U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

NUREG-0383
Volume 2
Revision 27

Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance

Office of Nuclear Material Safety and Safeguards

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11 West 42nd Street
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U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-0383
Volume 2
Revision 27

Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance

Manuscript Completed: December 2008
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Office of Nuclear Material Safety and Safeguards

ABSTRACT

The purpose of this directory is to make available a convenient source of information on packaging approved by the U.S. Nuclear Regulatory Commission. To assist in identifying packaging, an index by Model Number and corresponding Certificate of Compliance Number is included at the front of Volumes 1 and 2. An alphabetical listing by user name is included in the back of Volume 3 of approved Quality Assurance programs. The reports include a listing of all users of each package design and approved Quality Assurance programs prior to the publication date of the directory as of September 30, 2008. Volume 1 is for internal use only.

U.S. NUCLEAR REGULATORY COMMISSION
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
NUREG-0361; Safety Analysis Report for the Plutonium Air Transportable Package Model No. PAT-1, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: PAT-1

(2) Description

A stainless steel containment vessel (designated TB-1) surrounded by a stainless steel and redwood overpack (designated AQ-1). The contents are sealed within a stainless steel product can (designated PC-1) inside the containment vessel.

The AQ-1 overpack is a right circular cylinder, approximately 42-1/2 inches long by 24-1/2 inches outside diameter. The walls of the overpack consist of approximately 8 inches of grain oriented redwood encased within double stainless steel drums. The ends of the drums are doubly closed. A copper heat conducting element and an aluminum load distributer are encased within the redwood.

The TB-1 containment vessel is approximately 8-1/2 inches outside length by 6-3/4 inches outside diameter. The minimum wall thickness of the vessel is approximately 1/2 inch. The interior cavity of the vessel is a right circular cylinder, 4-1/4 inches diameter, with hemispherical ends. The vessel is closed by 12, 1/2-inch diameter bolts and doubly sealed with a copper gasket and knife edges and an elastomer O-ring.

The weight of the package is approximately 500 pounds. The weight of the TB-1 containment vessel, when loaded with 4.4 pounds of contents is approximately 41.7 pounds.

5. (a) (3) Drawings and Specifications

The Model No. PAT-1 packaging is fabricated in accordance with the drawings and specifications in Section 9.0 of the Safety Analysis Report, NUREG-0361 as supplemented by Issue B of Drawing Nos. 1004, 1009, 1013, 1016, 1017, 1018, 1019, 1020 and 1022.

(b) Contents

(1) Type and form of material

Plutonium oxide and its daughter products, in any solid form. The plutonium oxide may be mixed with uranium oxide and its daughter products, in any solid form.

(2) Maximum quantity of material per package and additional permissible contents

(i) Maximum 2.0 kg total radioactive material, plus: maximum 16 grams of water and 10 grams of polyethylene or polyvinylchloride bagging material. The maximum decay heat load of the contents may not exceed 25 watts.

(ii) Maximum 200 grams total radioactive material, plus: maximum one gram of water, maximum 200 grams of metal canning material (in addition to the PC-1 product can, Drawing No. 1024), maximum 64 grams of aluminum foil or honeycomb (in addition to the top spacer, Drawing No. 1015), maximum 175 grams of glass and maximum 35 grams polyethylene or polyvinylchloride bagging material. The maximum decay heat load of the contents may not exceed 25 watts.

(c) Criticality Safety Index

Minimum transport index to be shown on label for nuclear criticality control: 0.4

6. The PC-1 product can (Drawing No. 1024) and the top spacer (Drawing No. 1015) need not be used when the contents include 20 curies or less of plutonium.

7. Prior to first use, each packaging shall meet the acceptance tests and standards specified in Subsection 8.1 and Section 9.0 of the Safety Analysis Report.

8. Prior to each shipment, the package shall meet the tests and criteria specified in Subsection 8.2 of the Safety Analysis Report.

9. The package shall be prepared for shipment and operated in accordance with the procedures specified in Section 7.0 of the Safety Analysis Report.

The systems and components of each packaging shall meet the periodic tests and criteria specified in Subsection 8.3 of the Safety Analysis Report.

11. Repair and maintenance of the packaging shall be in accordance with Sections 8.0 and 9.0 of the Safety Analysis Report.

12. The packaging shall be designed, procured, fabricated, accepted, operated, maintained, and repaired in accordance with a quality assurance plan approved by the Nuclear Regulatory Commission for this purpose.

13. Through special arrangement with the carrier, the shipper shall ensure observance of the following operational controls for each shipment of plutonium by air:

    (a) The package(s) must be stowed aboard aircraft on the main deck in the aft-most location that is possible for cargo of its size and weight. No other type cargo may be stowed aft of the package(s).

    (b) The package(s) must be securely cradled and tied-down to the main deck of the aircraft. The tie-down system must be capable of providing package restraint against the following inertia forces acting separately relative to the deck of the aircraft: Upward, 2g; Forward, 9g; Sideward, 1.5g; Downward, 4.5g.

    (c) Cargo which bears one of the following hazardous material labels may not be transported aboard an aircraft carrying a package(s):

Explosive A	Non-Flammable Gas
Explosive B	Flammable Liquid
Explosive C	Flammable Solid
Spontaneously Combustible	Flammable Gas
Dangerous When Wet	Oxidizer
Organic Peroxide	Corrosive

This restriction does not apply to hazardous material cargo labeled solely as:

Radioactive I	Poison
Radioactive II	Poison Gas
Radioactive III	Irritant
Magnetized Materials	Etiologic Agent

14. Packagings may be marked with Package Identification Number USA/0361/B(U)F-85 until October 1, 2005, and must be marked with Package Identification Number USA/0361/B(U)F-96 after October 1, 2005.

15. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12, until October 1, 2004, and under the provisions of 10 CFR 71.17 thereafter.

16. The package authorized by this certificate is hereby approved for transportation of plutonium by air.

17. Expiration date: March 31, 2009.

REFERENCES

Safety Analysis Report for the Plutonium Air Transportable Package Model Number PAT-1, NUREG-0361, June 1978.

Sandia Laboratories application dated February 20, 1980.
Supplements dated: July 27, 1990 and July 20, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 24, 2004

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
4888	14	71-4888	USA/4888/B( )	1	OF	5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
Department of the Air Force
Air Force Technical Application Center/CC
1030 S. HWY A1A
Patrick AFB, FL 32925-3002

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Teledyne Energy Systems applications dated April 26, 1985 and August 19, 1986, as supplemented

4. CONDITIONS
This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

Packaging

(1) Model Nos.: Sentinel-25A, LCG-25A; Sentinel-25B, LCG-25B; Sentinel-25C, LCG-25C; Sentinel-25C3, -25D, -25E, -25F

(2) Description

The packages are thermoelectric generators. The majors components include the main housing, tungsten shield, housing flange, and electrical connectors. The approximate dimensions and weights for the various Model Nos. are as follows:

Model No.	Dimensions (inches)	Weight (lbs.)
Sentinel-25A, LCG-25A	25 OD x 25	3000
Sentinel-25B, LCG-25B	25 OD x 25	3300
Sentinel-25C, LCG-25C	24 OD x 32	2000
Sentinel-25C3	24 OD x 32	1300
Sentinel-25D	25 OD x 27	3300
Sentinel-25E	25 OD x 34	4200
Sentinel-25F	25 OD x 32	1400

5.(a) Packaging (continued)

(3) Drawing

The packagings are constructed in accordance with the following Drawing Nos.:

Model No.	Drawing Nos.
All Models	Isotopes, Inc. Drawing Nos.: 001-20000, Rev. E 001-20001, Rev. F 001-20002, Rev. F 001-20003, Sht. 1, Rev. B 001-80003
Sentinel-25A, LCG-25A	Martin Company Drawing Nos.: N0013100, Rev. A N0013108, Rev. D 001-40000, Rev. A Isotopes, Inc. Drawing Nos.: 001-10000, Rev. B 001-70024, Rev. C 001-70025, Sht. 1, Rev. D 001-70033, Shts. 1 & 2, Rev. A 001-70036 001-80005
Sentinel-25B, LCG-25B	Martin Company Drawing Nos.: N0013200, Rev. C 001-40012 Isotopes, Inc. Drawing Nos.: 001-70024, Rev. C 001-70025, Sht. 1, Rev. D 001-70033, Shts. 1 & 2, Rev. A 001-70036 001-80005
Sentinel-25C, LCG-25C	Martin Company Drawing Nos.: 001-40004, Rev. A 001-70010 001-70012, Rev. B 001-80004 Isotopes, Inc. Drawing Nos.: 001C10000, Sht. 1 Rev. D, & Sht. 3 001-70009, Rev. D

Model No. (continued)	Drawing Nos. (continued)
Sentinel-25C3	Isotopes, Inc. Drawing Nos.: 001C10000 Shts. 1 & 2, Rev. D 001-70009, Rev. D 001-70057, Rev. D 001-70060, Rev. C 001-40019, Rev. B
Sentinel-25D	Martin Company Drawing No. 001-80004 Isotopes, Inc. Drawing Nos.: 001D10000 Shts. 1 & 2, Rev. C 001-70036 001-70033 Shts. 1 & 2, Rev. A 001-70025 Sht. 1, Rev. D 001-70024, Rev. C 001-40015, Rev. C 001-40006, Rev. B
Sentinel-25E	Isotopes, Inc. Drawing Nos.: 001E10000, Shts. 1 & 2, Rev. E, & Sht. 3 001-70039, Rev. C 001-70025, Sht. 1, Rev. D & Sht. 2 001-70024, Rev. C 001-40017, Shts. 1 & 2, Rev. D 001-40006, Rev. B
Sentinel-25F	Isotopes, Inc. Drawing Nos.: 001F10000, Shts. 1 & 2, Rev. H* 001-70070, Rev. C 001-70060, Rev. C 001-70009, Rev. D 001-40025, Rev. A

*As modified by Figure 1 of the April 26, 1985, application.

(b) Contents

(1) Type and form of material

(i) Strontium 90 titanate doubly encapsulated in a Hastelloy or Uniloy fuel capsule which meet the requirements of special form radioactive material; or

(ii) Model No. Sentinel-25F may have, strontium fluoride doubly encapsulated in Hastelloy or Uniloy fuel capsule, with a Hastelloy C-276 liner which meets the requirements of special form radioactive material.

(2) The maximum quantity of material per package

125,000 curies

6. A barrier (permitting the free circulation of air) must be provided with sufficient separation distance to ensure that the requirement of 10 CFR 71.43(g) will be met.

7. Eye-bolts shall be removed or covered during transportation to prevent their use as tie-down devices of packages.

8. In addition to the requirements of Subpart G of 10 CFR Part 71, each package shall be operated, prepared for shipment and maintained in accordance with the following Operating Procedures and Maintenance Programs:

Model No.	Operating Procedures	Maintenance Program
Sentinel-25A, LCG-25A	Appendix E of TES-3206, as revised	Appendix F of TES-3206, as revised
Sentinel-25B, LCG-25B	Appendix E of TES-3209, as revised	Appendix F of TES-3209, as revised
Sentinel-25C, LCG-25C	Appendix E of TES-3210, as revised	Appendix F of TES-3210, as revised
Sentinel-25C3	Appendix E of TES-3211, as revised	Appendix F of TES-3211, as revised
Sentinel-25D	Appendix E of TES-3212, as revised	Appendix F of TES-3212, as revised
Sentinel-25E	Appendix E of TES-3213, as revised	Appendix F of TES-3213, as revised
Sentinel-25F	Chapter VIII of TES-3202, as revised	Chapter IX of TES-3202, as revised

9. The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration date: October 1, 2008. This certificate is not renewable.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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REFERENCES

Teledyne Energy Systems applications dated: April 26, 1985; and August 19, 1986.

Teledyne supplements dated: November 3, 1986; September 17, and December 2, 1991.

Department of Air Force supplements dated: November 12, 1993; December 11, 1996; January 15, 2002; and December 16, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: February 28, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
4986	41	71-4986	USA/4986/AF	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Global Nuclear Fuel - Americas, L.L.C.
P.O. Box 780
Wilmington, NC 28402

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Electric Company application dated September 10, 1997, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: RA-3

(2) Description

A fuel assembly and fuel rod shipping container. Packagings are right rectangular boxes consisting of an outer container of wooden construction and a metal inner container separated by cushioning material.

The metal inner container is approximately 11 inches by 18 inches by 178 inches long and is positioned within a wooden outer container approximately 30 inches by 30 inches by 207 inches long. Cushioning is provided between the inner and outer containers by phenolic impregnated honeycomb and ethafoam. Closure is accomplished by bolts. A pressure relief (breather) valve is provided on the inner container, and is set for 0.5 psi differential. The total weight of the packaging and contents is 2,800 pounds.

(3) Drawings

The packaging is constructed in accordance with General Electric Company Drawing Nos. 769E229, Revision 9; and 769E231, Revision 8.

(4) Product Container

The fuel rod product container is constructed in accordance with General Electric Company Drawing No. 0028B98, Revision 0.

5.(b) Contents

(1) Type and form of material

(i) Unirradiated UO_2 fuel assemblies. Each fuel assembly is made up of either 60 or 62 rods in an 8 x 8 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.0 percent by weight, and the maximum average enrichment is 5.0 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 6.1, Appendix 8-H, of the supplements dated June 27 and November 1, 1995.

(ii) Unirradiated UO_2 fuel assemblies. Each fuel assembly is made up of 74 full and partial length rods in a 9 x 9 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.0 percent by weight, and the maximum average enrichment is 4.6 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 6.1, Appendix 8-I, of the supplements dated June 27 and November 1, 1995.

(iii) Unirradiated UO_2 fuel assemblies. Each fuel assembly is made up of 92 full and partial length rods in a 10 x 10 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.5 percent by weight, and the maximum average enrichment is 5.0 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 6.1, Appendix 8-J, of the supplements dated June 27 and November 1, 1995.

(iv) Unirradiated UO_2 fuel assemblies. Each fuel assembly is made up of 92 full and partial length rods in a 10 x 10 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.0 percent by weight, and the maximum average enrichment is 4.7 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 5.1 and Table 5.1 contained in Appendix 8-J(a) of the supplement dated May 10, 2005.

(v) Unirradiated UO_2 fuel rods, which are contained within the product container specified in 5(a)(4). The maximum U-235 enrichment is 5.0 percent by weight. The fuel rods are clad with zircaloy, incaloy, inconel, or stainless steel. The minimum pellet diameter is 0.340 inch, and the maximum pellet diameter is 0.515 inch.

(vi) Unirradiated UO_2 fuel rods, which may be loose or may be strapped together. The maximum U-235 enrichment is 5.0 percent by weight. The fuel rods are clad with zircaloy, incaloy, inconel, or stainless steel. The minimum pellet diameter is 0.340 inch, and the maximum pellet diameter is 0.515 inch.

5.(b) (2) *Maximum quantity of material per package*

(i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), and 5(b)(1)(iv):

Two (2) fuel assemblies. Total quantity of radioactive material within a package may not exceed a Type A quantity.

(ii) For the contents described in 5(b)(1)(v):

Two (2) fuel bundles. A fuel bundle is defined as any number of fuel rods contained within the product container specified in 5(a)(4).

(iii) *For the contents described in 5(b)(1)(vi):*

Two (2) fuel bundles. A fuel bundle is defined as a maximum of 14 fuel rods positioned within one side (channel) of the inner container.

(c) Criticality Safety Index (CSI)

For the contents described in 5(b)(1)(i), 5(b)(1)(ii) and 5(b)(1)(iii), and limited in 5(b)(2)(i):	0.4
For the contents described in 5(b)(1)(iv), and limited in 5(b)(2)(i):	0.8
For the contents described in 5(b)(1)(v), and limited in 5(b)(2)(ii):	6.3
For the contents described in 5(b)(1)(vi), and limited in 5(b)(2)(iii):	2.9

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly.

