Post-repair leak test only. — Sign-offs start on page 3. M.T.

3.3.4.4 BRR Cask Vacuum Drying and Helium Leak Test

Date: 9/2/15 Task Supervisor: T. Bork/S. Tucker/E. Lau

Shipment Identification #: >2015-1 (repair) Certified Leak Examiner: Tony Rossi

Purpose

To secure the lid of the loaded BEA Research Reactor shipping cask ("BRR package"), vacuum-dry the interior, secure all ports, and leak-test the package. This procedure includes all steps verbatim from the relevant part of BRR Package Safety Analysis Report section 7.1.2.1 "Wet Loading" and sections 8.2.2.* on leak rate tests (SAR Rev. 7, dated March 2014).

Notes: 1. Bold text is directly from BRR Package SAR starting with step 22 of section 7.1.2.1.
2. Non-bold steps were derived from previous INL Procedure Sections VII through X.
3. Unnumbered steps beginning with (I) denote independent checks.
4. All steps in this procedure after Step 26 are to be done by certified Level II or III Leak Examiner(s) (ASNT/SNT-TC-1A) who shall initial the steps as they are completed. The (I) independent checks may be performed by an authorized leak test trainee.

Prerequisites: Cask loading is complete and cask closure lid is on the cask body, with the lid's twelve (12) socket head cap screws (SHCSs) present but not tightened. Calibrated torque wrenches available; wrench ID#s and calibration dates: _____
_____.

A. Cask Closure and Sealing Washer Replacement *(equivalent to INL Procedure Section VII)*

____ **22. Install the twelve (12) 1–8UNC SHCSs to secure the closure lid to the cask body. Using a star pattern, tighten the closure SHCSs to 220 ±20 ft–lb torque (lubricated).**

CAUTION:	BRR cask surface temperatures may exceed 140° F. Exercise caution, especially near the top of the cask and the closure lid.

____ a. Torque all twelve (12) lubricated 1-8 UNC closure lid socket head screws, using a star pattern sequence in 40 to 50 ft-lb increments to 220 ± 20 ft-lb.

____ (I) VERIFY all twelve (12) closure lid socket head screws have been tightened to 220 ± 20 ft-lb torque.

____ b. Attach drain tubing as necessary to the drain port spout and route the drain tubing to a vented container to catch any remaining water.

____ c. OPEN the drain valve.

____ d. Once the water flow out of the drain port has stopped, direct the drain tubing to facility ventilation exhaust system.

____ 23. Remove the vent port dust cover, vent port plug, test port dust cover, and test port plug.

CAUTION 1: Examine cask port tools prior to use to ensure:
- free movement of the stem,
- Allen set screws are secured,
- sealing surfaces are cleaned and O-rings are properly conditioned for sealing,
- port plug can be captured on the bottom end of the tool stem, and
- stem retracted into the port tool prior to installation

CAUTION 2: When using the cask port tools, it is necessary to pull the port tool stem all the way up to the detent stops to ENSURE the end of the stem or port plug remains clear of the port opening.

NOTE 1: A length of flexible tubing, split on axis may be inserted around the stem, between the top of the port tool and the "T" handles to secure the stem remains in fully extended position while under vacuum.

NOTE 2: The Vent Port Tool is stored in case #1.

____ a. Remove the Vent Port dust cover AND install the Vent Port tool into the Vent Port.

____ b. Engage the Vent Port plug allen head and rotate the Vent Port tool handle to OPEN the Vent Port.

NOTE: The stem of the port tool may be marked (with tape) to denote the point where the port plug threads are fully disengaged with the port threads to permit fully extracting the tool stem while retain the capture of the port plug.

____ c. Raise the Vent Port tool stem into the top detent point to fully extract the vent port plug.

____ d. Remove the Test Port dust cover AND test port plug. (The Test Port is engraved with the marking SEAL TEST PORT on the cask.)

____ **24. Install a vent port tool into the vent port, and connect a source of dry pressurized air to the vent port tool.**

CAUTION:	BRR cask design pressure is 25 psig. Do not exceed 25 psig air pressure during the drying process.

NOTE:	Source of dry air flow may be supplied by an air blower (like exhaust from a HEPA vacuum cleaner), or regulated pressurized air line.

