

RECENT APPROVAL OF THE UX-30 AS A TYPE B PACKAGE

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INTRODUCTION

- Due to the increased availability of reprocessed uranium, there is a need for packages to transport UF_6 produced from reprocessed uranium.
- Reprocessed uranium may contain greater than Type A quantities of fission products and transuranics thus requiring a Type B package.

- Energy *Solutions* revised the UX-30 Safety Analysis Report (SAR) to show compliance with Type B requirements.

SAR Changes

- Inclusion of reprocessed uranium
- Addition of restrictions on the additional radionuclide content of the reprocessed uranium
- Enhanced leak testing for cylinders containing a Type B quantity of UF_6
- Revision of the shielding evaluation

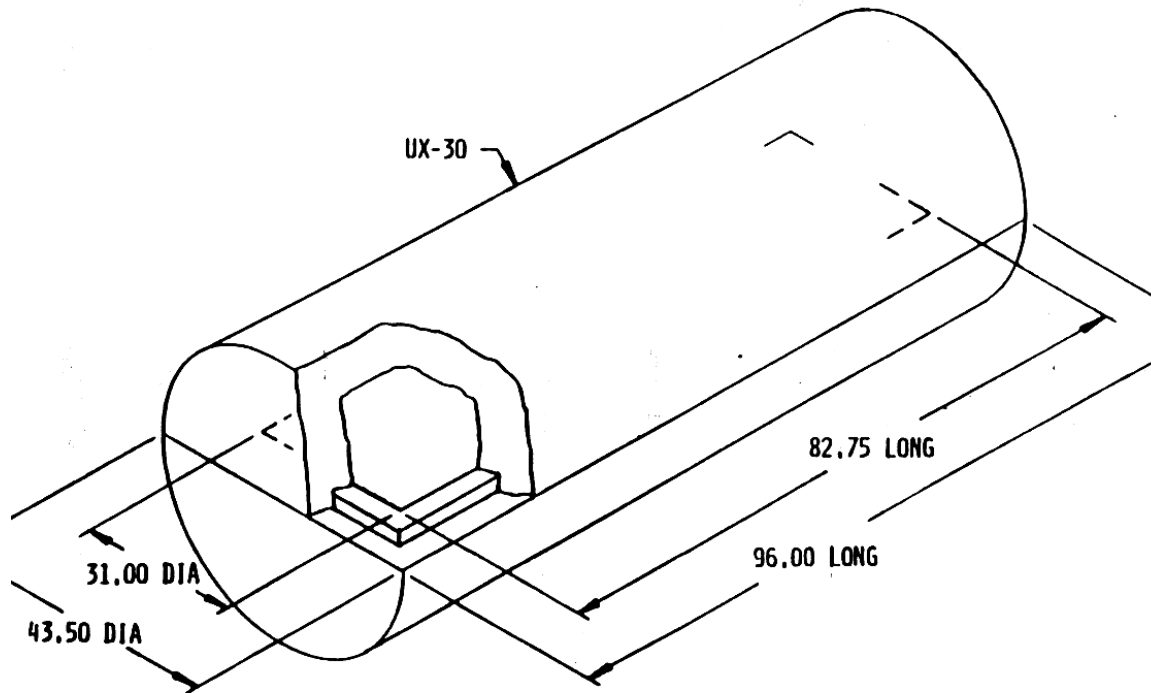
USNRC Authorization

The UX-30 was authorized by USNRC on April 14, 2009 as a Type B(U)F package for transport of greater than Type A quantities of unirradiated uranium and reprocessed uranium in the form of UF_6

DESCRIPTION OF THE UX-30

The UX-30 consists primarily of two components:

- Standard 30B or 30C cylinder
- UX-30 overpack



- The exposed surfaces of the UX-30 are fabricated from ASTM A240 304 stainless steel.
- The 6” space between the inner and outer overpack steel shells is filled with an energy-absorbing and insulating closed-cell polyurethane foam.