7. Polyethylene holders with a maximum effective thickness of 0.151 inches (0.3835 cm) may be placed surrounding the fuel assembly up to a maximum of 0.13 grams H_2O hydrogen equivalent per cubic centimeter averaged over the assembly. The effective holder thickness is the linear average of the maximum and minimum thickness.

8. Polyethylene shipping shims may be inserted between rods within the fuel assemblies up to a maximum of 0.10 grams H_2O hydrogen equivalent per cubic centimeter averaged over the assembly. The shipping shims may be used with or without the polyethylene holders.

9. For shipment of fuel rods described in 5(b)(1)(v) and 5(b)(1)(vi), each fuel rod may be contained within a polyethylene sheath with a maximum thickness of 0.01 inch. Dunnage is permitted within the product container, and within the inner container, provided that the dunnage does not have a hydrogen density greater than that of water.

10. Maximum average enrichment means the highest enrichment averaged over any axial zone of the assembly.

11. In addition to the requirements of Subpart G of 10 CFR Part 71, each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 6 of the application, and the package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 6 of the application.

12. Transport of fissile material by air is not authorized.

13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17, provided that fabrication of the package was satisfactorily completed by August 31, 1986.

14. Revision No. 40 of this certificate may be used until October 1, 2008.

15. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

General Electric Company application dated September 10, 1997.

Supplements dated: November 20, 1997; June 5 and 25, July 1 and 21, and August 14, 1998; October 14, 1999; December 19, 2002; January 21, and December 3, 2004; April 18 and May 10, 2005; and January 2, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material
Safety and Safeguards

Date: January 31, 2008

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5086	12	71-5086	USA/5086/B(U)F	1	OF	2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

BWXT, Nuclear Products Division
P.O. Box 785
Lynchburg, VA 24505-0785

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

BWXT, Nuclear Products Division application dated December 23, 2003.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: UNC-2600

(2) Description

The inner container is an 11-gauge steel box with inside dimensions of 2-5/8" high x 7" wide x 96" long. The inner container is supported in a 22-1/2" ID by 102-1/2" long, 14-gauge steel drum by an insertable cage formed by nine 21-1/2" diameter by 3/8" thick steel plates, spaced approximately 12" apart, with a channel formed through the center of the plates by angle irons. The outer container closure is made with a 14-gauge drum lid with 12-gauge bolt locking ring with drop forged lugs, one of which is threaded, having a 5/8" diameter bolt.

(3) Drawings

The packaging is constructed in accordance with Thomas Gutman Consultant Drawing No. B-2600-2, Sheets 1 through 6, Rev. 3.

(b) Contents

(1) Type and form of material

Unirradiated, uranium-zirconium, fuel elements. The uranium may be enriched to any degree in the U-235 isotope.

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5086	12	71-5086	USA/5086/B(U)F	2	OF	2

(2) Maximum quantity of material per package

Up to 8.9 kilograms of U-235 per package. The ratio of the weight of U-235 to the weight of U-235 plus zirconium shall not exceed 0.074. The net weight of the contents shall not exceed 265 pounds.

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on label for nuclear criticality control: 1.4

3. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be prepared for shipment and operated in accordance with Chapter 7 of the application.

(b) The package must be acceptance tested and maintained in accordance with Chapter 8 of the application.

The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12.

8. Expiration date: February 28, 2009.

REFERENCES

BWXT, Nuclear Products Division dated December 23, 2003.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: February 05, 2004

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5607	12	71-5607	USA/5607/B()F	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
U.S. Department of Energy
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
T-2 Shipping Package, Safety Analysis Report Consolidated Application dated 8/22/03, as supplemented.

4. CONDITIONS
This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: T-2

(2) Description

Packaging for irradiated reactor fuel and components consisting of a lead encased in steel cask, removable containment vessel insert and shipping case.

The cask is a double-walled steel circular cylinder with thickened shielding in the center portion. The central cavity is 6.065 inches in diameter by 100 inches long. The lead shielding is 8.0 inches thick along a 45-inch center section reduced to 4.2 inches at each 36-inch end section. The containment vessel is positioned within the cask. Cask closure is accomplished by a gasketed and bolted steel plug. The cask is enclosed in the shipping case which is 36 inches in diameter by 133 inches long welded to a 4-foot by 6-foot steel pallet. The maximum weight of the packaging is approximately 20,600 pounds.

(3) Drawings

(i) The shipping case is constructed in accordance with DuPont Drawing Nos.: W716539, Rev. 1; 180191, Rev. 1; 180192, Rev. 0; 180193, Rev. 2; 180194, Rev. 0; 180197, Rev. 0; W716538, Rev. 0; 180195, Rev. 0; 180196, Rev. 0; and 180089, Rev. 0.

(ii) The cask is constructed in accordance with General Electric Drawing Nos.: 919D755, Rev. 1; 135C5202, Rev. 0; 153F966, Rev. 1; and 106D3721, Rev. 1; or it is constructed in accordance with DuPont Drawing Nos.: W239534, Rev. 2; 147214, Rev. 1; 147215, Rev. 2; and 147216, Rev. 1.

5.(a) (3) Drawings (Continued)

(iii) The ANL insert is constructed in accordance with Argonne National Laboratory Drawing Nos.: W0147-0227-DD, Rev 7; W0147-0228-DD, Rev. 6; W0147-0229-DC, Rev. 6; W0147-0231-DD, Rev. 3; W0147-0234-DC, Rev. 4; and W0147-0312-DE, Rev. 2.

(b) Contents

(1) Type and form of material

(i) Irradiated clad fuel in the form of solid metal, oxides, nitrides, and carbides of uranium, plutonium, or mixed uranium-plutonium contained within the ANL insert. The clad fuel may contain small quantities of Na or NaK. The minimum cooling time must be no less than 150 days.

(ii) Irradiated clad fuel pins of uranium dioxide enriched to up to 3.0 w/o in U-235 contained within the ANL insert. Average exposure of fuel not to exceed 18 megawatt days per kilogram. The clad fuel may contain small quantities of Na or NaK. The minimum cooling time must be no less than 90 days.

(iii) Irradiated reactor components held within the container shown in Drawing No. W0147-0234-DC, Rev. 4.

(2) Maximum quantity of material per package.

Internal decay heat not to exceed 208 watts, and:

(i) For the material described in 5(b)(1)(i), fissile material not to exceed 1.71 kg.

(ii) For the material described in 5(b)(1)(ii), fissile material (U-235) not to exceed 300 grams.

(c) Transport Index for Criticality Control (Criticality Safety Index)

For the contents described in 5(b)(1)(i) and 5(b)(1)(ii), and limited in 5(b)(2)(i) and 5(b)(2)(ii):

Minimum transport index to be shown on label for nuclear criticality control: 0.4

6. The contents must be shipped dry. When loaded underwater, the package must be dried using Consumer Power Company's procedure, "T-2 Cask Liner Assembly Drying Procedure," Proc. No. EE&T-C12, Rev. 1, 11/12/81.

7. The ANL Insert must be leak tested prior to first use and annually thereafter in accordance with the procedures specified in Argonne National Laboratories Document No. W0195-0054-ES-00.

8. Prior to each shipment, the package must be leak tested in accordance with procedures specified in HFEF Operating Instruction 6202.

9. In addition to the requirements of Subpart G of 10 CFR Part 71 and the other conditions of this certificate:

   (a) The package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application, as supplemented; and

   (b) The package must be maintained in accordance with the Maintenance Program of Chapter 8 of the application, as supplemented.

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12, until October 1, 2004, and under provisions of 10 CFR 71.17 thereafter.

11. Expiration date: October 1, 2008.

REFERENCES

T-2 Shipping Package, Safety Analysis Report, Consolidated Application dated August 22, 2003.

Department of Energy supplement dated February 13, 2004.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 03, 2004

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5757	10	71-5757	USA/5757/B( )F	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis Report for Neutron Source Shipping container dated February 14, 1968, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: Neutron Source Shipping and Installation Container

(2) Description

The Neutron Source Shipping and Installation container consists of two structures, one nested within the other, having an overall envelope of 5 feet, 5 inches diameter by 9 feet, 5-5/8 inches length. The outer structure, the shipping container, is a ring of polyethylene 11-1/2 inches thick with an OD of 5 feet 4 inches and length of approximately 5 feet 2 inches. The polyethylene is canned in a ½-inch thick carbon steel shell. The inner structure, the replacement and installation container, fits into the cavity of the outer structure. This assembly consists of a 6-1/2 inch OD, 79-5/8 inches long stainless central tube, which is plugged at both ends by machined stainless steel forging. Three cavities are machined in the bottom end plug to contain the neutron source assemblies. A jacket of lead, 6 inches thick, encircles the central tube, and this innermost layer of shielding serves to attenuate the gamma radiation. A wall of polyethylene, 8-1/2 inches thick, surrounds the lead shield and is canned with a ½-inch thick carbon steel plate. Gross weight is approximately 19,000 pounds.

5. (a) Packaging - (Continued)

(3) Drawings

The packaging is constructed in accordance with Westinghouse Electric Corporation Drawing Nos. 905D318, Rev. C; 905D315, Rev. F; and 905D285, Rev. A.

(b) Contents

(1) Type and form of material

(i) Radium-Beryllium neutron sources. These sources may be either unirradiated or irradiated and may have surface contamination as a result of previous use.

(ii) Plutonium 238-Beryllium neutron sources. These sources may be unirradiated or irradiated and may have surface contamination as a result of previous use.

(2) Maximum quantity of material per package

(i) One, two, or three neutron sources as described in 5(b)(1)(i) and limited to a total emission rate of 1.9×10^8 n/sec. These sources are limited to a combined surface contamination of not more than an A_2 quantity of radioactive material.

(ii) One, two, or three neutron sources as described in 5(b)(1)(ii) and limited to a total emission rate of 2.5×10^9 n/sec. These sources are limited to a combined surface contamination of not more than an A_2 quantity of radioactive material.

(c) Criticality Safety Index 11.2

6. The different types of sources shall not be intermixed within the same container for shipment.

7. Only sources manufactured before May 26, 2005, are authorized for transport.

8. Air transport of fissile material is not authorized.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Revision No. 9 of this certificate may be used until October 1, 2008.

11. Expiration date: October 1, 2008. This certificate is not renewable.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5757	10	71-5757	USA/5757/B( )F	3	OF	3

REFERENCES

Safety Analysis Report for Neutron Source Shipping Container, WAPD-OP(R)S-2473 dated February 14, 1968.

Supplements: Bettis Atomic Power Laboratory letter WAPD-OP(R)C-474 dated December 22, 1975. Naval Reactors letter G#92-03738, dated October 15, 1992; G#C97-03621 dated October 17, 1997; G#02-4094 dated November 20, 2002;G#05-02118, dated May 26, 2005; G#06-03304, dated August 25, 2006; and G#08-01057, dated March 13, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Meraj Rahimi, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: May 30, 2008

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
5797	17	71-5797	USA/5797/B(U)F	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Washington, D.C. 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

U.S. Department of Energy
application dated May 30, 1991,
as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: Inner HFIR Unirradiated Fuel Element Shipping Container, and Outer HFIR Unirradiated Fuel Element Shipping Container

(2) Description

Packaging for unirradiated fissile radioactive material as fuel elements for the High Flux Isotope Reactor (HFIR). The containers are right circular cylinders with an11-gauge carbon steel shell. The lid is attached to the container with sixteen 3/8-16x1-inch steel bolts. The steel shell is filled with stacked fir plywood rings. The plywood rings form a central cavity which is lined with 1-inch thick polyethylene foam.

The packaging for the inner HFIR fuel element has overall dimension of 25 inches OD by 45 inches high, a 10-7/8-inch diameter by 30-1/4-inch deep cavity, and a 660 pound gross weight.

The packaging for the outer HFIR fuel element has overall dimensions of 31.5 inches OD by 45.75 inches high, a 17-3/8-inch diameter by 31-1/8-inch deep cavity, and a 1,050 pound gross weight.

(3) Drawings

(i) The packaging for the inner HFIR fuel is constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-20978-EL-003E, Rev. E, and M-20978-EL-008E, Rev. C

5. (a) (3) Drawings (continued)

(ii) The packaging for the outer HFIR fuel is constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-20978-EL-002E, Rev. D, and M-20978-EL-008E, Rev. C.

(b) Contents

(1) Type and form of material

Uranium as U_3O_8-Al cermet, enriched up to 95% in the U-235 isotope, and clad in aluminum, 10-mils thick, and:

(i) For the packaging described in 5(a)(3)(i), the contents are described in ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HFIR-FE-3," and in the following Oak Ridge National Laboratory Drawing Nos.: E-42118, Rev. Q; E-42112, Rev. H; D-42113, Rev. G; D-42114, Rev. J; and E-42117, Rev. H.

(ii) For the packaging described in 5(a)(3)(ii) the contents are described in ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HFIR-FE-3," and in the following Oak Ridge National Laboratory Drawing Nos.: E-42126, Rev. M; E-42120, Rev. H; D-42121, Rev. H; D-42122, Rev J; and E-42125, Rev. J.

(2) Maximum quantity of material per package

(i) For the contents described in 5(b)(1)(i) not more than 2.63 kg of U-235.

(ii) For the contents described in 5(b)(1)(ii) not more than 6.88 kg of U-235.

(c) Criticality Safety Index 0.4

6. The lid lifting attachments must be blocked as shown on Martin Marietta Energy Systems, Inc., Drawing No. M-20978-EL-009E, Rev. 2, to prevent inadvertent use of the attachments during transport.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Each package shall be maintained in accordance with the Maintenance Program in Chapter 8 of the application;

   (b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application; and

   (c) The fuel element shall meet the fabrication inspection requirements of ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HFIR-FE-3."

8. Use of packaging fabricated after December 31, 1976, is not authorized.

9. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Transport by air of fissile material is not authorized.

11. Expiration date: September 30, 2012.

REFERENCES

U.S. Department of Energy Application dated May 30, 1991.

Supplements dated: February 26, 1992; April 2, 1993; September 23, 1996; September 2, 1998; February 24, 2000; February 4, 2002; August 20, 2007; and October 29, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: December 17, 2007

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5805	26	71-5805	USA/5805/B( )	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and cor .nts) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging an ransportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance wit' any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Chem-Nuclear Systems, Inc., application dated February 25, 1994.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: CNS 3-55

(2) Description

The package is a steel-encased, lead-shielded cask with crushable impact limiters. The basic cask is a steel cylinder 133-3/4 inches long by 50-1/2 inches in diameter with maximum cavity dimensions of 36 inches in diameter by 116 inches long reduced to 111 inches by the shield ring attached to the lid cover. Shielding is provided by 6 inches of chemical lead in the sides and closure base plate and 5-1/4 inches in the closed end.

The outside steel encasement is made up of two, 1/2-inch plates on the sides and three plates totaling 2-5/8 inches on the end. The containment vessel is a 1/4-inch thick cylinder with a 1/2-inch end plate. The shells are welded together with the lead shielding poured to fill the annular and end spaces.

The removable, flanged and recessed base plate weldment consists of 3/8-inch and 1-1/4-inch outside plates and a 5/8-inch inside plate. The space between the plates is lead-filled.

The base plate is secured to the cask body by means of twelve, 1-1/2-inch high strength bolts and nuts and sealed with two silicone O-rings.

The cavity is penetrated by a vent line at the closed end and a drain line through the base plate. The vent line is sealed by a gasketed and shielded plug. The drain line is sealed with a 25 psig relief valve.

5.(a)(2) Description (continued)

Cask appendages include two, 8-inch lifting trunnions and two, 4-inch removable tilting trunnions on the cask side.