____ a. Connect a source of dry pressurized air with a flow shut off control to the Vent Port tool.

____ **25. Open the air supply flow control valve to permit dry pressurized air flowing through the cavity, ensuring that the air pressure does not exceed 25 psig. Continue the air supply flow until all apparent free standing water has been removed from the cavity.**

____ a. ENSURE air source is regulated not to exceed a pressure of 25 psig AND initiate dry air flow through the cask cavity.

____ b. Continue air flow through the cavity until there is no evidence of free standing water or condensation in the cask cavity or the drain tubing.

____ c. Secure the flow of dry air AND disconnect the pressurized air supply from the Vent Port tool.

____ **26. Remove the drain port fitting and tubing from the drain port.**

START

____ a. Disconnect the drain tubing, drain spout and drain valve assembly from the drain port.

✓ **27. Remove and discard the vent, test, and drain port sealing washers from their respective port plugs (if present), and clean and inspect each sealing surface. If damage is present that is sufficient to impair containment integrity (scratches or dent, etc.), repair the damaged surfaces per Section 8.2.3.2, *Sealing Area Routine Inspection and Repair.***

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a. Remove and discard the vent, test, and drain port sealing washers from their respective port plugs (if present); also remove the vent port tool if installed, AND VISUALLY INSPECT each sealing surface, cleaning it of any contamination and/or water as necessary.
IF the sealing surface is damaged such that it will impair cask containment integrity, THEN repair the damaged surfaces per the cask Safety Analysis Report Section 8.2.3.2, *Sealing Area Routine Inspection and Repair.*

_____ (I) VERIFY vent, test, and drain port sealing surfaces are free of damage and contamination.

_____ **28. Install the drain port plug and a new (unused) sealing washer in the drain port. Tighten the drain port plug to 20 ±2 ft–lb torque.**

> NOTE: The Drain Port sealing washer MUST be replaced prior to each use.

_____ a. Replace the Drain Port sealing washer with a new (unused) sealing washer (Part number: NAS1523C-10N). Save the washer's packet for Q/A filing.

_____ (I) VERIFY the Drain Port sealing washer has been replaced with the correct part.

> NOTE: The Drain Port tool is stored in case #4.

_____ b. Insert the Drain Port sealing plug with the unused sealing washer into the Drain Port. Install the Drain Port tool AND tighten the Drain Port plug to 20 ± 2 ft-lb torque.

_____ (I) VERIFY the Drain Port plug has been tightened to 20 ± 2 ft-lb torque.

> NOTE: An informal gross leak test may be performed on the Drain Port seal at this time by connecting a vacuum pump and gauge to the Drain Port Tool and evacuating to less than 1 torr, isolate the vacuum and observe the gauge for gross leakage. The helium leak test tubing and leak detector manifold can be used to perform this informal test. Vent the test manifold before proceeding with vacuum drying steps.

_____ **29. Using the vent port tool, install the vent port plug with a new (unused) sealing washer. Ensure that the vent port plug is sufficiently loose to allow airflow through the vent port.**

> NOTE: The Vent Port sealing washer MUST be replaced prior to each use.

_____ a. Replace the Vent Port sealing washer with a new (unused) sealing washer (Part number: NAS1523C-6N). Save the washer's packet for Q/A filing.

_____ (I) VERIFY the Vent Port plug sealing washer has been replaced with the correct part.

b. Attach the Vent Port plug with the unused sealing washer to the end of the Vent Port tool and raise the Vent Port tool stem so that the vent plug is retracted into the tool.

CAUTION:	When installing the Vent Port tool, Do Not over tighten. It may result in the Vent Port tool O-ring damage.

c. Install the Vent Port tool, plug and sealing washer into the Vent Port AND ENSURE that the Vent Port plug is sufficiently loose to allow airflow through the vent port.

30. Install the test port plug and a new (unused) sealing washer in the closure lid approximately finger-tight.

NOTE:	The Test Port sealing washer MUST be replaced prior to each use.

a. Replace the SEAL Test Port sealing washer with a new (unused) sealing washer (Part number: NAS1523C-6N). Save the washer's packet for Q/A filing.

(I) VERIFY the Test Port plug sealing washer has been replaced with the correct part.

b. Install the test port plug with the unused sealing washer in the closure lid approximately finger-tight.

B. Cask Vacuum Drying *(equivalent to INL Procedure Section VIII)*

NOTE:	The vacuum manifold and vacuum gauge are stored in case #1 and the vacuum pump and hose in case #6.

