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UF₆ & UO₂ Packaging · Galvanizing & Tinning Kettles

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July 13, 2000

David Tiktinsky
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
U.S. Nuclear Regulatory Commission
11545 Rockville Pike- Mail Stop 13-D-13
Rockville, MD 20852

RE: Request for amendment to the Certificate of Compliance for USA/9234/BF-85 for NCI-21PF-1 Protective Shipping Package

Dear Dave,

Please find enclosed ten (10) copies of Section Seven and Eight of the subject Safety Analysis Report, which have been marked to show changes.

The requested changes reflect the Leak Tightness provision previously discussed with the NRC, and more stringent maintenance programs discussed at the recent industry conference.

In a parallel manner, the provisions of this request will be incorporated into US DOT Revalidation Certificate for DOT21-PF-1A, DOT21-PF-1B. This information is being provided to the industry users of DOT21-PF-1A & 1B, as well as US DOT.

Sincerely,



Trevor M. Rummel
Senior Vice President

cc: Tom Dougherty

NIMSSDI Public

SECTION SEVEN OPERATING PROCEDURES

Draft of 07/10/00

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7. OPERATING PROCEDURES

The NCI 21-PF-1 Overpack is loaded and unloaded and the 30B UF₆ cylinder is filled, tested, and handled in accordance with standard, in-plant operating procedures at various enrichment plants and at various nuclear fuel facilities, which may include the basic procedural requirements as described in USEC-651, and ANSI Standard N14.1. As a minimum, the specific procedures include steps described in the subsequent sections.

7.1 Procedures for Loading the Package

7.1.1 Receipt and Filling of 30B Cylinder

Receipt and filling of the 30B cylinder shall be performed in accordance with in plant operating procedures and ANSI N14.1.

7.1.2 Cylinder Inspection

Complete an inspection of the 30B cylinder as describe in USEC 651, or equivalent in-plant operating procedures, and ANSI N14.1 prior to insertion into the NCI 21-PF-1 Overpack. Any defective conditions must be corrected, and the cylinder must be re-certified prior to use.

7.1.3 Overpack Inspection

The user shall establish and implement written procedures to inspect the NCI 21-PF-1 Overpack prior to each use to assure the following:

- (a) The overpack base and supports are sound with no broken welds or components.
- (b) 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 six (6) by six (6) inch area shall be cause for the rejection of the Overpack.
- (c) The inner liner is free of debris and standing water.
- (d) The inner liner is intact and is not in a deteriorated or damaged condition.
- (e) The gaskets and cylinder support pads are in place and intact and are not in a deteriorated or damaged condition.
- (f) The gasket surfaces are free from nicks and deep scratches.
- (g) The cover plates and welds are sound and undamaged.
- (h) The Overpack halves fit together properly without gaps.
- (i) The closure mechanisms are in operational condition and properly close.
- (j) All vent seals/plugs are securely in place.
- (k) The tie-down and lifting/stacking supports are in place and are not in a deteriorated or damaged condition.
- (l) The shackles are in place and are not in a deteriorated or damaged condition.

- (m) The security seal apparatus is undamaged.

Following the inspection, a report shall be completed verifying that the NCI 21-PF-1 Overpack is free from damage and is in working order. Any defective condition must be corrected and the NCI 21-PF-1 Overpack must be re-certified prior to use.

7.1.4 Procedure for Loading a 30B Cylinder

- 7.1.4.1 Prior to loading the cylinder, the inspection required in Section 7.1.2 and 7.1.3 shall be completed and documented.
- 7.1.4.2 The 30B 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 and ANSI Standard N14.1 shall be used.
- 7.1.4.3 Leak tightness of the filled cylinder shall be previously verified using a test having a sensitivity of at least 1×10^{-3} std-cc/sec per ANSI Standard N14.5-1997. Leak tightness of the filled cylinder shall be verified by leak rate testing of the pigtail before disconnection and after closing the cylinder valve. Alternatively, a vacuum test may be performed on the cooled cylinder 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 proscribed by the facility's operating procedures.
- 7.1.4.4 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.
- 7.1.4.5 After verifying leak tightness of the filled cylinder, the cylinder shall be allowed to cool until the vapor pressure of the cylinder is below atmospheric pressure.
- 7.1.4.6 Prior to loading into the NCI 21-PF-1 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 proscribed 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 NCI 21-PF-1 Overpack.
- 7.1.4.7 A tamper-indicating seal shall be installed on the 30B cylinder prior to loading it into the NCI 21-PF-1 Overpack.