Removable impact limiters are provided at the cask ends and at the two, 8-inch trunnions. The former consist of a series of 6-inch diameter closed end tubes. Each impact limiter has tubes approximately 6 inches long around the end periphery. The closure end impact limiter has 12 tubes, six about 6 inches long and six about 2 inches long, around the sides. The closed end impact limiter has six tubes about 6-inches long around the sides. A gusseted tube acts as the trunnion impact limiter.

The cask is secured horizontally to a skid which is mounted to the transport vehicle for shipment. An optional sunshade is provided.

The gross weight of the package, excluding the skid and sunshade is approximately 70,000 pounds. The skid weighs about 4,200 pounds.

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc., Drawing Nos.: MOD 100, Rev. 14; C-111-D-0001, Rev. 0; and C-111-E-0002, Rev. 2; and ATCOR Drawing Nos.: MOD 139-1, Rev. K; MOD 140, Rev. C; MOD 124, Rev. 6; 0999-D-07, Rev. 8; and 0999-C-08, Rev. 9. An optional sunshade is constructed in accordance with Chem-Nuclear Systems, Inc., Drawing No. C-110-D-5001, Rev. 1.

(b) Contents

(1) Type and form of material

Depleted Antimony-Beryllium (Sb-Be) neutron sources and irradiated metal components packaged in secondary containers.

(2) Maximum quantity of material per package

Package internal decay heat load not to exceed 250 watts. The source strength of depleted neutron sources not to exceed 2.3 curies of Antimony-124.

6. (a) Both the inner cask cavity and the secondary container must be free of water when the package is delivered to a carrier for transport.

(b) Except for close fitting items, shoring must be placed between contents, secondary container and cask cavity to minimize secondary impacts due to accident sequence.

(c) The maximum gross weight of the contents, secondary container and shoring is limited to 9,220 pounds.

7. Prior to each shipment, the silicone O-ring seals (base plate and vent plug) must be inspected, the seals must be replaced with new seals if inspection shows any defects or every six (6) months, whichever occurs first.

8. Prior to delivery of the package to a carrier for transport, the package containment cavity shall be leak tested. The sensitivity of the test shall be at least 1×10^{-1} atm-cm^3/sec (STP). In addition, the packaging containment cavity shall be leak tested at least once every twelve (12) months. The sensitivity of the test shall be at least 1×10^{-3} atm-cm^3/sec (STP).

9. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application.

10. Each packaging must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17. Fabrication of additional packagings after December 31, 1983, is not authorized.

12. Expiration date: October 1, 2008. This package is not renewable.

REFERENCES

Chem-Nuclear Systems, Inc. application dated February 25, 1994.

Supplements dated: February 16, 1999; December 5, 2000; January 23, February 2, March 2, and April 23, 2001; October 3, 2002; January 14, 2004; February 26, and May 15, 2007; and June 6, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Eric J. Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: 6/10/08

NRC FORM 618 (8-2000) 10 CFR 71	CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES			U.S. NUCLEAR REGULATORY COMMISSION
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
5830	10	71-5830	USA/5830/B( )	1 OF 2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of the Navy
Naval Sea Systems Command
Detachment
Radiological Affairs Support Office
PO Drawer 0260
NWS Yorktown, VA 23691-0260

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Minnesota Mining and Manufacturing Co.
Application dated June 28, 1968, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: SNAP-21

(2) Description

A thermoelectric generator 16 inches in diameter by 30 inches long packaged in a right circular metal protective enclosure 52 inches in diameter by 68 inches high. Main components of the generator consist of an outer Berylco-165 housing with flange; U-8 Mo shielding; thermal insulation; thermoelectric modules; and the heat source. Total weight of the package is 1,900 pounds.

(3) Drawings

The SNAP-21 is constructed in accordance with Minnesota Mining and Manufacturing Company Drawing No. B-SK-37-4014 and Drawings included in 3M Report No. MMM-3691-33.

(b) Contents

(1) Type and form of material

Strontium 90 titanate pellets doubly encapsulated by a thin inner liner and a 0.2-inch thick Hastelloy C primary containment capsule which meets the requirements of special form radioactive material.

(2) Maximum quantity of material per package 33,000 curies.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5830	10	71-5830	USA/5830/B( )	2	OF	2

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) The package must be prepared for shipment, operated and maintained in accordance with Minnesota Mining and Manufacturing Company Report No. MMM 3691-42, "SNAP-21 Program, Phase II, Deep Sea Radioisotope-Fueled Thermoelectric Generator Power Supply System, Shipping and Handling Manual." For disposal shipments, temperature recorders and accelerometers are not required to be operational.

7. The package authorized by this certificate is hereby approved for use under the general license provisions 10 CFR 71.17.

8. Revision No. 9 of this certificate may be used until December 1, 2006.

9. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCE

Minnesota Mining and Manufacturing Company application dated June 28, 1968.

Department of Navy supplements dated: June 8 and October 10, 1990, September 20, 1995, April 16, 1998, April 27, 2000, January 5, 2004, and October 18, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 11/3/05

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5862	9	71-5862	USA/5862/B( )	1	OF	2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of the Air Force
HQ ATAC/SEG
1030 S. Highway A1A
Patrick AFB, FL 32925-3002

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Teledyne Energy Systems application dated June 26, 1985, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

Packaging

(1) Model No.: Sentinel-100F

(2) Description

The package, a thermoelectric generator, is 45.5 inches in height with a base diameter of 24.5 inches (excluding mounting pads), and weighs approximately 2,600 pounds. The components include a Tungsten biological shield (10.705" X 13.837" OD) which is within the aluminum (6061) outer protective housing. Four 6061-T6 mounting pads at the base of the aluminum housing provide the shipping pallet attachment points.

(3) Drawings

The packaging is constructed in accordance with the following Isotopes, Inc. Drawing Nos.:

010F10000	Sheets 1-3 (Rev. C), Generator Assembly Sentinel 100F
010-20000	Sheets 1-2 (Rev. B), Fuel Capsule Assembly
010-70003	(Rev. A) Shield Body
010-70004	Shield Plug
001-90064	Sheets 1-2 (Rev. A), Shipping Crate Sentinel RTG
001-90039	Sheets 1-2 (Rev. J), Sheet 3 (Rev. H), and Sheet 4, Pallet Assembly

5. (b) Contents

(1) Type and form of material

Strontium-90 titanate doubly encapsulated in a stainless steel liner and Hastelloy or Uniloy HC capsule which meets the requirements of special form radioactive material.

(2) Maximum quantity of material per package

370,000 curies.

6. Fabrication of additional packagings is not authorized.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in the supplement dated August 30, 1985.

(b) The package must be maintained in accordance with the Maintenance Program in the supplement dated August 30, 1985.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

Teledyne Energy Systems application dated June 26, 1985.

Teledyne supplements dated: August 30, 1985; and July 26, 1990.

Department of the Air Force supplements dated: November 12, 1993; August 15, 1995; August 25, 2000; and August 30, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert J. Lewis, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 26 Sept 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
5926	20	71-5926	USA/5926/B( )F	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
GE Hitachi Nuclear Energy Americas, LLC
6705 Vallecitos Road
Sunoi, CA 94586

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
General Electric Company application
dated January 18, 1993, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: GE-100

(2) Description

A steel encased lead shielded shipping cask. The cask is double-walled steel circular cylinder, 20-1/4-inch diameter by 26-7/8 inch high with a central cavity approximately 7-5/8-inch diameter by 10 inches high. Approximately 5-7/8 inches of lead surround the central cavity. The cask is equipped with a cavity drain line and lifting device. Closure is accomplished by a gasketed and bolted steel lead filled plug. For additional shielding lead, tungsten or uranium liners may be inserted in the cask cavity. The maximum weight of the packaging is 4,800 pounds.

(3) Drawings

The packaging is constructed in accordance with General Electric Company Drawing Nos. 129D4727, Rev. 5; 129D4729, Rev. 5; 129D4730, Rev. 4; and 129D4731, Rev. 1.

5. (b) Contents

(1) Type and form of material

(i) Byproduct and irradiated special nuclear material in the form of fuel rods, or plates, fuel assemblies, or meeting the requirements of special form radioactive material; or

(ii) Solid nonfissile irradiated metal hardware and reactor control rods (blades).

(2) Maximum quantity of material per package

Radioactive decay heat not to exceed 400 watts and 500 grams U-235 equivalent mass fissile material. (U-235 equivalent mass equals U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass).

Plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy or reactor elements.

(c) Criticality Safety Index

For the contents described in 5.(b)(1)(i):

Minimum transport index to be shown on label for nuclear criticality control: 5.6

6. Shoring shall be provided to minimize movement of contents during accident conditions of transport.

7. At the time of delivery of the loaded package to a carrier for transport, the package contents shall be dry and the fissile material unmoderated (H to X atomic ratio less than 2).

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be maintained in accordance with the maintenance procedures submitted with GE application dated January 18, 1993.

(b) The package must be prepared for shipment and operated in accordance with the operating procedures submitted with GE application dated January 18, 1993.

9. Transport of fissile material by air is not authorized.

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

11. Revision No. 19 of this certificate may be used until October 1, 2008.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5926	20	71-5926	USA/5926/B( )F	3	OF	3

12. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

General Electric Company application dated January 18, 1993.

Supplements dated: March 3, 1993; November 19, 1997; March 14, 2003; January 19, 2007; and December 21, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: January 25, 2008

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
5939	33	71-5939	USA/5939/B( )F	1 OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3 THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

GE-Hitachi Nuclear Energy Americas, LLC
3901 Castle Hayne Road
Wilmington, NC 28401

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Electric Company* application dated November 19, 1992, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 1500

(2) Description

A steel encased lead shielded shipping cask. The cask is double-walled steel circular cylinder, approximately 30 1/4-inch diameter by 48 1/2 inches high with a central cavity approximately 7-inch diameter by 25 inches high. The diameter is reduced from 30 1/4 inches to 17 1/2 inches by cone construction at the top 7 inches of the cask. Approximately 11 inches of lead surround the central cavity. The cask is equipped with a cavity drain line and lifting device. Closure is accomplished by a gasketed and bolted steel lead-filled plug. A protective jacket consisting of an upright circular cylinder with open bottom and a protruding box section diametrically across the top and vertically down the sides attaches to a square pallet. Dimensions of the protective jacket are approximately 60 7/8 inches high by 50 inches wide across the box section. The outer cylindrical diameter is 36 1/2 inches and the pallet is 59 1/2 inches square. The maximum weight of the packaging is approximately 15,500 pounds.

(3) Drawings

(i) The packaging is constructed in accordance with General Electric Company Drawing Nos. 129D4748, Rev. 7; 129D4749, Rev. 5; and 129D4750, Rev. 9.

(ii) An optional canister insert is constructed in accordance with the following Chem-Nuclear Systems, Inc., Drawing Nos., supplement dated March 1, 1993:

C-110-D-48019-001, Rev. D; and C-110-A-48019-002, Rev. C.

* This license was transferred from General Electric Company to GE-Hitachi Nuclear Energy Americas, LLC, in 2007.

5.(b) Contents

(1) Type and form of material

(i) Byproduct material and special nuclear material meeting the requirements of special form radioactive material and antimony pins encased in stainless steel, or

(ii) Byproduct material as $^{90}SrF_2$ or $^{137}CsCl$ capsules meeting Condition No. 6, below, or

(iii) Solid nonfissile irradiated metal hardware and reactor control rods (blades), or

(iv) Stainless steel encapsulated solid metal Co-60 sources, or

(v) Byproduct material as $^{137}CsCl$ capsules meeting Condition No. 7, below.

(2) Maximum quantity of material per package

Not to exceed a decay heat generation of 3,120 watts and

(i) Item 5(b)(1)(i) above:

500 grams U-235 equivalent mass. (U-235 equivalent mass equals U-235 mass plus 1.66 times Pu mass). Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements.

(ii) Item 5(b)(1)(ii) above:

458,000 curies.

(iii) Item 5(b)(1)(iv) above:

200,000 curies.

(iv) Item 5(b)(1)(v) above:

157,000 curies.

(c) Criticality Safety Index 5.7

6. For the contents described in 5(b)(1)(ii): The $^{90}SrF_2$ capsules must be in accordance with Vitro Drawing Nos. H-2-66759, Rev. 0; and H-2-66758, Rev. 0. The $^{137}CsCl$ capsules must be in accordance with Vitro Drawing Nos. H-2-66760, Rev. 0; and H-2-66761, Rev. 0. After fabrication, the $^{90}SrF_2$ and $^{137}CsCl$ capsules must be leak tested using a method having sufficient sensitivity to detect a leak rate of 10^{-8} atm cc/sec. Any capsule with a detectable leak may not be delivered to a carrier for transport.

7. For the contents described in 5(b)(1)(v): The $^{137}CsCl$ capsules must be contained in the canister insert described in item 5(a)(3)(ii), above. The $^{137}CsCl$ capsules must be constructed and tested in accordance with Section 1.2.3 of the Chem-Nuclear Systems, Incorporated supplement dated March 1, 1993. The canister insert must be operated, tested, and maintained in accordance with Chapters 7 and 8 of the Chem-Nuclear Systems, Inc., supplement dated March 1, 1993. The shipment period must be completed within 30 days following the placement of the canister lid on the canister insert.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Except for packaging Serial Number 1506, the package must be prepared for shipment, operated, and maintained in accordance with the "Shipping Package Assembly/Disassembly" sections of the application, supplement dated September 27, 2001.

   (b) The silicone rubber lid gaskets must be replaced within the 12-month period preceding each shipment. Prior to each shipment the silicone rubber lid gaskets must be inspected. The silicone rubber gaskets must be replaced if inspection shows any defects. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.

   (c) Packaging Serial Number 1506 must be prepared for shipment, operated, and maintained in accordance with Neutron Products, Inc., supplement dated October 10, 2002.

   (d) Packaging Serial Number 1506 must be bubble tested within the 12-month period preceding each shipment, and after each third use. The bubble test must be performed in accordance with Neutron Products, Inc., supplement dated October 10, 2002.

9. Except for packaging Serial Number 1506, the package may only be dry loaded and unloaded; loading or unloading under water is not authorized.

10. Transport of fissile material by air is not authorized.

11. The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.17.

12. Revision No. 32 of this certificate may be used until October 1, 2008.

13. Expiration date: October 1, 2008. This package is not renewable.

REFERENCES

General Electric Company application dated November 19, 1992.

General Electric Company supplements dated December 12, 1997, August 13, 1998, and August 27 and September 27, 2001; September 24, 2003, and January 19, 2007.

Chem-Nuclear Systems, Inc., supplement dated March 1, 1993.

Neutron Products, Inc., supplements dated February 1 and October 10, 2002.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: 10/22/07

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5957	28	71-5957	USA/5957/B( )F	1	OF	9

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of Energy
Washington, D.C. 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Department of Energy application dated April 18, 1995, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No. BMI-1

(2) Description

A steel-encased lead shielded shipping cask. The basic cask body is a cylinder 33.37 inches in diameter by 73.37 inches high formed by two concentric stainless steel shells whose annular region is filled with lead. The outer ½-inch thick shell has a 0.12-inch thick plate spot welded to it, providing a 0.06-inch thick air gap insulator. The inner shell is 15.5 inches inside diameter by 54 inches inside length. The cask lid is a stainless steel weldment having 7.75 inches of lead shielding. The cask lid is secured to the cask by twelve steel studs which are welded to the cask body. The cask is provided with a drain line with needle valve and plug, pressure gauge, and a pressure relief valve. The total cask weight, including maximum contents of 1,800 lbs, is 23,660 lbs.

(3) Drawings

The cask is constructed in accordance with the following Battelle Memorial Institute (BMI) Drawing Nos.: 43-6704-0001, Rev. B; and 41-4409-0003, Rev. B.

5.(a) Packaging (continued)

(4) Product Containers

The various authorized product containers are constructed in accordance with the following Drawing Nos.:

(i) Inner can assembly as shown in BMI Drawing No. 00-000-421, Rev. C.

