

71-9196



March 27, 2009
E&L-038-09

Michele M. Sampson, Senior Project Manager
Licensing Section
Division of Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Sampson:

Subject: Supplement to Response to Second Round Request for Additional Information to US Nuclear Regulatory Commission Concerning Certificate of Compliance No. 9196 For the Model No. UX-30 Package (Docket No. 71-9196 TAC No. L24143)

EnergySolutions previously provided a response to the request for additional information dated February 5, 2009. After further discussion with your office, we determined that additional changes to the SAR were needed. Attached are revised Chapters 7 & 8 to the SAR, both the public and non-public versions, to address the issues we discussed concerning the SAR text.

The two attachments to this letter are listed below:

Attachment 1 Revised public versions of Chapter 7 and 8; please replace the previously provided chapters with those in this attachment. The entire Chapter 7 and Chapter 8 are included.

Attachment 2 Revised non-public versions of Chapter 7 and 8; please replace the previously provided chapters with those in this attachment. Note that these pages are covered by the proprietary affidavit provided with our original submittal dated October 22, 2007. The entire non-public versions of Chapter 7 and Chapter 8 are included.

Should you or members of your staff have questions about the responses, please contact Mark Whittaker at (803) 758-1898.

Sincerely,

Mirza I. Baig
Technical Services Manager – Engineering & Licensing

Attachments: As stated

NMS501
NMS24

Attachment 1

7.0 OPERATING PROCEDURES

DOT regulations (49CFR173.420) require that uranium hexafluoride packagings conform with ANSI N14.1, *Uranium Hexafluoride – Packaging for Transport*. Loading and unloading procedures for Type 30B cylinders, based on USEC-651, *The UF₆ Manual: Good Handling Practices for Uranium Hexafluoride*, and incorporating the requirements of ANSI N14.1, are presented here. Proper operation of the UX-30, assuming a properly filled cylinder, is described below.

The 30C cylinder is identical to the 30B in all respects except for the addition of a Valve Protection Cover (hereinafter referred to as the “VPC”); therefore the loading and unloading procedures are essentially identical to the 30B. Incremental steps applicable to the 30C cylinder for the VPC are added.

7.1 Package Loading

7.1.1 Preparation for Loading

7.1.1.1 Receipt and Filling of 30B or 30C Cylinder

Receipt and filling of the cylinder shall be performed in accordance with in plant operating procedures, ANSI N14.1, and appropriate provisions of the 30C cylinder specification (Addendum 2-2004 to ANSI N14.1-2001).

7.1.1.2 Cylinder Inspection and Testing

Complete an inspection of the 30B cylinder as described in USEC 651 (or equivalent in-plant operating procedures) and ANSI N14.1 prior to insertion into the UX-30 Overpack. Any defective conditions must be corrected, and the cylinder must be recertified prior to use.

If a 30C Cylinder is being used, the VPC assembly and O-Rings shall be visually inspected for defective conditions including irregular surface conditions of the VPC, Flange, and O-rings. Any defective conditions must be corrected, and the cylinder must be re-tested in accordance with the provisions of paragraph 7.1.2.3. Defective O-Rings must be replaced with new O-Rings in accordance with the 30C cylinder

specification (Addendum 2-2004 to ANSI N14.1-2001).

Prior to filling a clean, empty cylinder with a Type B quantity of UF₆, the cylinder will be leak tested by an air or inert gas pressure test at 100 psig. All connections and fittings will be leak tested using Carbona soapless lather or an approved equivalent (ANSI N14.5-1997, Appendix A Method 5.7 Soap Bubble) with a test sensitivity of 1×10^{-3} std-cc/sec. No leakage is permitted. Prior to filling a cylinder containing a UF₆ heel with a Type B quantity of UF₆, verify that the cylinder is at a vacuum of approximately 5 psia. Cylinders that will not hold a vacuum will be emptied, cleaned, and pressure tested prior to use.