31. Connect a vacuum pump and a shutoff valve to the vent port tool and evacuate the cavity until the internal pressure is 1 – 2 torr. Isolate the vacuum pump from the cask body cavity by closing the shutoff valve and shutting off the vacuum pump, closing the shutoff valve and venting the suction line to atmosphere, or other appropriate means that does not maintain a vacuum on the outlet of the shutoff valve.

a. Connect a vacuum pump and a shutoff valve to the Vent Port tool through the vacuum manifold so the pump draws suction on the cask cavity and discharges to the ventilation system.

b. VERIFY the vacuum shutoff valve on the vacuum manifold is OPEN and the gas supply valve is CLOSED.

c. ENSURE the Vent Port plug AND the vacuum pump valves are OPEN. Use the vacuum pump to evacuate the cask cavity until the internal pressure is 1-2 torr.

d. Isolate the vacuum pump from the cask body cavity by closing the shutoff valve on the vacuum manifold AND shutting off the vacuum pump AND venting the vacuum pump line to atmosphere.

32. Monitor the cavity pressure for a minimum of 30 minutes. If the cavity pressure does not exceed 3 torr at the end of the time period, proceed to Step 34. If it appears that cavity pressure will exceed 3 torr, it is not necessary to wait 30 minutes before proceeding to Step 33. As an option, repeat Steps 31 and 32 without first performing Step 33.

____ a. IF cavity pressure remains < 3 torr for AT LEAST 30 minutes, THEN RECORD pertinent information on the BRR Package Datasheet (page 14). Then proceed to **Step 34** and then to section C, "Helium Leak Test".

____ b. For pressure ≥ 3 torr,
- ☐ IF total vacuum drying time is < 8.0 hours,
  THEN re-connect the vacuum line and repeat Steps 31.c through 32.a for no greater than 8.0 hours of total vacuum drying time.
- ☐ IF total vacuum drying time is > 8.0 hours,
  THEN RECORD pertinent information on the BRR Package Data sheet (page 14).

____ **33.** [IF cavity pressure is still ≥ 3 torr after failed attempt(s) at vacuum drying, THEN backfill cask cavity with dry nitrogen as follows.] **Open the port tool to re–pressurize the cask body cavity to atmospheric pressure and repeat Steps 31 and 32. The cask may be re-pressurized with air, nitrogen, or helium.**

____ a. Connect a regulated nitrogen tank to the vacuum manifold in parallel to the vacuum pump AND VERIFY that the regulator is backed off AND that the nitrogen tank supply valve is CLOSED.

____ b. VERIFY nitrogen regulator backed off AND OPEN nitrogen tank isolation valve.

____ c. Slowly adjust the regulator to backfill the cask cavity with nitrogen gas to a pressure +1-0 psig.

____ d. Back the nitrogen regulator off and CLOSE the nitrogen tank isolation valve and gas supply valve on the vacuum manifold.

____ e. Re-connect the vacuum pump line to the vacuum manifold.

____ f. Repeat the vacuum drying test by performing Steps 31.c through 32.a.
IF the cavity pressure cannot be maintained less than 3 torr for 30 minutes, THEN inform the Shipment Coordinator, the Assistant Director of Reactor Operations, and the Quality Assurance Supervisor before proceeding.

____ g. RECORD pertinent information on the BRR Package Datasheet (page 14).

____ **34. Disconnect the vacuum pump from the vent port tool and [...]**

C. Helium Leak Test *(equivalent to INL Procedure Section XI)*

NOTE1:	Helium source MUST be ≥ 99% purity.

NOTE2:	An intermediate pressure (IP) regulator is installed at the helium supply tank with an IP isolation valve and a low pressure (LP) regulator and gas flow meter are installed, all in series with the vacuum manifold and the helium supply tank.

34. (continued) **[...] connect a source of helium gas** [to the vent port tool].

a. Helium Backfill Set-up: Connect a regulated helium tank to the vent port tool AND VERIFY that the regulator is backed off AND that the helium tank supply valve is CLOSED. Ensure the bottle regulator isolation valve and vacuum manifold gas supply valves are CLOSED.

b. Evacuate the helium supply line by briefly opening the 1/2-inch gas supply valve on manifold and the flow control valve. Then close both isolation valves. ENSURE the cask cavity pressure remains < 3.0 torr. (May need to reconnect and start the pump and open the pump valve to pump down the cask cavity to < 3.0 torr.)

35. Provide a helium atmosphere inside the cask payload cavity by backfilling with helium gas to a pressure of slightly greater than atmospheric pressure, i.e., +1, -0 psig.