AUTHORIZED CONTENTS

Type and Form of Material

- Unirradiated uranium, in the form of UF_6 , with a U-235 mass percentage not to exceed 5 weight percent
- Reprocessed uranium, in the form of UF_6 , with a U-235 mass percentage not to exceed 5 weight percent
 - fission product gamma activity shall not exceed 4.4×10^5 MeV Bq/kgU
 - alpha activity from neptunium and plutonium shall be less than 3.3×10^3 Bq/kgU

Type and Form of Material

- Maximum quantity of material per package
 - 5,020 pounds UF_6 contained in a 30B or 30C cylinder
 - maximum H/U atomic ratio for the UF_6 is 0.088
 - total activity in the package may not exceed $10^5 A_2$

REVISED SAR

Structural and Thermal Evaluation

- No change to the maximum quantity of UF_6
- No change to the previous structural and thermal evaluations

Containment Evaluation

- 30B or 30C cylinder containing the uranium hexafluoride must meet the leak test criterion of “leak tight.”
- Leakage rate tests are performed prior to first use of each cylinder, after maintenance, repair or replacement of components of the containment system, and periodically at intervals not to exceed 12 months.

Containment Evaluation (cont.)

- Pre-shipment leak tests must show no detectable leakage

Shielding Evaluation

- Gamma source is limited to 4.4×10^5 MeV Bq/kgU from fission products
 - based on the limits of ASTM C 996

Shielding Evaluation

Condition	Package Surface mSv/hr (mrem/hr)	1m from Surface mSv/hr (mrem/hr)
Normal Conditions of Transport		
End	0.0171 (1.71)	0.0018 (0.18)
Side	0.0165 (1.65)	0.0039 (0.39)
Allowable	2.0 (200)	NA
Hypothetical Accident Conditions		
End	0.0414 (4.14)	0.0033 (0.33)
Side	0.0386 (3.86)	0.0062 (0.62)
Allowable	NA	10 (1000)

Package Operations

Pre-Shipment Leak Test

Pressure Drop Test (Option 1)

- Connect a manifold, which includes a calibrated pressure gauge, to the valve and pressurize the manifold volume with dry air or nitrogen.
- A drop in pressure of greater than the minimum detectable amount shall be cause for test failure

Package Operations

Pre-Shipment Leak Test (cont.)

Vacuum Test (Option 2)

- Attach a pigtail to the closed valve
- Draw a vacuum
- Monitor for UF_6
- The presence of UF_6 in the pigtail is an indication that the valve is not fully closed or is defective.

Acceptance Tests and Maintenance Program

Acceptance Tests

Applicable to the 30B or 30C cylinder used for transport of a Type B quantity

- cylinder must have a measured leak rate less than 1×10^{-7} cm³/sec
- performed using Evacuated Envelope Method of ANSI N14.5-1997

Acceptance Tests and Maintenance Program

Maintenance Program

Applicable to the 30B or 30C cylinder used for transport of a Type B quantity

- cylinder must have been tested within 12 months prior to shipment
- performed using Evacuated Envelope Method of ANSI N14.5-1997

Competent Authority Endorsement

- USDOT issued a Competent Authority Certification for the UX-30 as a Type B(U)F package on Oct. 2, 2009.
- Endorsement of the USDOT certificate has been requested in other countries by various UX-30 users.

Endorsement Status

Country	Certificate	Expiration
Belgium	RIS/8.3USA.9196.10.074	28/02/2011
Canada	CDN/E150/-96 Rev 18	02/02/2011
France	F/837/X (with specificities) or F/838/X	both 15/10/2010
Germany	D/5426/B(U)F-96 Rev.0	28/02/2011
Netherlands	NL/0229/AF-96 Rev. 2	28/02/2011
Russia	RUS/2332/B(U)F-96T Rev. 3	28/02/2011
Sweden	2009/4568	28/02/2011
United Kingdom	USA/9196/B(U)F-96(1) Issue 1	28/02/2011
Korea	ROK/0005/B(U)F-96 (Rev.5)	28/02/2011

Conclusion

- UX-30 package was initially authorized by the USNRC and USDOT for the shipment of Type B quantities of reprocessed uranium.
- With the endorsement by additional countries, the UX-30 can now be used for international shipments.