7.1.1.3 Overpack Inspection

The UX-30 package must be prepared for shipment in accordance with the requirements of 10CFR71.87. Inspect base and lid of package prior to loading. The following shall be cause for further investigation or removal from service until the defective condition is satisfactorily corrected:

- Excessive distortion, warping, or other damage of the inner or outer shell preventing closure of the package or proper installation of all 10 closure pins.
- Failure of ball-lock pins to lock in place.
- Damaged alignment pins.
- Large dents (more than 0.5-inch deep).
- Damaged dust seal.
- Failed welds.
- Excessive wear of inner shell steel or rubber pads.
- The overpack base and supports are sound with no broken welds or components.
- The overpack inner and outer shells are intact with no broken welds and no holes, tears, or deformations greater than ½ inch. Visual indications of corrosion or oxidation causing a through wall pitting in two (2) or more locations within a six (6) by six (6) inch area shall be cause for the rejection of the Overpack.
- The inner liner is free of debris and standing water.
- The inner liner is intact and is not in a deteriorated or damaged condition.

- The gaskets and cylinder support pads are in place and intact and are not in a deteriorated or damaged condition.
- The gasket surfaces are free from nicks and deep scratches.
- The cover plates and welds are sound and undamaged.
- The overpack halves fit together properly without gaps.
- All vent seals/plugs are securely in place.
- The tie-down and lifting/stacking supports are in place and are not in a deteriorated or damaged condition.
- The tamper-indicating seal apparatus is undamaged.

7.1.2 Loading of Contents

PROCEDURE FOR LOADING THE 30B OR 30C CYLINDER

- 7.1.2.1. Prior to loading the cylinder, the inspection required in Section 7.1.1.2 and 7.1.1.3 shall be completed and documented.
- 7.1.2.2 The 30B or 30C UF6 cylinder is filled, tested, and handled in accordance with standard, in-plant operating procedures at the facility. As a minimum, the procedures described in USEC-651, or other equivalent in-plant procedure, ANSI Standard N 14.1, and appropriate provisions of the 30C cylinder specification (Addendum 2-2004 to ANSI N14.1-2001) shall be used.
- 7.1.2.3 The filled cylinder valve will be tested by leak rate testing. The test will be performed by connecting a pressure gauge manifold, which has a void volume of 55 cm³ or less, to the valve and pressurizing the manifold volume with dry air or nitrogen.

Note: If air is used for the test, the air supply should be clean and dry. If it is not, or if the quality of the air supply is uncertain, the test should be performed with nitrogen to ensure reliable results.

The test shall be performed using a pressure gauge, accurate within 1%, or less, of full scale.

The test pressure shall be applied for at least 15 minutes. A drop in pressure of greater than the minimum detectable amount shall be cause for test failure. The maximum sensitivity of the gauge shall be 0.1 psig.

Sensitivity at the test conditions is equivalent to the prescribed procedure sensitivity of 10^{-3} ref-cm³/sec based on dry air at standard conditions as defined in ANSI N14.5-1997

Alternatively, a vacuum test may be performed on the cylinder (Note: the cylinder's outer surface shall be approximately at ambient temperature and its vapor pressure below atmospheric pressure) by attaching a pigtail to the closed valve and drawing a vacuum. The continued presence of UF₆ in the pigtail is an indication that the valve is not fully closed or is defective, and corrective measures shall be taken to remedy the leak as prescribed by the facility's operating procedures.

- 7.1.2.4 If the 30C cylinder has been filled, the VPC shall be installed over the valve using the locator pin.

Note: The VPC is a component of the 30C cylinder and is unit-specific, with the same serial number as the cylinder. The VPC shall not be transferred to any other cylinder. Prior to installation of the VPC, it shall be verified that the serial numbers on the VPC and 30C cylinder are the same.

Prior to installation of the VPC a silicone-based lubricant shall be applied to the VPC O-rings

Prior to installation, the VPC bolts shall be lubricated with a polytetrafluorethylene (PTFE) - based lubricant. The six bolts tightened to a finger tight condition, followed by a tightening procedure using a calibrated torque wrench, where each bolt shall be tightened to 30 foot pound (+5/-0 tolerance}. Bolt tightening sequence shall be a

star pattern, followed by rotational and reverse rotational tightening until stable at final torque value.