NOTE:	Use 50 to 60 psig on the bottle regulator outlet gage, and slowly adjust the LP regulator for an outlet pressure of 3 to 4 psi.

36. Disconnect the helium gas source from the vent port tool.

37. Using the vent port tool, tighten the vent port plug to 9 ±1 ft–lb torque.

(I) VERIFY the Vent Port plug has been tightened to 9 ± 1 ft-lb torque.

C1. Set-up and Connection of Helium Leak Detector:

NOTE:	Calibrate or adjust the leak detector to manufacturer's instructions for instrument sensitivity equal to or greater than 5 x 10^{-8} cc/sec sensitivity for helium prior to proceeding to connect the leak detector to the cask port tools.

CAUTION:	When installing the Seal Test port tool, Do Not over tighten. It may result in the port tool O-ring damage.

a. ENSURE an isolation valve is in the Drain Port test line and the calibrated helium leak standard is connected downstream of the Drain Port isolation valve.

b. Connect and operate the leak detector in test mode to obtain a system calibration and background reading.

c. Connect the helium gas source, with low pressure (LP) regulator gas supply at the vacuum manifold reading approximately 50 to 60 psig and the LP regulator adjusted for an outlet pressure of 3 to 4 psi, and use the helium leak standard valve to establish leak rate instrument response equal to the temperature corrected calibrated leak.

d. With Drain Port leak detection isolation valve open, AND the calibrated helium leak standard valve open, OBSERVE AND RECORD the system reading.

e. CLOSE the calibrated helium leak standard valve AND OBSERVE the time it takes for the leak detector to stabilize and RECORD the system background reading and time. (This time will be used as a minimum system response time.)

C2. Leak Test of the Main Lid Seal and the Drain Port Seal and the Vent Port Seal:

38. Perform leakage rate testing on the containment O-ring seal and the drain and vent port sealing washers per Section 8.2.2.2, *Helium Leakage Rate Testing the Main Containment O-ring Seal*, Section 8.2.2.3, *Helium Leakage Rate Testing the Drain Port Sealing Washer*, and Section 8.2.2.4, *Helium Leakage Rate Testing the Vent Port Sealing Washer.* [Note: It may be possible to perform some of these procedures simultaneously.]

CAUTION:	BRR cask design pressure is 25 psig. Do not exceed 25 psig.
NOTE:	Helium may adhere to surfaces around the Vent Port and Plug surfaces. A dampened cloth wipe down followed by blowing air or nitrogen gas over the surface may be used to clear remaining helium to avoid high background helium during the leak test.

C2.1 **BRR SAR 8.2.2.1 Maintenance/Periodic Leakage Rate Test Acceptance Criteria**

Maintenance/periodic leakage rate test acceptance criteria are identical to the criteria delineated in Section 8.1.4.1, *Fabrication Leakage Rate Test Acceptance Criteria.*

BRR SAR 8.1.4.1 Fabrication Leakage Rate Test Acceptance Criteria

1. To be acceptable, each leakage rate test shall demonstrate a "leaktight" leakage rate of 1×10^{-7} reference cubic centimeters per second (ref–cm3/s), air, or less, per Section 6.3, *Application of Reference Air Leakage Rate (LR)*, of ANSI N14.5.

2. In order to demonstrate the leaktight leakage rate, the sensitivity of the leakage rate test procedure shall be 5×10^{-8} cm^3/s, air, or less, per Section 8.4, *Sensitivity*, of ANSI N14.5.

3. Failure to meet the stated leakage rate shall be recorded and evaluated in accordance with the cognizant quality assurance program.

C2.2 **BRR SAR 8.2.2.2 Helium Leakage Rate Testing the Main Containment O-ring Seal**

_____ **1. The maintenance/periodic leakage rate test of the BRR package containment O–ring seal integrity shall be performed following the guidelines of Section A.5.4, *Evacuated Envelope – Gas Detector*, of ANSI N14.5.**

_____ **2. The BRR package shall be assembled with the two O–ring seals installed in the closure lid, and the vent and seal test ports are installed with their associated sealing washers. If not previously tightened, tighten the closure lid bolts to 200 – 240 ft-lb torque. Assembly is as shown in Appendix 1.3.3, *Packaging General Arrangement Drawings.***