7.1.5 Procedure for Loading the NCI 21-PF-1 Overpack

- 7.1.5.1 The inspection required by Section 7.1.2, 7.1.3, and 7.1.4 shall be performed and documented prior to loading the NCI 21-PF-1 Overpack with a 30B cylinder.
- 7.1.5.2.1 Carefully load the 30B cylinder into bottom half of the NCI 21-PF-1 Overpack with the cylinder valve positioned up (at 12:00 o'clock position).
- 7.1.5.2.2 Remove the temporary valve protection cover, if present.
- 7.1.5.2.3 One secondary aluminum insert shall be placed into the cylinder skirt.
- 7.1.5.2.4 The next secondary aluminum insert shall be placed into the cylinder skirt
- 7.1.5.2.5 Once the two secondary aluminum inserts have been placed into the cylinder skirt, a two to three inch space should exist between the two pieces. A steel spacer shall be placed between the two aluminum inserts. (see Appendix 1.3 for illustration)
- 7.1.5.2.6 The primary aluminum insert shall be placed over the valve.
- 7.1.5.2.7 Install the metal spider of the valve protection device among the inserts. Verify that the bridge of the valve location insert covers the cylinder valve.
- 7.1.5.2.8 Clamp the metal spider of the valve protection device in place. (see Appendix 1.3 for illustration)
- 7.1.5.3 Carefully place the lid on the NCI 21-PF-1 Overpack.
- 7.1.5.4 Operate all closures mechanisms, alternating first corner-to-corner (4 closures) followed by side-to-side (6 closures in total).
- 7.1.5.5 Install security seals and record their numbers.
- 7.1.5.6 Complete radiation survey and assign Transport Index per applicable regulations.
- 7.1.5.7 Remove or obliterate old labels and re-label per applicable regulations.

7.2 Procedures for Unloading the Package

- 7.2.1 Procedure for unloading the NCI 21-PF-1 Overpack
 - 7.2.1.1 Inspect the exterior of the overpack as possible for damage using the steps provided in Section 7.1.3 (a), (b), (g), (h), (i), (j), (k), (l), and (m). Document any damage observed. Complete receiving report as required by facility operating procedures.
 - 7.2.1.2 Remove and record the NCI 21-PF-1 Overpack security seal.
 - 7.2.1.3 Loosen all closure mechanisms.

- 7.2.1.4 Remove the 30B cylinder from the NCI 21-PF-1 Overpack.
- 7.2.1.5 Remove the 30B cylinder security seal.
- 7.2.1.6 Remove the Valve Protection Device from the 30B cylinder.
- 7.2.1.7 Clean any loose debris from NCI 21-PF-1 Overpack interior.
- 7.2.1.8 Close the NCI 21-PF-1 Overpack prior to storage.

7.2.2 Procedure for unloading the 30B cylinder

- 7.2.2.1 Prior to unloading the cylinder, cylinder shall be inspected and weighed as required by USEC 651 or equivalent in plant operating procedures.
- 7.2.2.2 The 30B 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 Empty Package for Transport

Empty cylinders may be shipped without protective overpacks provided the residual heel does not exceed 25 lbs of UF₆ and 5% maximum ²³⁵U enrichment and as required by the applicable regulations.

7.3.1 Preparation of an empty overpack for shipment:

- 7.3.1.1 Close the NCI 21-PF-1 Overpack.
- 7.3.1.2 Complete radiation survey.
- 7.3.1.3 Remove or obliterate old labels and re-label per applicable regulations.

SECTION EIGHT: ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

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8. ACCEPTANCE AND MAINTENANCE PROGRAMS

This section describes the activities to be performed in compliance with Subpart G of 10CFR71 to assure that the NCI 21-PF-1 package conforms to the requirements of this Safety Analysis Report and remains in conformance following loading.

8.1 Acceptance Tests

8.1.1 Acceptance Tests for the NCI 21-PF-1 Overpack

Each completed overpack shall be inspected to document compliance with the following drawing requirements:

- (a) Final dimensions as described below:
 - Inner cylinder cavity dimensions.
 - Outer shell dimensions.
 - Closure mechanism locations.
 - Bolt center locations and hole diameters in tie down supports.
 - Flatness of gasket surface.
- (b) Installation of gaskets and cylinder support pads.
- (c) Lid to body fit.
- (d) Closure mechanism is in proper configuration.
- (e) Installation of lifting shackles and security seal pads.
- (f) Actual weights of top and bottom halves.
- (g) Final assembled weights.
- (h) Proper permanent marking and nameplates per 10CFR71.85(c), 49CFR172, and ANSI N14.1, appropriate edition.

8.1.2 Acceptance Tests for the 30B Cylinder

Acceptance tests for the 30B cylinder shall be in accordance with ANSI N14.1 (appropriate edition). Additionally, the cylinder shall be demonstrated to be capable of maintaining a leak tight condition using a test having a sensitivity of at least 5.0×10^{-8} std-cc/sec per ANSI N14.5-1997.