Note: Inspection for deposits on the valve and boss/coupling shall be accomplished per the procedure set forth in paragraph 7.1.2.8 prior to installing the VPC.

7.1.2.5 The VPC shall be leak tested prior to each shipment by a pressure drop test (ANSI Standard N14.5-1997 Method A.5.1 Gas Pressure Drop) having a sensitivity of 1×10^{-3} std-cc/sec or less. The annulus between the VPC o-rings will be pressurized through the test port with dry air or nitrogen using a pressure gauge manifold, which has a total void volume including the annulus of 55 cm^3 or less.

Note: If air is used for the test, the air supply should be clean and dry. If it is not, or if the quality of the air supply is uncertain, the test should be performed with nitrogen to ensure reliable results.

The test shall be performed using a pressure gauge, accurate within 1%, or less, of full scale. The test pressure shall be applied for at least 15 minutes. A drop in pressure of greater than the minimum detectable amount shall be cause for test failure. The maximum sensitivity of the gauge shall be 0.1 psig.

Note: A soap-bubble test cannot be used for testing the VPC because of the configuration of the VPC and its O-rings.

7.1.2.6 The cylinder shall be weighed using the procedures and standards outlined in USEC-651, or other equivalent in plant operating procedure, to assure that the capacity of the cylinder has not been exceeded.

7.1.2.7 The cylinder shall be allowed to cool until the vapor pressure of the cylinder is below atmospheric pressure.

7.1.2.8 Prior to loading into the UX-30 Overpack, the valve port and valve boss/coupling shall be inspected for solid deposits. Solid deposits around the valve port or valve boss/coupling indicate a leak condition, and the cylinder shall not be loaded into the overpack. Corrective measures shall be taken to remedy the leak as prescribed by the facility's operating procedures. If the valve port and valve boss/coupling are free of solid deposits, the cylinder may be loaded into the Overpack.

7.1.2.9 A tamper-indicating seal shall be installed on the 30B cylinder prior to loading it into the Overpack.

Note: On the 30C cylinder the tamper-indicating seal shall be installed on the VPC.

PROCEDURE FOR LOADING THE OVERPACK

7.1.2.10 The inspection required by Section 7.1.1.2, 7.1.1.3, and 7.1.2 shall be performed and documented prior to loading the UX-30 Overpack with a 30B or 30C cylinder.

7.1.2.11 Before loading, the UF₆ inside the cylinder shall be completely solidified.

7.1.2.12 The UX-30 lower half shall be resting in its shipping and handling cradle.

7.1.2.13 Using a suitable crane, the cylinder shall be carefully placed in the lower half of the UX-30. The cylinder valve shall be located at the top of the overpack, intersecting a vertical plane through the overpack centerline, on either side of the enclosure.

NOTE: IF A STANDARD 30-B CYLINDER IS BEING TRANSPORTED, ENSURE THAT THE VALVE COVER (“VALVE PROTECTOR”) IS REMOVED PRIOR TO SHIPMENT.

NOTE: THE VPC ON THE 30C CYLINDER SHALL NOT BE REMOVED PRIOR TO SHIPMENT

7.1.2.14 Place the upper half of the UX-30 onto the lower half.

7.1.2.15 Secure the upper half of the Shipping and Handling Cradle. Tighten as required.

- 7.1.2.16 Install the 10 ball-lock pins in their receptacles, thereby securing the two package halves together.

CAUTION: ENSURE EACH PIN IS PROPERLY INSTALLED. VERIFY THAT THE PUSH-BUTTON IS IN THE NORMAL, RETRACTED POSITION WHEN RELEASED (NOT STUCK IN THE “IN” POSITION). VERIFY THAT THE PIN IS LOCKED IN PLACE (CANNOT BE REMOVED BY TUGGING ON THE PIN OR LANYARD). BALL-LOCK PINS NOT OPERATING PROPERLY SHALL BE REMOVED FROM SERVICE.

- 7.1.2.17 Install the two standard tamper-indicating seals in their proper positions. Install the bolt plugs in the optional lid lifting lugs as shown in the General Arrangement Drawings, Appendix 1.4.1.