(ii) Basket Assembly as shown in BMI Drawing Nos. BCL-000-500, Rev. A; BCL-000-501, Rev. A; and 0048, Rev. A.

(iii) Fermi Fuel Element copper casting assembly as shown in BMI Drawing No. K5928-5 0049D, Rev. to May 12, 1966.

(iv) Basket Assembly as shown in BMI Drawing No. 1020, Rev. B (or with alternate spacer shown in CI Drawing No. 334D2193) or GA Drawing No. 9590001, Rev. A. Failed fuel assemblies must be seal welded in aluminum or stainless steel tubes with wall and end cap thicknesses of at least 0.015 inch.

(v) Basket Assembly defined by BMI Drawing No. BCL-000-500, Rev. A, as modified by BMI Drawing Nos. 00-000-236, Rev. C, and BCL-000-502, Rev. B.

(vi) Basket Assembly and storage can defined by BMI Drawing No. 00-000-391, Rev. C, and Atomic International Drawing No. AIHL, S8DR 0019-01, Rev. A, respectively.

(vii) Inner can assembly as shown in Union Carbide Corporation Drawing No. 101501, Rev. A.

(viii) Basket Assembly as shown in University of Missouri Research Reactor (MURR) Drawing No. 2234, Sheets 1 through 5, Revision 0.

(ix) HFBR assembly basket and spacer plate as shown in Brookhaven National Laboratory Drawing Nos.: BNL 93-001, Sheets 1, 2, and 3, Rev. 2, and BNL 93-002, Sheet 1, Rev. 2.

(x) Basket assembly as shown in General Electric Company Drawing No. 183C8253, Rev. 1.

5.(b) Contents

(1) Type and form of material

(i) Intact irradiated MTR- or BRR-type fuel assemblies containing not more than 200 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.

(ii) Intact irradiated Enrico Fermi Core. A fuel assembly containing not more than 4.77 kgs U-235 prior to irradiation. Uranium may be enriched to 25.6 w/o in the U-235 isotope.

(iii) Greater than Type A quantity of radioactive material which may include uranium enriched in the U-235 isotope, U-233, plutonium, as metal, oxides, or compounds which are thermally stable up to 600°F. Plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy, or reactor elements.

(iv) Greater than Type A quantity of byproduct material meeting the requirements of special form radioactive material.

(v) Greater than Type A quantity of byproduct material in normal form as metal, oxides, or compounds which are thermally stable up to 600°F.

(vi) Irradiated Triga-Type fuel assemblies described in Section 6.6 of the application (pp. 6-23 through 6-27).

(vii) Irradiated S8DR fuel elements 0.56-inch OD by 18.7 inches long by 0.010-inch wall thickness of Hastelloy-N. The fuel material is UZrH fully enriched in U-235.

(viii) Intact irradiated CP-5 fuel assemblies containing not more than 176 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93 w/o in the U-235 isotope. Active fuel length shall be 28.5 inches.

(ix) Solid nonfissile irradiated hardware which may contain encapsulated fission monitors.

(x) Irradiated uranium oxide waste enriched in the U-235 isotope up to a nominal 93 w/o which is thermally stable up to 800°F.

(xi) Irradiated uranium enriched in the U-235 isotope meeting the requirements of special form radioactive material.

(xii) Intact irradiated MURR fuel assemblies containing not more than 775 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be 24 inches.

5.(b) Contents (continued)

(1) Type and form of material (continued)

(xiii) Intact irradiated MITR-II fuel assemblies containing not more than a nominal 510 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be approximately 24 inches.

(xiv) Intact irradiated High Flux Beam Reactor (HFBR) fuel assemblies containing not more than a nominal 351 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum of 93.5 w/o in the U-235 isotope. Active fuel length shall be nominal 24 inches.

(xv) Intact irradiated MTR-type fuel assemblies containing not more than 240 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.

(xvi) Irradiated MTR-type fuel sections containing not more than 176 grams U-235 per fuel section prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length per fuel section shall be approximately 11 inches. The fuel assembly shall be sectioned only in the non-fuel bearing regions of the assembly.

(xvii) Intact irradiated MTR-type fuel assemblies containing not more than 282.7 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 20 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.

(2) Maximum quantity of material per package.

The minimum cooling time of each fuel assembly and rod is 90 days, maximum decay heat generation per package not to exceed 1.5 kW, and the external dose rate not to exceed 10 mrem/hr 3 feet from the external surface of the cask and:

(i) For the contents described in 5(b)(1)(i):

Twenty-four (24) fuel assemblies as contained in product containers specified in 5(a)(4)(ii) or 12 fuel assemblies as contained in product containers specified in 5(a)(4)(v).

(ii) For the contents described in 5(b)(1)(ii):

One (1) fuel assembly as contained in product container specified in 5(a)(4)(iii).

(iii) For the contents described in 5(b)(1)(iii):

480 grams U-233 or 480 grams Pu-239 or 800 grams U-235 as contained in product container specified in 5(a)(4)(i).

5.(b) Contents (continued)

(2) Maximum quantity of material per package (continued)

(iv) For the contents described in 5(b)(1)(iv):

Gamma sources securely confined in the cask cavity to preclude secondary impacts during accident conditions of transport. Thermal heat generation rate is limited to 200 watts.

(v) For the contents described in 5(b)(1)(v):

Contained in product containers specified in 5(a)(4)(i) and limited to 200 thermal watts.

(vi) For the contents described in 5(b)(1)(vi):

Thirty-eight (38) fuel assemblies as contained in product containers specified in 5(a)(4)(iv). Fuel assemblies with an initial enrichment (U-235 in U) of greater than 70 w/o U-235 are limited to 19 assemblies per product container. Shipments of less than 19 assemblies with a U-235 enrichment greater than 70 w/o may be combined with assemblies of 70 w/o U-235 or less provided: $x/38 + y/19 \leq 1$; x = no. assy's ≤ 70 w/o U-235, y = no. assy's > 70 w/o U-235.

(vii) For the contents described in 5(b)(1)(vii):

Twenty-four (24) fuel elements per can and six sealed cans per basket as described in 5(a)(4)(vi). Each of the six cans may contain up to 818 g U-235 and 158 g hydrogen. The cask is limited to 4.908 kg U-235.

(viii) For the contents described in 5(b)(1)(viii):

Twelve (12) fuel assemblies.

(ix) For the contents described in 5(b)(1)(ix):

Thermal heat generation rate is limited to 200 watts.

(x) For the contents described in 5(b)(1)(x):

Twenty-four (24) containers each limited to 352 grams U-235 as contained in product containers specified in 5(a)(4)(vii). The decay heat per container is limited to 20 watts. The containers must be leak tested in accordance with Union Carbide Corporation letter dated November 17, 1980.

5.(b) Contents (continued)

(2) Maximum quantity of material per package (Continued)

(xi) For the contents described in 5(b)(1)(xi):

Twenty-four (24) capsules each limited to 100 grams U-235.

(xii) For the contents described in 5(b)(1)(xii):

Eight (8) fuel assemblies as contained in the product container specified in 5(a)(4)(viii). The maximum burnup is 150 MWD/Assembly and the minimum cooling time of each fuel assembly is 150 days. The maximum radiation source term is 400,000 curies.

(xiii) For the contents described in 5(b)(1)(xiii):

Eight (8) fuel assemblies, contained in the product container specified in 5(a)(4)(viii). The maximum decay heat per package is 200 watts.

(xiv) For the contents described in 5(b)(1)(xiv):

Twenty (20) fuel assemblies contained in two baskets separated by a spacer plate as specified in 5(a)(4)(ix). Each shipment must contain twenty fuel assemblies. The maximum burnup is approximately 130 MWD/assembly, and the minimum cooling time is 470 days.

(xv) For the contents described in 5(b)(1)(xv):

Twelve (12) fuel assemblies contained in product container specified in 5(a)(4)(v).

(xvi) For the contents described in 5(b)(1)(xvi):

Forty (40) fuel sections contained in the product container specified in 5(a)(4)(x). When a shipment contains less than the maximum number of fuel sections (40), empty fuel section basket spaces must be provided with an aluminum or steel spacer in the form of an open-ended pipe with a minimum outer diameter of 2.5 *inches and a minimum* wall thickness of 0.125 *inches. The spacer must be of* sufficient length to replace the absent fuel sections.

(xvii) For the contents described in 5(b)(1)(xvii):

Eight (8) fuel assemblies contained in the peripheral locations of the basket specified in 5(a)(4)(v). The maximum burnup is 14%, the maximum decay heat is 15 watts per fuel assembly, and the minimum cool time is 120 days. Four aluminum inserts, as shown in Lockheed Martin Drawing No. 507584, Rev. 1, must be positioned in each of the four center basket locations.

5.(c) Criticality Safety Index

(1) For the contents described in 5(b)(1)(iii) and 5(b)(1)(xv), and limited in 5(b)(2)(iii) and 5(b)(2)(xv): 0.4

(2) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(vi), 5(b)(1)(vii), 5(b)(1)(viii), 5(b)(1)(x), 5(b)(1)(xi), 5(b)(1)(xii), 5(b)(1)(xiii), 5(b)(1)(xiv), 5(b)(1)(xvi), and 5(b)(1)(xvii), and limited in 5(b)(2)(i), 5(b)(2)(ii), 5(b)(2)(vi), 5(b)(2)(vii), 5(b)(2)(viii), 5(b)(2)(x), 5(b)(2)(xi), 5(b)(2)(xii), 5(b)(2)(xiii), 5(b)(2)(xiv), 5(b)(2)(xvi), and 5(b)(2)(xvii): 100

6. For Item 5.(b)(1)(iii), mixtures of fissile material are authorized, provided the following equation is satisfied:

$$\frac{X}{480} + \frac{Y}{480} + \frac{Z}{800} \leq 1, \text{ where}$$

X = Grams U-233 to be shipped
Y = Grams Pu-239 to be shipped
Z = Grams U-235 to be shipped

7. Except for the contents described in 5(b)(1)(ii), 5(b)(1)(iv) and 5(b)(1)(xii); and limited in 5(b)(2)(ii), 5(b)(2)(iv) and 5(b)(2)(xii), the cask must be shipped dry.

8. If the cask contents of 5(b)(1)(ii), 5(b)(1)(iv) or 5(b)(1)(xii) are shipped wet, the licensee must confirm that the pressure relief valve is operable (set pressure - 75 psig). When needed, sufficient antifreeze in the cask must be used to prevent damage of any component of the package by freezing.

9. Loading and unloading operations of the contents described in 5(b)(1)(iii) and limited in 5(b)(2)(iii) must preclude contact of water with the contents.

10. When the contents of 5(b)(1)(vi) are loaded wet, the optional 0.5-inch diameter drain hole must be present in the primary basket lower plate to assure proper draining of the basket.

11. The presence and effectiveness of the Boral poison plate in the Basket Assemblies as shown in BMI Drawing Nos. BCL-000-500, Rev, A; 0048, Rev. A; and 00-000-236, Rev. C, must be verified by neutron measurements prior to first use and records maintained of such verification. Verification of the presence of the Boral must be made in each subsequent use.

12. Contents 5(b)(1)(i) and 5(b)(1)(x) may be mixed provided the sum of the product containers and fuel assemblies does not exceed 24.

13. Axial movement of fuel assemblies must be limited so that the active fuel region will remain correctly positioned with respect to the poisoned section of the basket. Removable spacers may be used in each section of the basket to limit axial movement of the assemblies.

14. Contents must be securely confined in the cask cavity to minimize movement.

15. Prior to each use, adequacy of containment vessel must be demonstrated by performance of the leak test described in Section 7.1.1.1 of the application.

16. Gaskets and seals (cask and fuel canister) must be replaced at least every 12 months or earlier if visible degradation occurs.

17. For contents described in 5(b)(1)(iii) and limited in 5(b)(2)(iii), the mass of fissile material contained in reactor fuel must be based on the mass prior to irradiation.

18. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application. Additionally, for the contents described in 5(b)(1)(xvii), the package must be prepared for shipment in accordance with the procedures specified in the supplement dated January 29, 1999.

    (b) The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

19. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

20. Revision No. 27 of this certificate may be used until March 31, 2007.

21. Expiration date: October 1, 2008.

REFERENCES

Department of Energy application dated: April 18, 1995

Department of Energy supplements dated: November 20, 1995, September 4, 1998, January 29 and April 20, 1999, December 13, 2000, and February 16, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 8, 2006

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5979	11	71-5979	USA/5979/B( )	1	OF	2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Alpha-Omega Services, Inc.
9156 Rose Street
Bellflower, CA 90706

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Alpha-Omega Services, Inc. application dated June 1980, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 5979

(2) Description

A shipping container for teletherapy cobalt sources. Configuration of the outer container is box-like measuring approximately 38" x 50" x 40". The box is lined with 4.5" of plywood with a 0.125" outer steel shell welded to an exterior angle framework. Transverse strips across the bottom facilitate use of a fork-lift and lifting lugs are provided at the four top corners. The inner shield vessel is essentially a 24" diameter, lead-filled, barrel-shaped configuration. Three different cylindrical plug inserts and bolted end caps provide flexibility to accommodate several sizes and shapes of sources. Gross weight is approximately 5,000 lbs.

(3) Drawings

The packaging is constructed in accordance with Alpha-Omega Services, Inc., Drawing Nos.: 0090, Rev. A; 0091, Rev. A; 0092, Rev. 1; and 0093, Rev. 0.

(b) Contents

(1) Type and form of material

Cobalt 60 or cesium 137 as sealed sources which meet the requirements of special radioactive material.

(2) Maximum quantity of material per package

13,000 curies Co-60 or 3,000 Cs-137, with decay heat load not to exceed 200 watts.

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
5979	11	71-5979	USA/5979/B( )	2	OF	2

6. Lifting eyes shall be covered or blocked to prevent use as tie-down attachments.

7. The shield vessel closures shall be equipped with gaskets.

8. Bolts used to secure the shield vessel closure caps shall be secured against loosening by vibration during transport.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

   a) Each package must meet the Maintenance Inspection Program of the supplement dated January 27, 2005; and

   b) The package must be prepared for shipment in accordance with the Operating Procedures of the supplement dated January 27, 2005.

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

11. Expiration date: October 1, 2008.

REFERENCES

Alpha-Omega Services, Inc., application dated June 1980.

Supplements dated: April 12, 1983; May 22 and August 20, 1990; January 30, and November 16, 1995; July 5, 2000; October 26, and November 15, 2004; and January 27, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 9, 2005

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6078	31	71-6078	USA/6078/AF	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Westinghouse Electric Company, LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Westinghouse Electric Company, LLC, application dated September 27, 2005.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model Nos.: 927A1 and 927C1

(2) Description

A steel fuel bundle shipping container consisting of a strongback and fuel bundle clamping assembly, shock mounted to a steel outer container. The fuel bundles are separated by 3/16" thick, high carbon steel segmented separator blocks permanently attached to the strongback. The segmented separator blocks are 6" x 8" and are installed (welded) in segments to form a continuous block for the entire active length of the fuel assembly. The Model No. 927A1 package is approximately 43" in diameter by 189" long with an approximate gross weight of 6,700 lbs. The Model No. 927C1 package is approximately 43" in diameter by 216" long with an approximate gross weight of 7,300 lbs.

(3) Drawings

The Model Nos. 927A1 and 927C1 containers are constructed in accordance with Combustion Engineering, Inc. Drawing No. L-6078-01, Sheets 1 through 4, Rev. 5.

(b) Contents

(1) Type and form of material

(i) Model No. 927A1: unirradiated fuel bundles consisting of 0.38" diameter uranium dioxide fuel pellets clad in 0.028" thick zircaloy tubes in a 14 x 14 square array with a 0.58" pitch. Each fuel bundle consists of a maximum of 176 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 19.6 kg U-235.

