procedure.

6.2.28 WIPE UP bubble test solution remaining on cask surfaces.

6.2.29 RECORD satisfactory completion of leak test on test report sheet if no leakage was observed in Step 6.2.11 and no pressure loss was noted in Step 6.2.12 and 6.2.24.

REPORT OF
CASK LEAK TEST

CASK S/N _____ DATE _____

NOTE: Start new report sheet for each test/retest performed to entry #5 or later.

ENTRY	STEP REF	INSPECTION/ACTION	DATA	INITIAL
		Setup Prerequisites		
1	5.1.1	Calibration of leak test fixture pressure gauge verified	_____ tool no.	_____
2	5.1.1	Leak test fixture relief valve operates at 10 psig ± 0.5 psig		_____
3	5.1.1	Calibration of torque wrench verified	_____ tool no.	_____
4	5.1.3	Cask closures made/torqued per cask handling procedures		_____
		Test Procedure		
5	6.2.4	Data obtained in Step 6.2.3 _____ time	_____ psig	_____
6	6.2.9	Time at which bubble solution testing is begun.	_____	_____
7	6.2.12	Time at which bubble solution testing is complete	_____	_____
8	6.2.13	Pressure gauge reading after completion of bubble solution test.	_____ psig	_____
9	6.2.22	Data obtained in Step 6.2.21 _____ time	_____ psig	_____
10	6.2.25	Pressure gauge reading 15 min. after entry No. 8	_____ psig	_____
11	6.2.29	Leak test results satisfactory	_____	_____

Comments:

Signatures: (Test performers shall complete this form)

Person(s) performing test: _____ _____

Figure 1

LEAK TEST FIXTURE