_____ **3. Utilizing a port tool, attach a vacuum pump and a source of helium gas, in parallel, to the vent port.**

_____ **4. Close the valve to the source of helium gas and open the valve to the vacuum pump.**

_____ **5. Utilizing a port tool, rotate the vent port plug to the open position.**

_____ **6. Evacuate the system to a 90% vacuum or better (≤ 10% ambient atmospheric pressure). Isolate the vacuum pump from the system.**

_____ **7. Provide a helium atmosphere inside the evacuated cavity by backfilling with helium gas (99% purity or better) to ambient atmospheric pressure (+1 psi, -0 psi).**

_____ **8. Utilizing the port tool, rotate the vent port plug to the closed position, and remove the helium–contaminated port tool from the vent port.**

_____ **9. Install a clean (helium-free) port tool into the seal test port.**

_____ **10. Utilizing appropriate fittings, attach a helium mass spectrometer leak detector (MSLD) to the port tool.**

_____ **11. Utilizing the port tool, rotate the seal test port plug to the open position.**

_____ **12. Evacuate the cavity between the containment O–ring seal and the test O–ring seal until the vacuum is sufficient to operate the leak detector per the manufacturer's recommendations.**

_____ **13. Perform the helium leakage rate test to the requirements of Section 8.2.2.1, *Maintenance/Periodic Leakage Rate Test Acceptance Criteria.* If, after repeated attempts, the BRR package containment O–ring seal fails to pass the leakage rate test, isolate the leak path and, prior to repairing the leak path and repeating the leak test, record on a nonconformance report and disposition prior to final acceptance in accordance with the cognizant quality assurance program.**

_____ (I) VERIFY the Seal Test Port plug is finger-tight.

C2.3 **BRR SAR 8.2.2.3 Helium Leakage Rate Testing the Drain Port Sealing Washer**

_____ **1. The maintenance/periodic leakage rate test of the drain port plug containment sealing washer integrity shall be performed following the guidelines of Section A.5.4, *Evacuated Envelope – Gas Detector*, of ANSI N14.5.**

_____ **2. The BRR package shall be assembled with the two O–ring seals installed on the closure lid. Ensure the vent and seal test port plugs are installed with their associated sealing washers. Assembly is as shown in Appendix 1.3.3, *Packaging General Arrangement Drawings.***

_____ **3. Verify the presence of a helium atmosphere below the vent port plug containment sealing washer, as specified above in Steps 3 – 8 of Section 8.2.2.2, *Helium Leakage Rate Testing the Main Containment O–ring Seal.***

_____ **4. Install a port tool into the drain port.**

_____ **5. Utilizing appropriate fittings, attach a helium MSLD to the port tool.**

_____ **6. Evacuate the cavity above the drain port plug containment sealing washer until the vacuum is sufficient to operate the leak detector per the manufacturer's recommendations.**

_____ **7. Perform the helium leakage rate test to the requirements of Section 8.2.2.1, *Maintenance/Periodic Leakage Rate Test Acceptance Criteria.* If, after repeated attempts, the drain port plug containment sealing washer fails to pass the leakage rate test, isolate the leak path and, prior to repairing the leak path and repeating the leak test, record on a nonconformance report and disposition prior to final acceptance in accordance with the cognizant quality assurance program.**

C2.4 **BRR SAR 8.2.2.4 Helium Leakage Rate Testing the Vent Port Sealing Washer**

_____ **1. The maintenance/periodic leakage rate test of the vent port plug containment sealing washer integrity shall be performed following the guidelines of Section A.5.4, *Evacuated Envelope – Gas Detector, of ANSI N14.5.***

_____ **2. The BRR package shall be assembled with the two O–ring seals installed on the closure lid. Ensure the vent and seal test port plugs are installed with their associated sealing washers. Assembly is as shown in Appendix 1.3.3, *Packaging General Arrangement Drawings.***

_____ **3. Verify the presence of a helium atmosphere below the vent port plug containment sealing washer, as specified above in Steps 3 – 8 of Section 8.2.2.2, *Helium Leakage Rate Testing* the Main Containment O–ring Seal.**

_____ **4. Install a port tool into the vent port.** [Use a clean, helium-free port tool.]

_____ **5. Utilizing appropriate fittings, attach a helium MSLD to the port tool.**

____ a. Start the leak detector in test mode.

_____ **6. Evacuate the cavity above the vent port plug containment sealing washer until the vacuum is sufficient to operate the leak detector per the manufacturer's recommendations.**

____ a. After the leak detector test pressure (TP) stabilizes and the leak rate stabilizes, OBSERVE the leakage rate above background.