5.(b) (1) Contents (Continued)

(ii) Model No. 927A1: unirradiated fuel bundles consisting of 0.381" diameter uranium dioxide fuel pellets clad in 0.026" thick zircaloy tubes in a 14 x 14 square array with a 0.58" pitch. Each fuel bundle consists of a maximum of 176 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 20.5 kg U-235. The fuel assembly may contain rods that have annular pellet zones at the top and bottom whose lengths shall not exceed 12". The annular pellets have the same parameters as the solid pellets, except that the inner diameter shall not exceed 0.1905".

(iii) Model No. 927A1: unirradiated fuel bundles consisting of 0.325" or 0.3255" diameter uranium dioxide fuel pellets clad in 0.025" thick zircaloy tubes in a 16 x 16 square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 20.76 kg U-235. The fuel assembly may contain rods that have annular pellet zones at the top and bottom whose lengths shall not exceed 12". The annular pellets have the same parameters as the solid pellets, except that the inner diameter shall not exceed 0.1625".

(iv) Model No. 927A1: unirradiated fuel bundles consisting of 0.31" diameter uranium dioxide fuel pellets clad in 0.024" thick zircaloy tubes in a 16 x 16 square array with a 0.472" pitch. Each fuel bundle consists of a maximum of 231 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 11.68 kg U-235.

(v) Model No. 927C1: unirradiated fuel bundles consisting of 0.325" or 0.3255" diameter uranium dioxide pellets clad in 0.025" thick zircaloy tubes in a 16 x 16 square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 22.77 kg U-235. The fuel assembly may contain rods that have annular pellet zones at the top and bottom whose lengths shall not exceed 12". The annular pellets have the same parameters as the solid pellets, except that the inner diameter shall not exceed 0.1625".

(vi) Model No. 927C1: unirradiated fuel bundles consisting of 0.324" diameter uranium dioxide fuel pellets clad in 0.0235" thick zircaloy tubes in a 17 x 17 square array with a 0.501" pitch. Each fuel bundle consists of 264 fuel rods with a maximum 3.6 w/o enrichment in the U-235 isotope, and contains not more than 16.43 kg U-235.

(vii) Model No. 927C1: unirradiated fuel bundles consisting of 0.3225" diameter uranium dioxide pellets clad in 0.0225" thick zircaloy tubes in a 16 x 16 square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 22.0 kg U-235. The fuel assembly may contain rods that have annular pellet zones at the top and bottom whose lengths shall not exceed 12". The annular pellets have the same parameters as the solid pellets, except that the inner diameter shall not exceed 0.155".

5.(b) (2) Maximum quantity of material per package

Model No. 927A1: Two fuel bundles weighing not more than 1400 lbs. each.

Model No. 927C1: Two fuel bundles weighing not more than 1506 lbs. each.

(c) Criticality Safety Index: 15.7

6. Each fuel assembly shall be unsheathed or shall be enclosed in an unsealed, polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath shall not be folded or taped in any manner that would prevent flow of liquids into or out of the sheathed fuel assembly.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.

(b) The packaging must be maintained in accordance with the Maintenance Program of Chapter 8 of the application.

8. Fabrication of additional packagings is not authorized.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration date: October 1, 2008. This certificate is not renewable.

11. Revision No. 30 of this certificate may be used until October 1, 2006.

REFERENCES

Westinghouse Electric Company, LLC, consolidated application dated September 27, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 10/24/05

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
6206	31	71-6206	USA/6206/AF	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Framatome ANP, Inc.
P.O. Box 11646
Lynchburg, VA 24506-1646

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

B&W Fuel Company application dated April 23, 1990, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: Model B

(2) Description

A fuel assembly shipping container consisting of a steel strongback clamping assembly, shock mounted to a steel outer container. Two 3/16-inch thick, 8-5/8-inch high and full length stainless steel plates containing 1.5% minimum boron are positioned between adjacent fuel assemblies. The outer container is approximately 40 inches in diameter by 200 inches long. Gross weight of the loaded container not to exceed 7,600 pounds.

(3) Drawings

The container is constructed in accordance with Framatome Cogema Fuels Drawing Nos. 1273422, Rev. 0; 1273423, Rev. 0; 1273424, Rev. 0; 1273425, Rev. 0; 1273426, Rev. 0; and 1273427, Rev. 0.

(b) Contents

(1) Type and form of material

Unirradiated, sintered UO_2 pellets in fuel rods. The maximum inner diameter and the minimum outer diameter of the fuel rod cladding, guide tubes and instrument tubes are in accordance with Table 3 of B&W Fuel Company supplement dated October 27, 1995; and the minimum guide tube outer diameter and minimum wall thickness are in accordance with Framatome Cogema Fuels supplement dated February 7, 1996. The locations of the guide tubes and instrument tubes are in accordance with Figures 2 through 5 of B&W Fuel Company supplement dated October 27, 1995. The rods are assembled into fuel assemblies. The fuel assemblies may contain Special Absorber Rods as described in Tables 6.4.2 and 6.4.3 of Framatome ANP's supplement dated October 15, 2002.

5. (b)(1) Contents (continued)

Fuel assemblies as described above have the following specifications:

Assembly Type	15x15	15x15	15x15	17x17	17x17	15x15
No. fuel rods	208	208	208	264	264	204
No. non-fuel tubes	17	17	17	25	25	21
Fuel rod pitch, in.	0.568	0.568	0.568	0.496	0.502	0.563
Maximum fuel pellet OD, in.	0.3707	0.3742	0.3622	0.3232	0.3252	0.3671
Tube material	zirconium alloy	zirconium alloy	zirconium alloy	zirconium alloy	zirconium alloy	zirconium alloy
Maximum active fuel length, in.	144	144	144	145.825	144	144
Maximum enrichment w/o U-235	5.05	5.05	4.98	5.05	5.05	5.05
Maximum U-235 Loading (kg)	25.1978	25.6758	23.7220	24.3108	24.6126	24.2355

(2) Maximum quantity of material per package

Two fuel assemblies. Total quantity of radioactive material within a package may not exceed a Type A quantity.

(c) Criticality Safety Index 6.3

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly.

7. There must be a bow clamp to restrain each spacer grid and end fitting. The ratio of assembly weight to the number of clamp bows must not exceed 168 pounds per clamp.

8. The weight of the contents (fuel assemblies, control rods, spacers, etc.) must not exceed 3,360 pounds.

9. Fabrication of additional packagings is not authorized.

10. In addition to the requirements of Subpart G of 10 CFR Part 71, the package shall be operated and maintained in accordance with Section 7.0 of the application, as supplemented.

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Expiration date: October 1, 2008. This package is not renewable.

REFERENCES

B&W Fuel Company application dated April 23, 1990.

Supplements dated: July 23, 1990; May 4, August 18, August 25, and October 14, 1992; September 24, 1993; and April 8, May 2, and November 23, 1994; February 26, March 17, April 7, July 31, October 27, and December 1, 1995.

Framatome Cogema Fuels supplements dated February 7, 1996; January 20, March 19 and 26, and [illegible] 17, 1998; and August 29, September 8, and November 13, 2000; February 9, 2001; October 15, 2002; May 2 and July 25, 2003; and April 28, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert J. Lewis, Chief
Spent Fuel Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 02 Sept 2005

NRC FORM 618 (8-2000) 10 CFR 71		CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES		U.S. NUCLEAR REGULATORY COMMISSION
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
6347	11	71-6347	USA/6347/AF	1 OF 2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

General Atomics
P.O. Box 85608
3550 General Atomics Court
San Diego, CA 92186

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Atomics Company Application dated February 19, 1982, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: FSV-3

(2) Description

Inner container is a 18.5" ID x 34" high, 18-gage steel drum. Inner container is centered and supported in a 22.5" ID x 38.25" high, 16-gage steel drum. Void spaces between the inner and outer containers and within the inner container are filled with vermiculite. Total weight, including contents, is 500 pounds.

(3) Drawing

The packaging is constructed in accordance with General Atomics Company Drawing No. FFE-613, Issue D.

(b) Contents

(1) Type and form of material

Unirradiated fuel element consisting of a graphite body, hexagonal in transverse cross-section, approximately 14.2" across the flats and 31.2" high. Dispersed in columns within the fuel element body there is a maximum 1.41 kg U-235 plus U-238 and Th-232. The U-235: U-238: Th-232 atomic ratio is about 1:0.07:8.3. The atomic ratio of carbon to the U-235 is in the range of 1800 to 1.

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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5.(b) (2) Maximum quantity of material per package

One fuel element containing not more than 1.41 kg U-235 and weighing not more than 320 pounds. Total quantity of radioactive material within a package may not exceed a Type A quantity.

(c) Criticality Safety Index 1.3

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(i) The package must be operated and prepared for shipment in accordance with the operating procedures of Chapter 6 of the application.

(ii) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 7 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Transport by air of fissile material is not authorized

9. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCE

General Atomics Company application dated February 19, 1982.

Supplements dated: March 9, 1982; February 24, 1992; February 28, 1997; April 30, 2002; and August 20, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: September 26, 2007.

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
6386	17	71-6386	USA/6386/B(U)F	1	OF 3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis Report for 235R001 Shipping Container dated August 11, 1970, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 235R001

(2) Description

The 235R001 shipping container structure is horizontal, having an oblong cross section and is fabricated from 0.104-inch thick carbon sheet steel. The container is 313 inches long and has a maximum weight of 4,640 pounds, empty. The oblong cross section dimensions are approximately 35.5 inches high by 33.0 inches wide. The container was originally designed to ship unirradiated fuel modules of the AIG/A4W type. Subsequently, the container has been adapted to ship standard size or partial S8G fuel modules by use of a special frame assembly and cradle clamps, S3G-3 refueling modules using cell support assemblies, rodded or unrodded DIG fuel modules, and rodded or unrodded D2W fuel cells. The loaded container maximum weight is 12,200 pounds.

(3) Drawings

The packaging is constructed in accordance with Container Research Corporation Drawing Nos. 235R001, Rev. C, 235R004, Rev. C, and 235R005, Rev. 0, and Westinghouse Electric Corporation Drawing Nos. 973D425, Rev. 1, 903E693, Rev. 3, Sheet 1, 2 and 3 of 3, and 947J076, Rev. 0.

5.(b) Contents

(1) Type and form of material

Unirradiated fuel assemblies of the following types:

(i) A1G reactor cell without upper mechanism and with control rod, leadscrew and shipping fixture installed on rodded type modules.

(ii) Standard size S8G reactor cluster with regular or substitute support adapters and regular control rods. If only one cell is shipped per container, a dummy load shall be installed for balance.

(iii) Partial size S8G reactor cluster with regular or substitute support adapters and regular control rods. If only one cell is shipped per container, a dummy load shall be installed for balance.

(iv) S3G-3 refueling cells, with a maximum of one 0-1 reactor cell assembly per container.

(v) D1G fuel module, rodded.

(vi) D1G removable fuel assembly (RFA), unrodded.

(vii) A1G fuel cluster, fueled end only of full A1G reactor cell, rodded. Shipping poison rods are installed and are constructed in accordance with Westinghouse Electric Corporation Drawing Nos. 928E011, Rev. E, or 1588E41, Sheet 1, Rev. J, and Sheet 2, Rev. C.

(viii) D2W side or central fuel cells with control rod and control rod holddown device.

(ix) D2W corner fuel cells, without shear blocks, unrodded.

(x) D2W side or central fuel cell and shear block with control rod inserted in rodded fuel cell.

(xi) D2W corner fuel cell, with shear block, unrodded.

(2) Maximum quantity of material per package

(i) One fuel assembly as described in 5(b)(1)(i), 5(b)(1)(x), or 5(b)(1)(xi).

(ii) Two fuel assemblies as described in 5(b)(1)(ii), 5(b)(1)(iii), 5(b)(1)(iv), 5(b)(1)(v), 5(b)(1)(vii), 5(b)(1)(viii), 5(b)(1)(ix).

(iii) Four fuel assemblies as described in 5(b)(1)(vi).

5.(c) Criticality Safety Index

Minimum transport index to be shown on label for nuclear criticality control:

(1) For the contents described in 5(b)(1)(vii), 5(b)(1)(viii), 5(b)(1)(ix), and limited in 5(b)(2)(ii).: 50.0

(2) For contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), 5(b)(1)(iv), 5(b)(1)(v), 5(b)(1)(vi), 5(b)(1)(x), and 5(b)(1)(xi) and limited in 5(b)(2)(i), 5(b)(2)(ii) and 5(b)(2)(iii): 25.0

6. Expiration date: April 30, 2010.

REFERENCES

Safety Analysis Report for 235R001 Shipping Container, WAPD-OP(R)RD-357, dated August 11, 1970.

Supplements: Knolls Atomic Power Laboratory letter A1G 25-159, dated October 2, 1970. Bettis Atomic Power Laboratory letters WAPD-0P(R)RD-444, dated October 9, 1970; WAPD-OP(R)RD-476, dated October 26, 1970; and WAPD-OP(R)RD-488, dated October 30, 1970. Knolls Atomic Power Laboratory letters AIG 25-181, dated April 9, 1971; and A1G 25-191, dated May 11, 1971. Bettis Atomic Power Laboratory letters WAPD-OP(R)C-94, dated May 16, 1972; WAPD-OP(R)C-199, dated December 13, 1972; and WAPD-OP(R)C-229, dated March 6, 1978. Naval Reactors letters G#5078, dated January 26, 1976; G#5776, dated September 8, 1977; G#5905, dated January 23, 1978; G#5923, dated February 22, 1978; G#6095, dated August 17, 1978; G#6208, dated March 8, 1979; G#6373, dated September 4, 1979; G#6813, dated October 17, 1980; G#C85-0467, dated July 17, 1985; G#C88-8112, dated October 18, 1988; G#90-03655, dated August 10, 1990; G#92-03560, dated June 15, 1992; G#96-03371, dated March 15, 1996, G#C97-03444 dated April 8, 1997; G#C99-03514, dated June 1, 1999; G#C99-03688, dated December 30, 1999; G#C02-0750, dated April 8, 2002; G#C03-00273, dated January 24, 2003; and G#C03-01695, dated July 14, 2003.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

James R. Hall
for

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 25, 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6406	12	71-6406	USA/6406/AF	1	OF	2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

U.S. Energy Research and Development Administration application dated July 19, 1977, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: None specified

(2) Description

Specific packaging is not required. Safety is independent of packaging.

(b) Contents

(1) Type and form of material

Unirradiated fuel assemblies of the following type:

(i) D2W rodded fuel cell or unrodded corner type D2W fuel module in a Model No. 658H1AB shipping and storage container. Rodded type fuel module shall have a control rod and control rod holddown device installed.

(2) Maximum quantity of material per package

One fuel assembly as described in 5(b)(1)(i).

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
6406	12	71-6406	USA/6406/AF	2 OF	2

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on
label for nuclear criticality control:

For the contents described in 5(b)(1)(i): 100

6. Expiration date: March 31, 2008.

REFERENCES

U.S. Energy Research and Development Administration application dated July 19, 1977.

Supplements: Department of Energy letters G#5868 dated January 4, 1978, with enclosures; #6291 dated July 13, 1979; G#7609 dated September 30, 1983; G#C85-0435 dated April 19, 1985; G#C87-8027 dated December 23, 1987; G#92-03690 dated September 11, 1992; G#97-03513 dated June 11, 1997; G#C02-0700 dated February 8, 2002; G#02-0755 dated April 8, 2002; and G#02-4039 dated September 5,2002.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 20, 2003,

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6441	9	71-6441	USA/6441/B( )F	1	OF	2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis Report for D2G Power Unit Shipping Container dated August 4, 1969, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: D2G Power Unit

(2) Description

The D2G Power Unit shipping container assembly consists of five main assemblies; (1) the barrel assembly, (2) the upper cover, (3) the lower cover, (4) the main shipping skid, and (5) the barrel trunnion supports. To prepare the power unit shipping container for shipment of a power unit, the container barrel is rotated to the vertical position, the upper cover is removed and the power unit is loaded into the barrel and secured in the container with eight (8) shipping studs. The upper cover is then installed and the container is rotated to the horizontal position for shipment. The container assembly is 31 feet long and 8-1/2 feet wide and it is attached to a government owned permanently assigned depressed center railroad car; the maximum height above the rails is 13 feet, 10 inches in the shipping configuration. The power unit is shipped complete with design control rods and mechanisms installed.