8.2 Maintenance Programs

8.2.1 Maintenance Programs for the NCI 21-PF-1 Overpack

The user shall establish and implement written procedures for the periodic maintenance and inspection of each Model NCI 21-PF-1 Overpack requiring the following as a minimum:

8.2.1.1 Annually

- (a) Check that the lifting shackles, closure mechanism and supports, and tie-down supports are sound and free from unacceptable discontinuities, damage and deterioration. Procedures for checking torque on the closure shall be:
 - 1. Loosen set screws in collar bolts
 - 2. Adjust toggle closures to securely close Overpack
 - 3. Engage toggle clamps and close toggles, alternating first corner to corner followed by side to side.
 - 4. Torque to 110 + or - 10 foot pounds
 - 5. Tighten set screws
- (b) Check that all vents caps are properly sealed.
- (c) Check that the inner and outer shells are free of unacceptable discontinuities, and the inner shells are free of debris and standing water. Through wall corrosion or oxidation occurring in two or more locations on the inner or outer shells within six (6) inch by six (6) inch area is cause for removal from service, followed by remedial working repair and surface preparation.
- (d) Check that the cover plates are sound and undamaged, and gasket-sealing surfaces meet drawing requirements.
- (e) Individually weigh each half (lid and bottom) of each packaging to verify that neither half has gained more than 25 pounds. Weight gain must be assumed to be water. If either half exhibits a gain of more than 25 pounds, the packaging must be removed from service and dried to within 10 pounds of its original nameplate weight. New weights of each packaging half must be established after any modifications, refurbishment, or repainting. After drying each packaging must be inspected, as above.
- (f) Replace all gaskets and pads.

8.2.1.3 Every Five Years

The owners are responsible for re-certifying the NCI 21-PF-1 Overpack every five years to meet original design specifications. The following inspections shall be performed:

- (a) Perform all routine inspections stated in Section 7 and all annual inspections stated above.
- (b) Full visual inspection of all welds for the presence of discontinuities. Any questionable condition of a weld shall be subject to further examination to assure that no unacceptable discontinuities are present. Weld defects shall be repaired, prior to entering service.
- (c) Check the base and lid for warpage and/or distortion, which would prevent tight closure. Check that the gasket sealing surfaces meet design specifications.
- (d) Assure that all vent caps are properly sealed.
- (e) Verify that the inner and outer shells are free of corrosion, pitting, unacceptable discontinuities, broken welds and pinholes. Through wall corrosion or oxidation occurring in two or more locations on the inner or outer shells within six (6) inch by six (6) inch area is cause for removal from service, followed by remedial working repair and surface preparation.
- (f) Assure that security seal holes are functional and capable of maintaining their integrity when seals are used.
- (g) Permanently mark the exterior nameplate listing the date of recertification, the individual base and lid weights, and the name of the re-certifying company.

The NCI-21PF-1 Overpack shall receive a full visual inspection for the presence of corrosion. This inspection shall include assurance that corrosion, has not reduced the shell wall thickness by 10% of the original nomination thickness in any six (6) inch by six (6) inch area of the NCI-21PF-1 Overpack. In the event that the visual inspection cannot assure sufficient minimum wall thickness, other non-destructive evaluation techniques, such as ultrasonic testing or equivalent, shall be utilized.

- (h) The NCI 21-PF-1 Overpack foam shall be inspected to insure the presence and rigidity of foam. Each vent hole will be inspected with a probe (a blunt wooden or metal dowel 1/4" in diameter) to detect voids in the foam. Voids greater than 1/2 inch in depth or 1/2 inches diameter shall be cause for rejection of the NCI 21-PF-1 Overpack.

Voids may be repaired by injecting foam into the area and caulking compound. The injected foam and caulking must completely fill the void volume.

In the event the inspection reveals multiple voids greater than one inch in depth and greater than one inch diameter, the NCI-21PF-1 Overpack will be withdrawn from service. If the void(s) cannot be filled, the overpack shall be removed from service.

- (i) All repairs shall be performed by competent sources. All repairs that require welding shall be made by welders who are qualified in accordance with Section IX of the ANSI/ASME Boiler and Pressure Vessel Code or Section 5 of ANSI/AWS D1.1. The repair shop shall provide certification of weld procedures and welder qualifications.
- (j) Permanently mark the exterior nameplate listing the date of recertification, the individual base and lid weights, and the name of the recertifying company.

8.2.2 Maintenance Program for the 30B Cylinder

Maintenance of the 30B Cylinders shall be performed in accordance with ANSI N14.1.