7.1.3 Preparation for Transport

- 7.1.3.1 The UX-30 is now ready for shipment.

- 7.1.3.2 Perform the following inspections of the overpack after placement of the lid:

Perform a radiation survey of the package per the requirements of 10 CFR 71.47. Contamination levels on the external surfaces of each package shall be kept as low as practicable. The level of non-fixed radioactive contamination shall meet the requirements of 10 CFR 71.87(i).

Ensure that labeling and placarding requirements of DOT regulations, as defined in 49 CFR 172, are met.

Note that the loaded UX-30 package may only be handled via the shipping cradle or a sling placed underneath the package

7.2 Package Unloading

7.2.1 Receipt of Package from Carrier

7.2.1.1 Inspect the exterior of the overpack for possible damage:

- The overpack inner and outer shells are intact with no broken welds and no holes, tears, or deformations greater than ½ inch. Visual indications of corrosion or oxidation causing a through wall pitting in two (2) or more locations within a six (6) by six (6) inch area shall be cause for the rejection of the Overpack.
- The cover plates and welds are sound and undamaged.
- The overpack halves fit together properly without gaps.
- The tie-down and lifting/stacking supports are in place and are not in a deteriorated or damaged condition.
- The tamper-indicating seal apparatus is undamaged.

Document any damage observed. Complete the receiving report as required by facility operating procedures.

7.2.1.2 Note that the loaded UX-30 package may only be handled via the shipping cradle or a sling placed underneath the package.

7.2.2 Removal of Contents

7.2.2.1 Break the tamper indicating seals.

7.2.2.2 Remove the 10 ball-lock pins from the perimeter of the UX-30.

7.2.2.3 Release the package from the base shipping and handling cradle. Remove the bolt plugs from the lid lifting lugs, if lid lugs are present. If lid lift clips are present, install 4 lifting pins in upper half of shipping cradle.

7.2.2.4 Remove the lid from the package.

7.2.2.5 Remove the payload cylinder.

7.2.2.6 Remove the 30B cylinder security seal (which is on the VPC on the 30C cylinder).

Note: The VPC is a component of the 30C cylinder and is unit-specific, with the same serial number as the cylinder. The VPC shall not be transferred to any other cylinder.

7.2.2.7 Prior to unloading the cylinder, cylinder shall be inspected and weighed as required by USEC 651 or equivalent in plant operating procedures.

7.2.2.7 The UF₆ cylinder is emptied and handled in accordance with standard, in-plant, operating procedures at the facility. As a minimum, the procedures described in USEC-651 or equivalent in plant operating procedures, and ANSI Standard N14.1, shall be used.

7.3 Preparation of an Empty Package for Transport

7.3.1 Visually inspect the overpack prior to each use. The following shall be cause for further investigation or removal from service until the defective condition is satisfactorily corrected:

- Excessive distortion, warping, or other damage of the inner or outer shell preventing closure of the package and proper installation of all 10 closure pins.
- Failure of ball-lock pins to lock in place.
- Damaged alignment pins.
- Large dents (more than 0.5-inch deep).
- Damaged dust seal.
- Failed welds.
- Excessive wear of inner shell steel or rubber pads.

7.3.2 The UX-30 lower half shall be resting in its shipping and handling cradle.

NOTE: IF A STANDARD 30-B CYLINDER IS BEING TRANSPORTED, ENSURE THAT THE VALVE COVER (“VALVE PROTECTOR”) IS REMOVED PRIOR TO SHIPMENT.

NOTE: THE VPC ON THE 30C CYLINDER SHALL NOT BE REMOVED PRIOR TO SHIPMENT

7.3.3 Place the upper half of the UX-30 onto the lower half. Ensure that all requirements of 49 CFR 173.428 for Empty Radioactive Materials Packaging are met.

CAUTION: ENSURE EACH PIN IS PROPERLY INSTALLED. VERIFY THAT THE PUSH-BUTTON IS IN THE NORMAL, RETRACTED POSITION WHEN RELEASED (NOT STUCK IN THE “IN” POSITION). VERIFY THAT THE PIN IS LOCKED IN PLACE (CANNOT BE REMOVED BY TUGGING ON THE PIN OR LANYARD). BALL-LOCK PINS NOT OPERATING PROPERLY SHALL BE REMOVED FROM SERVICE.