The Type D or E power unit are retained in the container by means of eight shipping bolts. A special shipping ring is used to clamp the closure head and core cartridge assembly to the barrel upper flange of the shipping container. The control rods are restrained in the unit by means of rebound and outmotion latches located in the latching portion of the control rod drive mechanisms. The container assembly weighs about 100,000 pounds empty and about 270,000 pounds loaded.

(3) Drawings

The packaging is constructed in accordance with Baldwin-Lima-Hamilton Corporation Drawing Nos. R-126361, Rev. E, and R-126347, Rev. K, and Westinghouse Electric Corporation Drawing Nos. 955F632, Rev. 5, and 972D940, Rev. 5.

5. (b) Contents

(1) Type and form of material

Unirradiated enriched uranium as contained in Naval Reactors Type D or E power units consisting of core barrel, unirradiated fuel assemblies, closure head, mechanisms and associated hardware, with all design control rods and mechanisms installed.

(2) Maximum quantity of material per package

One power unit as described in 5(b)(1).

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on label for nuclear criticality control: 100

6. Expiration date: September 30, 2008.

REFERENCES

Safety Analysis Report for D2G Power Unit Shipping Container, ONP-74252-13, dated August 4, 1969.

Supplements: Bettis Atomic Power Laboratory letters WAPD-DP(CH)-1252, dated November 30, 1973; WAPD-DP(CH)-1466, dated October 18, 1974; Knolls Atomic Power Laboratory letter CGN 85542-250, dated February 5, 1981; Naval Reactors letter NR:RR:ESSNIDER G#92-03731, dated October 7, 1992; Naval Reactors letter NR:RR:SLDUNN G#97-03543, dated July 10, 1997; Naval Reactors letter NR:RR:MSHonea G#02-0735, dated March 13, 2002; and Naval Reactors letter NR:RR:JJHertzberg G#07-01133, dated March 19, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: April 27, 2007

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6553	21	71-6553	USA/6553/AF	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

United States Enrichment Corp.
6903 Rockledge Drive
Bethesda, MD 20817

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis Report on the "Paducah Tiger" Protective Overpack for 10-Ton Cylinders of Uranium Hexafluoride, Report No. KY-665, Revision 1, dated October 28, 1998, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: Paducah Tiger

(2) Description

A protective overpack which provides impact and thermal resistance for the Model No. 48X 10-ton cylinder. The cylinder is welded steel, and is 48 inches in diameter, 121 inches long, and has a 5/8-inch thick wall. The cylinder has a 108.9 ft3 volume, and is rated at 200 psig service pressure. The protective overpack has overall dimensions of approximately 153 inches x 76 inches x 72 inches. The overpack consists of two parts, a body and a lid, which are clamped and secured by four, 1-3/8-inch ratchet type binders, and eight, 1-3/4-inch guide pins, fitted with 3/4-inch high strength latch pins. The closed, assembled overpack consists of an outer 1/8-inch steel shell backed on both long sides, top and bottom by two, 10-gauge stainless steel breakaway plates. The valve end is protected by a 3/8-inch stainless steel breakaway plate and a 2-inch thick aluminum stiffening plate. A centrally located 3/16-inch steel shell, 60 inches in diameter x 128 inches long is separated from the outer shell by fire retardant polyurethane foam. The cylinder is held in the overpack by rubber shock isolators. Four mild steel brackets are provided on the body for lifting. Four, 2-inch bolts are used in conjunction with the ISO corner fittings for tie-down. The maximum gross weight of the package is 40,000 pounds.

(3) Drawings

The Paducah Tiger overpack is constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-1209-NRC-1, Rev. 0, M-1209-NRC-2, Rev. 0, M-1209-NRC-3, Rev. A, M-1209-NRC-4, Rev. 1, and M-1209-NRC-5, Rev. 0.

5.(b) Contents

(1) Type and form of material

Solid uranium hexafluoride (UF6) at not more than 4.5 w/o U-235 isotope enrichment, and an H/U ratio of no more than 0.088.

(2) Maximum quantity of material per package

The maximum weight of UF6 not to exceed 21,030 pounds (9,540 kg). The maximum U-235 content not to exceed 640 pounds (290 kg).

(3) Criticality Safety Index 0.0

6. Each Model No. 48X cylinder must be inspected, tested, maintained, assembled, and used in accordance with American National Standards Institute (ANSI) N14.1-2001. The cylinders must be designed and fabricated in accordance with ANSI N14.1-2001 or an earlier version of ANSI N14.1 in effect at the time of fabrication. The cylinders must be fabricated in accordance with Section VIII, Division I, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code and must be ASME Code-stamped. Except that the 48X cylinders manufactured by W.H. Stewart Company in accordance with ANSI N14.1-1971 after ANSI N14.1-1982 was approved may be used for shipment in the Paducah Tiger package provided that they are inspected, tested and re-certified in accordance with ANSI N14.1-2001.

7. In addition to the requirements of Subpart G of 10 CFR Part 71, each package shall be maintained, repaired, operated and prepared for shipment in accordance with Operating Instructions and Acceptance Tests and Maintenance Program in the application dated October 28, 1998, as supplemented December 21, 1998, June 7, 1999, and February 29, 2000.

8. Use of Model No. 48A cylinders is not authorized.

9. Use of Model No. 48X cylinders made of A-285 steel is not authorized.

10. The Model 48X cylinder valve stem and plug may be tinned with ASTM B32, alloy 50A or Sn50 solder material, or a mixture of alloy 50A or Sn50 with alloy 40A or Sn40A material, provided the mixture has a minimum tin content of 45 percent.

11. Paducah Tiger overpacks previously constructed in accordance with Martin Marietta Energy Systems, Inc., Drawing Nos. M-1209-NRC-1, Rev. C; M-1209-NRC-2, Rev. A, M-1209-NRC-3, Rev. A; and M-1209-NRC-4, Rev. A, may be used until September 10, 1999. For the overpacks authorized by this condition, the clearance distance between the end of the cylinder valve and the plane of the end of the cylinder skirt must be measured prior to each shipment. The clearance distance must be at least 3/8 inch.

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Revision No. 20 of this certificate may be used until December 30, 2006.

14. Expiration date: October 1, 2008. This package is not renewable.

REFERENCES

Safety Analysis Report on the "Paducah Tiger" Protective Overpack for 10-Ton Cylinders of Uranium Hexafluoride, Union Carbide Corporation Report No. KY-665, Revision 1, Dated October 28, 1998.

Supplements dated: December 21, 1998; January 12 and June 7, 1999; February 29, 2000; June 12, 2000; November 1, 2001; June 18, 2004; and September 6, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: December 22, 2005

NRC FORM 618 (8-2000) 10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6574	33	71-6574	USA/6574/B( )	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Scientific Ecology Group, Inc., application dated December 27, 1990, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: 3-82B

(2) Description

The packaging consists of a steel-lead-steel annulus cask fabricated in the form of a right circular cylinder and three different types of inner containers. The shielded cask, closed at one end and a lid closure at the other, is 66.25-inches in diameter by 74.5-inches in height. The cask wall consists of a 3/8-inch inner steel shell, 3-3/4-inches of lead shielding, one-inch outer steel shell, and a steel flange connecting the two shells. The cask outer shell is surrounded by a one-inch layer of insulating material and canned in 11-gauge steel.

The lid, sealed by a silicone flat gasket, is bolted to the cask body. A cylindrical shield plug is located in the center of the cask lid and is sealed by a silicone flat gasket. Lifting and tie-down devices are attached to the cask body. Impact skirts, consisting of removable rings of shock absorbing foam, are attached to the ends of the cask.

(3) Drawings

The package is fabricated in accordance with the following RWE NUKEM Corporation Drawing No.: STD-02-076, Sheets 1 through 3, Revision 8.

5. (b) Contents

(1) Type and form of material

Byproduct material consisting of dewatered, solid radioactive waste, including spent ion exchange resins, filter sludges, solidified evaporator concentrates, spent filter cartridges, and contaminated or irradiated solid materials.

(2) Maximum quantity of material per package

Greater than Type A quantity of byproduct material, which may contain not more than a Type A quantity of fissile material, provided the fissile material does not exceed the limits specified in 10 CFR 71.15. The cask contents must be contained within one of the following inner containers and limited as follows:

(a) Single disposable cylindrical containers constructed of metal or high integrity plastic with tightly fitted covers. A maximum decay heat load of 205 Btu/hr.

(b) Two pallets with four, 30-gallon drum size containers per pallet. Drums to be constructed of metal or high integrity plastic with a tightly fitted cover. A maximum decay heat load of 84 Btu/hr.

(c) One pallet with three, 55-gallon drum size containers. Drums to be constructed of metal or high integrity plastic with tightly fitted covers. A maximum decay heat load of 116 Btu/hr.

6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have a hydrogen concentration greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

6. (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

7. The total weight of the package must not exceed 50,000 pounds and the weight of the contents (including dunnage, etc.) must not exceed 8,195 pounds.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) The package shall be prepared for shipment and operated in accordance with Section 7.0 of the application, as supplemented.

   (b) The package shall be maintained in accordance with the maintenance program in the supplement dated March 13, 1991.

9. Except for close fitting contents, sufficient dunnage, shoring, and/or bracing must be utilized to minimize secondary impact of the contents within the cavity under accident conditions of transport.

10. Prior to each shipment, the seal on the main cover and the seal on the shield plug cover, if opened, or if the security seal is broken, must be inspected. The seals must be replaced if the inspection shows any visible defects or every 12 months, whichever occurs first.

11. The packaging must be leak tested in accordance with Section 8.2.2 of the application. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.14(b)(3)(i), the pre-shipment leak test is not required.

12. The package authorized by this certificate is hereby approved for use under the general provisions of 10 CFR 71.17.

13. Revision No. 32 of this certificate may be used until August 31, 2008.

14. Expiration date: October 1, 2008. This certificate is not renewable.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6574	33	71-6574	USA/6574/B( )	4	OF	4

REFERENCES

Scientific Ecology Group Incorporated application dated December 27, 1990.

Supplements dated: March 13, 1991; March 7, 1996; and October 10, 1997.

ATG Nuclear Services, LLC, supplements dated: December 1, 1998; August 9 and 11, 1999.

ATG, Inc. supplements dated March 29, 2001; and May 10, 2001.

RWE NUKEM Corporation supplements dated May 8, 2003, May 13, 2005, and March 28, 2006.

NUKEM Corporation supplement dated September 6, 2006, and August 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: September 14, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6581	35	71-6581	USA/6581/AF	1	OF	6

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Framatome ANP, Inc.
   2101 Horn Rapids Road
   Richland, WA 99352-0130

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Framatome ANP, Incorporated Consolidated License Application dated January 20, 2003, as supplemented.

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 51032-1

(2) Description

A steel shipping container for fuel bundles, consisting of a strongback and fuel bundle clamping assembly, shock mounted to a steel outer container. Steel separator blocks are bolted between fuel assemblies. The separator blocks are a minimum 6 inches wide by approximately 8 inches high and 9 inches long, with a minimum nominal 3/8-inch thick wall. The outer container is approximately 43 inches in diameter by 216 inches long. The maximum weight of the package, including contents, is 7,500 pounds.

(3) Drawings

The packaging is constructed and assembled in accordance with the following Siemens Power Corporation Drawing Nos.:

EMF-309,813, Rev. 2, Sheets 1 and 2
EMF-303,359, Rev. 7
EMF-303,360, Rev. 6
EMF-303,898, Rev. 5
EMF-300,607, Rev. 3
EMF-309,582, Rev. 0

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
6581	35	71-6581	USA/6581/AF	2 OF	6

5.(b) Contents

(1) Type and Form of material

(i) Unirradiated fuel rods consisting of uranium dioxide fuel pellets clad in zirconium alloy or *stainless steel tubes. Fuel rods must be in one of the following configurations:*

Type	15x15	17x17[1]	GEN1[2]	Rod Container[3]	T15x15 Square Array Assemblies[4]	T15x15 Cruciform Assemblies
Maximum Enrichment (%U-235)	5.0	5.0	5.0	5.0	5.0	2.8
Rods Per Assembly	204	264	any number	any number	208	28
Nominal Rod Pitch (in.)	0.563	0.496	NA	NA	0.527	0.556
Maximum Pellet Density (%TD)	95	95	95	95	95	95
Maximum Clad OD (in.)	0.430	0.380	0.500	0.500	0.400	0.500
Minimum Clad OD (in.)	0.410	0.355	0.260	0.260	0.364	0.260
Minimum sum of clad thickness and pellet-clad gap[5] (in.)	0.023	0.023	0.023	0.023	0.016	0.023
Assembly Cross Section (in.)	8.445	8.432	8.25	NA	7.91	8.25
Active Fuel Length (in.)	196	196	196	196	196	116
Fuel Rod Arrangement (Figure Number in Application)	11.1	11.2	NA	NA	VII-1	VII-3

Table Notes

1 Fuel assemblies consisting of a maximum 264 fuel rods in a 17x17 square array with any number of edge rods missing.

2 Fuel assemblies consisting of any number of fuel rods in a square array with a maximum assembly cross section of 8.25 inches square.

3 Any number of fuel rods positioned in a rod container. The rod container consists of a schedule 40 steel pipe with a maximum nominal diameter of 5 inches.

4 Fuel assemblies consisting of a maximum of 208 fuel rods in a 15x15 square array, with any number of edge rods missing.

5 Minimum sum of the cladding wall thickness and the pellet-clad radial gap, ((Min Clad OD - Max Pellet OD)/2), in.

5.(b) Contents (Continued)

5.(b) Contents (Continued)

(ii) Unirradiated fuel assemblies, composed of uranium dioxide fuel pellets clad in zirconium alloy or stainless steel tubes. Uranium is enriched to a maximum of 5.05 wt% in the U-235 isotope. The fuel assemblies may contain inserted control rod assemblies. The fuel assemblies have the following specifications:

Type	L1	L2	L4
Array Size	15x15	15x15	17x17
Fueled Rods Per Assembly	208	208	264
Minimum No. of Non-Fueled Rods	17	17	25
Nominal Rod Pitch (in.)	0.568	0.568	0.496
Maximum Pellet Diameter (in.)	0.3707	0.3742	0.3232
Maximum Pellet Density (%TD)	97.5	97.5	97.5
Nominal Clad OD (in.)	0.430	0.430	0.374
Minimum sum of clad thickness and pellet-clad gap[1] (in.)	0.023	0.023	0.023
Assembly Cross Section (in.)	8.52	8.52	8.432
Active Fuel Length (in.)	196	196	196
Fuel Rod Arrangement (Figure Number in Application)	VIII-1	VIII-1	VIII-2

Table Notes:

1 Minimum sum of the cladding wall thickness and the pellet-clad radial gap, ((Min Clad OD - Max Pellet OD)/2), in.

5.(b) Contents (Continued)

(iii) Unirradiated fuel rods consisting of uranium dioxide fuel pellets clad in zirconium alloy or stainless steel tubes. Fuel rods must be in one of the following configurations.