_____ **7. Perform the helium leakage rate test to the requirements of Section 8.2.2.1, *Maintenance/Periodic Leakage Rate Test Acceptance Criteria.* If, after repeated attempts, the vent port plug containment sealing washer fails to pass the leakage rate test, isolate the leak path and, prior to repairing the leak path and repeating the leak test, record on a nonconformance report and disposition prior to final acceptance in accordance with the cognizant quality assurance program.**

D. Concluding Actions

NOTE:	To meet acceptable criteria, each leakage rate test shall demonstrate a leakage rate of $\leq 1.0 \times 10^{-7}$ reference cubic centimeters per second air (ref-cm^3/s).
NOTE:	IF the leakage rate of ANY cask containment boundary exceeds acceptable limits, THEN it MUST be documented in accordance with facility quality assurance program nonconformance procedure prior to repairing or replacing the faulty component.

a. RECORD the inner O-ring leakage rate as indicated by the helium mass spectrometer leak detector on the BRR Package Datasheet (page 14).

b. RECORD the Drain Port sealing washer leakage rate as indicated by the helium mass spectrometer leak detector on the BRR Package Datasheet (page 14).

c. RECORD the Vent Port sealing washer leakage rate as indicated by the helium mass spectrometer leak detector on the BRR Package Data sheet (page 14).

(I) VERIFY the three pre-shipment leakage rate tests above are completed and leakage rates of cask containment boundaries are $\leq 1.0 \times 10^{-7}$ ref-cm^3/s.

d. Place the helium mass spectrometer leak detector unit in vent mode.

e. Remove the helium-free port tool AND disassemble and remove the test line.

(I) VERIFY all port plugs in place, ports closed, and port tools removed.

39. At the conclusion of all leakage rate testing, install the drain port dust cover, the test port dust cover, and vent port dust cover.

a. Provide the empty packets from the sealing washers, these completed procedure pages, and the completed BRR Package Data Sheet (page 14 of this procedure) to the facility Shipment Coordinator for review and filing.

Completed by: Tony Rossi 9/2/15
(Certified Level II or III Leak Examiner)

Received by: _____ Date 09/02/2015
(Facility Shipment Coordinator)

BRR PACKAGE DATA SHEET *(equivalent to INL Procedure Section X)*

Fuel Shipment Identification Number: N/A This is a post-repair leak test rather than a shipment.

Vacuum Drying Test

Pressure transducer model: N/A

Serial No.: — Date Calibration Due: —

Initial Cavity Pressure Reading: _____ (1-2 torr)

Final Cavity Pressure Reading: _____ (< 3 torr after at least 30 minute wait)

COMMENTS[1]:

[1] Note total amount of drying time, how many attempts were made, and whether the cask required helium or nitrogen purging prior to passing. Also note any other pertinent information.

Helium Leak Rate Test (CL = Calibrated Leak; LR = Leak Rate)

Tracer gas backfill pressure gage model: SWAGELOK 31655

Helium mass spectrometer model: 959 AGILENT Serial No. : MY13260015

CL Model/Serial No.: 729110 CL Value@Temp 2.14 X 10^{-7} cm^3/s

CL Temperature-corrected LR: N/A cm^3/s; Date Calibration Due: 10/2/15

Test Port and Drain Port system Background reading: 1.0 x 10^{-8} cm^3/s

Closure Lid Inner O-Ring Leak Rate: < 1.0 x 10^{-7} PASS (≤ 1.0x10^{-7} ref-cm^3/s)

Vent Port Sealing Washer Leak Rate: < 1.0 x 10^{-7} PASS (≤ 1.0x10^{-7} ref-cm^3/s)

Drain Port Sealing Washer Leak Rate: < 1.0 x 10^{-7} PASS (≤ 1.0x10^{-7} ref-cm^3/s)

COMMENTS[2]:

LEAK TEST after Sealing Surface Repair. SAT
Tony Rossi PASS 9-2-15

[2] Record any discrepancies. Note whether the inner O-ring or sealing washer failed the initial test. Include any other pertinent information in accordance with Type B Shipping Program.

BRR Package Information

Tamper-Indicating Device Seal Number: N/A

Truck No.: N/A Trailer No.: N/A

Calibrated Torque Wrench, 0 to 75 ft-lbs (serial number): 81003285

Calibrated Torque wrench, 0 to 500 ft-lbs (serial number): 81003282

Completed by: Tony Rossi Date 9/2/15
(Certified Level II or III Leak Examiner)