7.3.4 Secure the upper half of the Shipping and Handling Cradle. Tighten as required.

7.3.5 The empty UX-30 is now ready for transport.

7.3.6 Note that the UX-30 package may only be handled via the shipping cradle or a sling placed underneath the package.

7.4 Other Procedures

Not Applicable

7.5 Appendix

Not Applicable

8.0 ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

8.1 Acceptance Tests

ACCEPTANCE TESTS FOR THE 30B OR 30C CYLINDER:

- Acceptance Tests For The 30B Cylinder – Designed and Manufactured per ANSI N14.1 (appropriate edition), “Uranium Hexafluoride – Packaging for Transport”. Acceptance tests for the 30B cylinder shall be in accordance with ANSI N14.1 (appropriate edition).
- Acceptance Tests For The 30B Cylinder – Designed and Manufactured per ANSI N14.1 – 1995, “Uranium Hexafluoride – Packaging for Transport” and ISO 7195:1993(F), “Packaging of Uranium Hexafluoride (UF₆) for Transport”. Acceptance tests for the 30B cylinder shall be in accordance with ANSI N14.1 – 1995 and ISO 7195:1993(F).
- Acceptance Tests For The 30C Cylinder - Designed and manufactured in accordance with Addendum 2-2004 to ANSI N14.1-2001.
- Acceptance Tests For The 30B or 30C Cylinder Used For Transport of a Type B Quantity of UF₆ – in addition to the tests listed above, the cylinder must have a measured leak rate less than 1×10^{-7} cm³/sec. The acceptance leak test of the 30B or 30C cylinder used for reprocessed UF₆ will be performed using Method A.5.4 Evacuated Envelope of ANSI N14.5-1997. The cylinder will be evacuated to a 90% vacuum and then pressurized with helium to approximately 1 psig. The pressurized cylinder is placed in a sealable container connected to a helium mass spectrometer leak detector. The container is sealed and evacuated until the vacuum is sufficient to operate the helium mass spectrometer leak detector and the helium concentration in the container void is monitored. The acceptance criterion is 1.0×10^{-7} atm-cm³/sec of air (leaktight). The detector sensitivity must be less than or equal to 5.0×10^{-8} atm-cm³/sec.

ACCEPTANCE TESTS FOR THE UX-30:

The following acceptance tests are for the UX-30

8.1.1 Visual Inspections and Measurements

- 8.1.1.1 See Appendix 8.3.1 for acceptance criteria and inspections associated with polyurethane foam manufacturing.
- 8.1.1.2 Prior to the first use of the package, the following inspection shall be performed:

Dimensional compliance with the drawings referenced in the Certificate of Compliance.

Verify that the packaging is free of cracks, pinholes, or defects that could reduce the effectiveness of the package.

Verify that the packaging is marked in accordance with 10 CFR 71.85 (c).

8.1.2 Weld Examinations

Prior to the first use of overpacks fabricated on or prior to March 31, 2009, all welds shall be visually inspected in accordance with AWS D1.1 PARA 6.9 (statically loaded). Prior to the first use of overpacks fabricated after March 31, 2009, welding shall be performed in accordance with ASME Section III, Subsection NF or Section VIII-Div.1 (as appropriate) and shall be visually inspected in accordance with ASME Section V with acceptance criteria in accordance with ASME Section III, Subsection NF-5000..

8.1.3 Structural and Pressure Tests

None.

8.1.4 Leakage Tests

None.

8.1.5 Component and Material Tests

Prior to the first use of the package, an assembly test showing proper operation of closure interface and all ball-lock pins shall be performed.

8.1.5 Shielding tests

None.

8.1.7 Thermal Tests

None.

8.2 Maintenance Program

MAINTENANCE PROGRAM FOR THE 30B OR 30C CYLINDER:

- Maintenance Program For The 30B Cylinders Manufactured per ANSI N14.1 (appropriate edition), “Uranium Hexafluoride – Packaging for Transport”.