Type	15x15	17x17[1]	GEN1[2]
Maximum Enrichment (%U-235)	4.87	4.87	4.87
Rods Per Assembly	204	264	any number
Nominal Rod Pitch (in.)	0.563	0.496	NA
Maximum Pellet Density (%TD)	97.5	97.5	97.5
Maximum Clad OD (in.)	0.430	0.380	0.500
Minimum Clad OD (in.)	0.410	0.355	0.260
Minimum sum of clad thickness and pellet-clad gap[3] (in.)	0.023	0.023	0.023
Assembly Cross Section (in.)	8.445	8.432	8.25
Active Fuel Length (in.)	196	196	196
Fuel Rod Arrangement (Figure Number in Application)	11.1	11.2	NA

Table Notes

1 Fuel assemblies consisting of a maximum 264 fuel rods in a 17x17 square array with any number of edge rods missing.

2 Fuel assemblies consisting of any number of fuel rods in a square array with a maximum assembly cross section of 8.25 inches square.

3 Minimum sum of the cladding wall thickness and the pellet-clad radial gap, ((Min Clad OD - Max Pellet OD)/2), in.

(2) Maximum quantity of material per package

Maximum quantity of material within a package may not exceed a Type A quantity. Total weight of fuel assemblies, or fuel rods, and rod containers, not to exceed 3400 pounds, and

(i) For the contents described in 5(b)(1)(i), the total weight of fuel assemblies:

Two full length fuel assemblies. Two short fuel assemblies may be substituted for each full length fuel assembly provided the two short assemblies are shipped end-to-end and the total fuel length does not exceed the maximum fuel length for a full length assembly; or

Two rod containers.

(ii) For the contents described in 5(b)(1)(ii):

Two fuel assemblies.

(iii) For the contents described in 5(b)(1)(iii):

Two fuel assemblies.

(c) Criticality Safety Index 0.4

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed polyethylene sheath which will not extend beyond the ends of the fuel assemblies. The ends of the sheaths must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assemblies.

7. Hydrogenous shims are not permitted within the fuel assemblies.

8. Separator blocks, shock mounts, and fuel element clamp assemblies must be in accordance with Tables 2.2, 2.3, 2.4, 2.5, and VII-3 of the application.

9. Each separator block must be attached to the strongback by one of the following methods, as shown in Drawing No. EMF-309,813, Rev. 2, Sheet 2:

(a) Two, 5/8-11 UNC Grade 5 steel cap screws and nuts. A 5/8-11 UNC Grade 2 (or better) steel stud may be substituted for one of the cap screws.

(b) Two, 1-8 UNC Grade 8 steel cap screws and nuts. A 1-8 UNC Grade 8 steel stud may be substituted for one of the cap screws.

The fuel assembly cross section is defined as the rod pitch times the number of rods on the edge of the assembly.

11. Rods containing gadolinia or other neutron poison are authorized but not required.

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6581	35	71-6581	USA/6581/AF	6 OF	6

12. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package shall be prepared for shipment and operated in accordance with the procedures in Chapter 3.0 of the application.

    (b) Each packaging shall be maintained in accordance with the procedures in Section 3.4 of the application.

    (c) Each packaging shall meet the acceptance tests in Chapter 4.0 of the application.

    (d) Each fuel rod shall be welded closed and certified to be leak-tight prior to shipment.

13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

14. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

..matome ANP, Incorporated consolidated application dated January 20, and its supplements, May 8, June 18, July 7, and November 26, 2003; March 22, and August, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert J. Lewis, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 27 Sept. 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
6613	13	71-6613	USA/6613/B(U)-96	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

QSA Global Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

AEA Technology, QSA Inc., application dated July 19, 2001, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 702

(2) Description

The cask system overall dimensions are 19" x 21" x 20". The cask is a stainless steel weldment containing depleted uranium shielding. The cask has a central cavity which is 2.26 inches in diameter by 3.29 inches long. Closure is accomplished by a neoprene gasket, six 3/8-inch bolts and a stainless steel stepped plug containing depleted uranium shielding. The closure is equipped with an eye bolt. The cask is mounted on a 19" x 21" rectangular steel skid with four, ½-inch bolts and a tie-down system consisting of four, ½-inch diameter threaded rods which connect a clamp ring at the top of the cask to channel brackets welded to the skid. A protective cage constructed of 1-¼-inch square steel tubing and perforated 18 gauge steel sheets tack welded to the tubular frame surrounds the cask and is bolted to the skid by four, ½-inch bolts. Maximum gross weight of the packaging is 410 pounds.

(3) Drawings

The cask and other system components are constructed in accordance with QSA Global Drawing No. R70290, Sheets 1 to 10, Revision S.

5.
(b) Contents

(1) Type and form of material

Sources which meet the requirements of special form radioactive material. Authorized isotopes include Cs-137, Ir-192, Se-75, and Yb-169.

(2) Maximum quantity of material per package:

Isotopes	Output Curies
Cs-137	500
Ir-192	15,000
Se-75	10,000
Yb-169	10,000

Output curies are determined by measuring the source output at 1 meter from the device and expressing its activity in curies. (Procedures reference: American National Standards Institute N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography.")

(3) Maximum decay heat per package:

129 watts

6. The name plate must be fabricated of material capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each package shall be operated and prepared for shipment in accordance with Section 7.0 of the application, as supplemented.

(b) The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application, as supplemented.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Expiration Date: June 30, 2013

REFERENCES

AEA Technology, QSA Inc., application dated July 19, 2001.

Supplements dated: March 12 and July 19, 2002; April 3, 2003; June 24 and October 25, 2005; October 5 and 25, 2007; and May 15, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Meraj Rahimi, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: May 28, 2008

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U.S. NUCLEAR REGULATORY COMMISSION

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a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
6786	8	71-6786	USA/6786/B( )	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of the Navy
NRSC Technical Support Center
Naval Sea Systems Command Detachment
Radiological Affairs Support Office
PO Drawer 0260
NWS Yorktown, VA 23691-0260

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Aerojet Application dated February 18, 1971, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model Nos.: URIPS-8A and URIPS-8B

(2) Description

The packages, thermoelectric generators, are 28.5 inches in overall height, with an outer diameter of 19.14 inches, and total weight of approx. 1,600 pounds. The components include a depleted uranium shield (470 lbs.), a steel housing, cover bolts (recessed and caulked over), an electrical adaptor, cooling fin system, and cylindrical fin guard, stiffened by eight ribs on the inside surface. The housings are equipped with lifting and tie down devices. The Model No. URIPS-8B differs from Model No. URIPS-8A in the electric converter system. The thermoelectric generator may be secured in a shipping frame identified in Drawing No. 1138459, Rev. A.

(3) Drawings

The package is constructed in accordance with the following Aerojet Company Drawing Nos.:

1138441	8-Watt URIPS-8A Assembly
1138442, Rev. C	Generator Housing
1138457	Cooling Fins
1139240, Rev. A	Fin Guard
1139245, Rev. A	Shipping Package URIPS-8
1139246	8-Watt URIPS Assembly
1138459, Rev. A	Shipping Frame-URIPS-8
1138443, Rev. B	Top Cover
1138444	Bottom Cover
1138436	Fuel Capsule
1138437, Rev. B	Shield Uranium
1138435	Fuel Liner
1138440, Rev. A	W-2 Shield Plug
1138453	Insulation
1138455, Rev. B	Copper Plug

(b) Contents

(1) Type and form of material

Strontium 90 titanate doubly encapsulated which meets the requirements of special form radioactive material.

(2) Maximum quantity of material per package

56,850 ci.

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be prepared for shipment and operated in accordance with the operating procedures specified in the supplement dated August 6, 1998.

(b) The package must be maintained in accordance with the maintenance procedures specified in the supplement dated August 6, 1998.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Expiration date: October 1, 2008. This package is not renewable.

REFERENCES

Aerojet Nuclear Systems Company application dated February 18, 1971.

Supplemented by Naval Nuclear Power Unit letter dated: December 10, 1971, and Oak Ridge

National Laboratory dated: December 28, 1972; and February 27 and March 27, 1973.

Department of the Navy application dated: June 8, 1990.

Supplements: Department of the Navy letter 5104 Ser 455/1U599998 dated June 18, 1991; Department of the Navy letter 5104 Ser N455C/8U595525 dated April 16, 1998; and Department of the Navy letter 5104 Ser N455C/8U595912 dated August 6, 1998; Department of the Navy letter 5104 Ser N455C/3U574771 dated August 25, 2003.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

for John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 11, 2005

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U.S. NUCLEAR REGULATORY COMMISSION

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1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9001	40	71-9001	USA/9001/B( )F	1	OF	9

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

VECTRA Technologies, Inc., application dated March 30, 1995, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: IF-300

(2) Description

A stainless steel encased, depleted uranium shielded cask. The cask is cylindrical in shape, 64 inches in diameter, and a maximum of 210-inches long with maximum cavity dimensions of 37-1/2 inches in diameter by 180-1/4-inches long. Shielding is provided by 4 inches of depleted uranium, 2-1/8 inches of stainless steel, and a minimum of 4-1/2 inches (550 gallons) of a water ethylene glycol mixture.

Two closure heads are provided for the shipment of BWR and PWR fuel assemblies. The heads are 304 stainless steel forgings and end plates which encase the 3-inch thick depleted uranium shielding. Either closure head may be used for packaging solid irradiated hardware.

The closure heads are secured to the cask body by means of 32, 1-3/4 inch studs and nuts. The cask is sealed with a metallic ring gasket.

The cavity is penetrated by a vent line at the top and a drain line at the bottom. These lines are sealed by bellows stainless steel globe valves and valved quick-disconnect couplings. Stainless steel pipe caps or pipe plugs may be used in lieu of the quick-disconnect couplings. The vent line is also equipped with a 350-400 psig rated rupture disk. All valves are housed in protected boxes on the cask exterior.

5.(a) Packaging (continued)

(2) Description (continued)

Neutron shielding is provided by a liquid-filled, thin-walled, corrugated containment on the cask exterior. This cylindrical structure is separated into two longitudinal compartments, each equipped with two expansion tanks, fill and relief valves. The fill line from each compartment is terminated by a stainless steel globe valve in a protected box (separate from cavity boxes) on the cask exterior. The stainless steel globe valves may be replaced by stainless steel blind flanges. The vent line from each compartment goes to an expansion tank which is provided with a pressure relief valve set at 200 psig.

The cask has three types of fuel baskets which can be interchanged to accommodate various fuels. The PWR basket holds seven assemblies (except for Group III PWR contents, where six assemblies are authorized and the center cell does not contain a fuel assembly), the unchanneled BWR basket holds eighteen assemblies, and the channeled BWR basket holds seventeen assemblies. The channeled and unchanneled BWR fuel baskets may be provided with supplementary shielding (depleted uranium) near the cask closure.

The cask is shipped horizontally with the bottom supported in a tipping cradle between two pedestals and the upper end resting in a semi-circular saddle; the upper end is pinned to the saddle. The cask supports are welded to the framing of a 37-1/2-foot long by 8-foot wide structural steel skid. The skid may also have installed on it an auxiliary cooling system, consisting of two diesel engines driving two blowers which discharge cooling air to the corrugated surface of the cask via common ducting. Neither installation nor operation of all or part of this auxiliary cooling system is a requirement of this package approval.

The entire cask and cooling system is covered by a retractable aluminum enclosure. Access to the enclosure is via locked panels in the side and a locked door in one end. Although the Model No. IF-300 cask can be transported for short distances on the highway, its principal mode of transportation is by railroad.

The gross weight of the cask is approximately 140,000 pounds. The skid and other external components weigh approximately 45,000 pounds.

(3) Drawings

The Model No. IF-300 shipping cask is described by the following General Electric Company Drawing Nos.: 159C5238 - Sheet 1, Rev. 9; Sheet 2, Rev. 3; Sheet 4, Rev. 8; Sheet 5, Rev. 5; Sheet 6, Rev. 8; Sheet 7, Rev. 4; Sheet 8, Rev. 5; Sheet 9, Rev. 8; Sheet 10, Rev. 5; and Sheet 11, Rev. 2, GTS Duratek Drawing No.: C-110-B-57915-001, Rev. 1, Duratek Drawing No. C-002-044125-001, Rev. 0, and Pacific Nuclear Systems, Inc. Drawing Nos.: 420-11-3000, Sheets 1 through 9, Rev. 1; 420-11-3001, Sheet 1, Rev. 1; 420-11-3002, Sheets 1 and 2, Rev. 1; 420-11-3003, Sheets 1 and 2, Rev. 1; 420-11-3004, Sheets 1 and 2, Rev. 1; 420-11-3005, Sheets 1 and 2, Rev. 1; and 420-11-3006, Sheet 1, Rev 1.

5.(a)(4) Basic Components

The basic components of the Model No. IF-300 shipping cask that are important to nuclear safety are listed in Section IX, Table IX-1.

(b) Contents

(1) Type and form of material

(i) Irradiated PWR and BWR uranium oxide fuel assemblies. PWR assemblies may be shipped with or without control rods. Partial fuel assemblies, that is, assemblies from which fuel pins are missing, **must not be** shipped unless dummy fuel pins are used to displace an amount of water equal to that displaced by the original pins. The specific power of each fuel assembly must not exceed 40 kW/kgU. The BWR and PWR fuel assemblies must have the following dimensions and specifications:

Group Ia fuel assemblies

	PWR	BWR
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial U content/assembly, kg	465	198
Maximum initial U-235 enrichment, weight percent	4.0	4.0
Maximum assembly average burnup, MWd/MTU	35,000	35,000
Minimum cooling time, days	120	120
Maximum initial bundle cross section, in	8.75	5.75
Fuel pin array	14x14/15x15	7x7
Initial fuel diameter, in	0.380-0.460	0.500-0.600
Initial fuel pin pitch range, in	0.502-0.582	0.647-0.809
Maximum initial active fuel length, in	145	146

5.(b)(1)(i) Contents - Type and form of material (continued)

Group Ib fuel assemblies

	PWR
Fuel form	Clad UO_2 pellets
Cladding material	Zr or SS
Maximum initial U content/assembly, kg	439
Maximum initial U-235 enrichment, weight percent	4.0
Maximum assembly average burnup, MWd/MTU	45,000
Minimum cooling time, years	5
Maximum initial bundle cross section, in	8.75
Fuel pin array	15x15
Initial fuel diameter, in	0.380-0.460
Initial fuel pin pitch range, in	0.502-0.582
Maximum initial active fuel length, in	144

5.(b)(1)(i) Contents - Type and form of material (continued)

Group II fuel assemblies

	PWR	BWR
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial U content/assembly, kg	475	198
Maximum initial U-235 enrichment, weight percent	4.0	4.0
Maximum assembly average burnup, MWd/MTU	35,000	35,000
Minimum cooling time, days	120	120
Maximum initial bundle cross section, in	8.75	5.75
Fuel pin array	16x16/17x17	8x8
Initial fuel diameter, in	0.376-0.400	0.475-0.505
Initial fuel pin pitch range, in	0.496-0.507	0.630-0.645
Maximum initial active fuel length, in	150	150

5.(b)(1)(i) Contents - Type and form of material (continued)

Group III fuel assemblies

	PWR[a]	BWR[b]
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr	Zr
Maximum initial U content/assembly, kg	442	187
Maximum initial U-235 enrichment, weight percent	4.25	4.25
Maximum assembly average burnup, MWd/MTU	45,000	45,000
Minimum cooling time, years	5	4
Maximum initial bundle cross section, in	8.75	5.75 (8x8) 5.75 (9x9)
Fuel pin array	15x15	8x8/9x9
Initial fuel diameter, in	0.424	0.483 (8x8) 0.440 (9x9)
Initial fuel pin pitch, in	0.563	0.640 (8x8) 0.566 (9x9)
Maximum initial active fuel length, in	144	150 (8x8) 146 (9x9)
Minimum initial top/bottom blanket length, in[c]	6	6 (8x8) 6 (9x9)

Notes:

[a] The center fuel assembly location in the PWR basket must not contain a fuel assembly, with the six PWR assemblies being placed in the six peripheral basket positions.

[b] This note is no longer applicable.