- ◆ Maintenance of the 30B Cylinders shall be performed in accordance with ANSI N14.1 (appropriate edition).
- Maintenance Program For The 30B Cylinders Manufactured In Accordance With ANSI N14.1–1995, “Uranium Hexafluoride – Packaging for Transport” and ISO 7195:1993(F), “Packaging of Uranium Hexafluoride (UF₆) for Transport”.
 - ◆ Maintenance of the 30B Cylinders shall be performed in accordance with ANSI N14.1 - 1995 and ISO 7195:1993(F).
- Maintenance Program for the 30C Cylinder.
 - ◆ Maintenance of the 30C Cylinder shall be performed in accordance with Addendum 2-2004 to ANSI N14.1-2001.
- Maintenance Program for 30B or 30C Cylinders Used For Transport of a Type B Quantity of UF₆ –
 - ◆ In addition to the maintenance requirements listed above, the cylinder must have been tested within 12 months prior to shipment to demonstrate a measured leak rate less than 1×10^{-7} cm³/sec. The acceptance leak test of the 30B or 30C cylinder used for reprocessed UF₆ will be performed using Method A.5.4 Evacuated Envelope of ANSI N14.5-1997. The cylinder will be evacuated to a 90% vacuum and then pressurized with helium to approximately 1 psig. The pressurized cylinder is placed in a sealable container connected to a helium mass spectrometer leak detector. The container is sealed and evacuated until the vacuum is sufficient to operate the helium mass spectrometer leak detector and the helium concentration in the container void is monitored. The acceptance criterion is 1.0×10^{-7} atm-cm³/sec of air (leaktight). The detector sensitivity must be less than or equal to 5.0×10^{-8} atm-cm³/sec.

MAINTENANCE PROGRAM FOR THE UX-30:

8.2.1 Structural and Pressure Tests

- 8.2.1.1 Visual inspection of accessible welds shall be carried out within 12 months prior to shipment in accordance with ASME Section V with acceptance criteria in accordance with ASME Section III, Subsection NF-5000.
- 8.2.1.2 Excessive accumulations of dirt, oil, and other debris shall be removed from the inner and outer surfaces after each use.
- 8.2.1.3 The dust seal and all rubber pads shall be inspected every 6 months for wear. The dust seal shall be replaced when excessive wear renders the seal ineffective.

8.2.1.4 Inner and outer surfaces shall be inspected for penetrations every 6 months. If any skin failure is observed, these may be repaired using a suitable stainless steel welding procedure. Care should be taken to avoid application of heat for an excessive duration, causing the package to change shape.

8.2.2 Leakage Tests

None.

8.2.3 Component and Material Tests

None.

8.2.4 Thermal Tests

None.

8.2.5 Miscellaneous Tests

8.2.5.1 The following inspections shall be performed to verify acceptability of the foam:

Plastic overpack foam-filling-hole plugs should be removed every 12 months to allow inspection of foam condition for indications of foam deterioration (e.g., presence of solid foam on inside of plug). Verify tight fit of plug after replacement (plug should not turn freely by hand).

Overpacks are to be weighed every 12 months to determine if water has leaked into the overpack. A weight gain of more than 25 pounds per base or lid is reason for rejection (per USEC-651, "Uranium Hexafluoride: A Manual of Good Handling Practices", DOE Field Office, Oak Ridge).

8.2.5.2 In addition to the requirements of Section 7.1.1.3 to check the ball-lock pins before each use, the pins shall also be checked for proper operation annually.

This annual check shall consist of at least:

1. Depressing the push button and verifying the ball locks operate properly and that the push button retracts when it is released.
2. Inserting each pin into a receptacle on the UX-30 and verifying that it properly locks into place
3. Cleaning each pin by wiping it down with a clean cloth and, if necessary, lubricating it with a clean lightweight oil such as WD-40.

Malfunctioning ball-lock pins identified during this annual maintenance shall be immediately removed from service.

8.3 APPENDIX

8.3.1 Polyurethane Foam Specification ES-M-170

(Proprietary)

Appendix 8.3.1

Polyurethane Foam Specification ES-M-170

(Not Included in Public SAR)