[c] Length of natural UO_2 fuel above and below the enriched portion of the active fuel.

5.(b)(1) Contents - Type and form of material (continued)

(ii) Solid irradiated hardware, which may include fissile material, provided the quantity of fissile material does not exceed a Type A quantity and does not exceed the mass limits of 10 CFR 71.15. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask cavity to limit movement of the contents during accident conditions of transport. Use of a steel liner is authorized provided: (1) its outside dimensions are approximately those of the cask cavity inside dimensions, (2) constructed of single thickness of steel plate with full penetration welds, (3) thickness of steel plate does not exceed one inch, and (4) the liner is provided with a drain and vent to insure water removal.

(2) Maximum quantity of material per package

Maximum decay heat per package not to exceed 40,000 Btu/hr. Maximum 5,725 Btu/hr/PWR assembly. Maximum 2,225 Btu/hr/BWR assembly.

(i) Seven PWR fuel assemblies for Groups Ia, Ib and II as described in 5.(b)(1)(i).

(ii) Six PWR fuel assemblies for Group III as described in 5.(b)(1)(i). The center fuel assembly location in the PWR basket for Group III PWR contents must not contain a fuel assembly, with the six PWR assemblies being placed in the six peripheral basket positions.

(iii) Seventeen channeled BWR assemblies (for Groups Ia, II and III), or eighteen unchanneled BWR fuel assemblies (for Groups Ia and II), as described in 5.(b)(1)(i).

(iv) Above fuel assemblies to be contained in their respective fuel baskets as shown in GE Drawing No. 159C5238 - Sheet 6, Rev. 8 and GTS Duratek Drawing No. C-110-B-57915-001, Rev. 1, or PNSI Drawing No. 420-11-3000, Sheets 1 through 9, Rev. 1.

5. (c) Unloaded package - contents and maximum quantity of material

Greater than a Type A quantity of residual radioactive material consisting of mixed-fission and activation products adhering to interior cavity and fuel basket surfaces.

(d) Criticality Safety Index

For Groups Ia, Ib and II PWR and BWR fuel assemblies as described in 5.(b)(1)(i)	**0.4**
For Group III PWR and BWR fuel assemblies as described in 5.(b)(1)(i)	**0.0**

6. The end of life total calculated residual gas that could become available from the fuel pins must not exceed 0.50 lb moles for content 5.(b).

7. The maximum gross weight of the cavity contents must not exceed 21,000 pounds.

8. For the shipment of irradiated fuel assemblies, the cask cavity (containment vessel) must be promptly inerted following removal of the water from the cavity. The cask cavity must be purged at least three times with argon, nitrogen, or helium. Each purge volume must be equivalent to or greater than the cask cavity volume. After the final purge, the cavity must be promptly filled with argon, nitrogen, or helium at 1.0 atm pressure.

9. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.

10. Prior to loading Group III PWR contents, a plug must be inserted into the center assembly location of the PWR basket and there must not be a Group III PWR assembly in the center basket location at any time.

11. Prior to each shipment, the licensee must confirm that the cask contains no more than 1 cubic foot of water in the cavity and the licensee must prepare the cask for shipment, in accordance with Subsection 10.1 of the application.

12. (a) The cask contents shall be so limited that under normal conditions prior to transport, 62 times the neutron dose rate plus 6.3 times the gamma dose rate will not exceed 560 mrem/hr at a distance of six feet from the side of the cask (ten feet from the cask center-line).

    (b) The cask content limitation of 12.(a) does not apply to:

        (1) Group II BWR fuel in the channeled fuel basket with a minimum planar average enrichment of 2.65 wt% ^{235}U.

        (2) Group III BWR fuel in the channeled fuel basket with a minimum planar average enrichment of 3.19 wt% ^{235}U.

13. The neutron shielding tanks must be filled with approximately a 50/50 volume percent mixture of ethylene glycol and water during the months of October through May.

14. Replacement globe valves other than the valve specified on Drawing No. 159C5238-Sheet 4, Rev. 8, must be tested as stated in Subsection 6.6.3.2 of the application.

15. The packaging must be maintained in accordance with the requirements of Subsection 10.2 of the application. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is brought into full compliance with these requirements prior to the next use of the package.

16. The cask cavity must be equipped with a rupture disk device with a burst pressure within the range of 350-400 psig (443°F) including all tolerances.

17. The uranium shielding material must be separated from all steel surfaces with a minimum copper thickness of 4-mils, except that the stud bolts attaching the shield assemblies to top of the unchanneled BWR basket must be coated with a minimum of ½-mil of copper.

18. A shutoff valve must not be installed between each neutron shield tank and its respective thermal expansion tank.

19. The cask may be wrapped with reinforced plastic during shipment, provided that the decay heat of the contents does not exceed 1.5 KW. The reinforced plastic used to wrap the cask must not be greater than 0.015 inches thick or have a thermal conductivity less than 0.0242 Btu/hr-ft-°F. The reinforced plastic wrapping cannot be used as the cask surface for purposes of complying with 10 CFR 71.87.

20. The package authorized by the certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

21. Transport by air of fissile material is not authorized.

22. Revision 39 of this certificate may be used until October 1, 2008.

23. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

VECTRA Technologies, Inc., application dated March 30, 1995.

VECTRA Technologies, Inc., supplements dated: April 27, and August 18, 1995; November 25, 1997;

Chem-Nuclear Systems supplements dated January 9, 1998; June 8 and June 21, 1999; January 14, February 17, March 16, June 16, July 14, October 11, October 20, and November 9, 2000; and April 23, 2001.

Duratek supplements dated February 4, September 9, October 21, 2002; August 25, 2004 and March 4, 2005.

EnergySolutions supplement dated May 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 16, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9010	41	71-9010	USA/9010/B( )F	1 OF	10

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

NAC International, Inc
655 Engineering Drive, Suite 200
Norcross, GA 30092

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Nuclear Assurance Corporation application, dated February 27, 1996.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

) Packaging

(1) Model No.: NLI-1/2

(2) Description

A depleted uranium, water, and lead shielded shipping cask, encased in stainless steel, and equipped with balsa impact limiters. The cylindrical cask body is 195-1/4 inches long by 47-1/8 inches OD. The principal shielding consists of 2-3/4 inches of depleted uranium, 2-1/8 inches of lead, and 5 inches of (borated) water-ethylene glycol mixture.

A 7/8-inch thick stainless steel outer shell is welded to a solid stainless steel forging at each end of the cask. The outer shell of the cask is surrounded by a 1/4-inch thick steel water jacket that is also attached to the end forgings. A water expansion tank is welded to the water jacket shell. The inner cask cavity is formed by a 1/2-inch thick, stainless steel cylindrical shell; welded at its top end to the upper cask forging and its bottom end to a circular plate.

There are four separate configurations of the cask.

Configuration (A): The containment vessel is a right circular stainless steel shell, 12-5/8 inches ID by 178 inches inside length by 1/4-inch thick, located within the inner cask cavity. The containment vessel is closed and sealed by a 5-inch thick, composite steel and uranium closure head, twelve, 1-inch diameter bolts, and silver plated, metallic O-ring. Eight of the twelve closure bolts are used to secure the containment vessel to the upper cask forging. Closure of the cask cavity is by a 1-1/2-inch thick steel closure head, eight, 1-inch diameter bolts, and elastomer O-ring. The radioactive contents are positioned and supported within the containment vessel (inner container) by an aluminum basket and internal support structure.

5.(a) Packaging (continued)

(2) Description (continued)

Configuration (B): The containment vessel is the 1/2-inch thick inner cavity shell. The 1/4-inch thick inner container is not used. The cask cavity is closed by two closure heads. The inner head is a 6-inch thick, composite steel and uranium plate secured to the upper cask forging by twelve, 1-inch diameter bolts and sealed with a silver plated, metallic O-ring. The outer head is 1-1/2-inch thick steel plate secured to the top of the upper cask forging by eight, 1-inch diameter bolts and sealed with an elastomer O-ring. The radioactive contents are positioned and supported within the containment vessel (inner cask cavity) by a modified aluminum basket and internal support structure.

Configuration (C): Same as Configuration (B), above, except the radioactive contents are positioned and supported within the containment vessel (inner cask cavity) in a stainless steel structure containing Boral sheets positioned so as to provide necessary neutron absorption.

Configuration (D): Same as Configuration (B) above, except that the radioactive contents are positioned and supported within the containment vessel (inner cask cavity) in a 3-element stainless steel structure as shown in NAC Drawing No. 347-291-F12, sheet 1, Rev. 2, and the cask must be enclosed in a closed shipping container.

The package, including impact limiters, has an overall length of 237 inches and an outside diameter of 75 inches. The maximum weight of the contents is 3,000 pounds. The weight of the package is approximately 49,250 pounds.

(3) Drawings

The Model No. NLI-1/2 shipping cask is constructed in accordance with the following National Lead Company Drawing Nos.:

<u>General</u>

70514F, Sheet 1, Rev. 8, Cask and Trailer General Arrangement
70514F, Sheet 2, Rev. 8, Cask and Trailer General Arrangement
70885F, Sheet 1, Rev. 3, Spent Fuel Cask Details
70885F, Sheet 2, Rev. 2, Spent Fuel Cask Details
70885F, Sheet 3, Rev. 2, Spent Fuel Cask Details
70885F, Sheet 4, Rev. 1, Spent Fuel Cask Details
70887F, Sheet 1, Rev. 1, Outer Closure Head
70888F, Sheet 1, Rev. 3, Spent Fuel Cask General Assembly

<u>Configuration (A)</u>

70516F, Sheet 1, Rev. 8, Spent Fuel Cask General Assembly
70562F, Sheet 1, Rev. 11, Inner Container
70562F, Sheet 2, Rev. 7, Inner Container
70562F, Sheet 3, Rev. 0, Inner Container*
70562F, Sheet 4, Rev. 0, Inner Container*

5.(a) Packaging (continued)

(3) Drawings (continued)

Configuration (B)

70886F, Sheet 1, Rev. 2, Basket Concept
70884F, Sheet 1, Rev. 2, Inner Closure Head

Configuration (C)

460-052-F8, Sheet 1, Rev. 4, Rockwell Fuel Basket-NLI-1/2 Cask*
460-052-F9, Sheet 1, Rev. 3, Container - Fermi Fuel, Rockwell Basket, NLI-1/2 Cask, Assembly of*

Configuration (D)

347-291-F12, sheet 1, Rev. 2, Liner - 3 Element, NLI-1/2 Cask, Fuel Movement Project*

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uclear Assurance Corporation drawings.

(b) Contents

(1) Type and form of material

(i) Irradiated PWR or BWR uranium oxide fuel assemblies of the following specifications:

	PWR	BWR	Consolidated Fuel Rods
Fuel form	Clad UO_2 pellet	Clad UO_2 pellet	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS	Zr or SS
Maximum initial fuel pin pressure at 100°F, psig	550	200	550
Maximum initial U content/assembly, kg	475	197	950
Maximum average initial U-235 enrichment, w/o	3.70	2.65	3.70
Maximum bundle cross section, inches	8.75	5.75	8.75
Fuel pin array size	14x14/15x15 16x16/17x17	7x7 8x8	Pins from 7x7, 8x8, 14x14, 15x15, 16x16, 7x17 in triangular pitch

5.(b)(1)(i) (continued)

	PWR	BWR	Consolidated Fuel Rods
Maximum active fuel length, inches	144	145.25	144
Maximum specific power, kW/kgU	40	27	40
Maximum average burnup, MWD/MTU	40,000**	34,000	40,000
Maximum decay heat, kW	10.6	10.6	0.6
Minimum cooling time, days	150*	120	4,380

The PWR type assembly may be shipped either with or without burnable poison rods or control rods.

*Four (4) fuel rods may have a minimum cooling time of 120 days.

**PWR fuel assembly may have a maximum average burnup of 56,000 MWD/MTU provided the minimum cooling time prior to shipment is 450 days and the neutron shield fluid contains 1.0 weight percent boron. (The borated fluid may be left in the shielding tanks during the shipment of other contents.)

(ii) Irradiated metallic fuels of the following specifications:

	Fermi-1	EBR-II Blanket
Fuel form	Uranium-molybdenum alloy pins	Uranium metal cylindrical slugs
Cladding material	Zr	Aluminum containers
Max. initial U content/assembly, kg	18.7/assy. 300/16 assy. cask load	292/container
Max. avg. initial U-235 enrichment, w/o	26.0	0.21 (3.88 kg Pu/canister)
Max. bundle cross section, inches	2.93 sq	4.875 dia
Fuel rods per canister	140	41
Max. active fuel length, inches	30.5/assy 122/cask	157
Max. average burnup, MWD/MTU	2,840	2,400
Max. decay heat, watts	20	300
Min. cooling time, days	5,000	365

5.(b)(1)(continued)

(iii)

	Research Reactor
Fuel form	Uranium metal rods
Cladding material	Aluminum
Maximum initial U content/assembly-kg	54.5
Maximum average initial U-235 enrichment	Natural
Maximum bundle cross-section, inches	1.36
Intact fuel rods per canister, maximum	7
Canisters per cask	3 intact fuel
Max. active fuel length, inches	120.5
Maximum average burnup MWD/MTU	1,600
Maximum decay heat, watts	750
Minimum cooling time, days	365

(iv) Irradiated PWR* or BWR uranium oxide fuel rods of the following specifications:

	PWR Rods	BWR Rods
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial fuel pin pressure at 100°F, psig	550	200
Maximum initial U content, kg	58.2	75
Maximum average initial U-235 enrichment, w/o	4.9	5.0
Maximum bundle cross section, inches	8.75	5.75
Maximum active fuel length, inches	150	150
Maximum specific power, kW/kgU	44	60
Maximum average burnup, MWD/MTU	60,000	75,000

5.(b)(1)(iv) (continued)

	PWR Rods	BWR Rods
Maximum decay heat, kW	1.65	4.0
Minimum cooling time, days	150	150

* For the shipments of irradiated PWR fuel rods, the neutron shield fluid must contain 1.0 weight percent boron (the borated fluid may be left in the shielding tanks during the shipment of other contents).

(v) Solid, non-fissile, irradiated hardware and neutron source components.

(vi) Byproduct and special nuclear material in the form of irradiated uranium and plutonium oxide fuel rods. Prior to irradiation, the maximum average enrichment in U-235 plus plutonium not to exceed 3.70 w/o and the maximum enrichment not to exceed 4.0 w/o.

(vii) Irradiated PWR uranium oxide fuel assemblies including additional irradiated fuel rods inserted and secured in the guide thimbles. The fuel assemblies must conform to the maximum active dimensions as described in Item 5(b)(i) except that maximum initial U content must be 495 kg and the maximum average initial U-235 enrichment shall be 3.35 w/o.

(viii) Irradiated Connecticut Yankee fuel assembly with a maximum average initial U-235 enrichment of 4.0 w/o and each of the 15 x 15 fuel rods clad by stainless steel. 204 rods/assembly; active length of 121.4 inches.

(ix) Irradiated MARK 42 fuel assemblies consisting of three concentric fuel tubes with PuO_2-Al powder metallurgy cores clad with type 6063 aluminum, containing a total of 3.35 kg of plutonium. The plutonium was initially enriched to contain 78.28 w/o Pu-239, 2.27 w/o Pu-241 and 0.15 w/o Pu-238.

(x) Irradiated MARK 22 fuel assemblies consisting of two concentric fuel tubes with uranium-aluminum cores clad with type 8001 aluminum, containing a total of 3.2 kg of uranium-235. The uranium was initially enriched to contain 66 w/o to 80 w/o uranium-235. The irradiated MARK 22 fuel assembly has an active length of 150 inches, a maximum burn-up of 1226 MWD and a minimum cooling time of 150 days.

(2) Maximum quantity of material per package

(i) Items 5(b)(1)(i) or 5(b)(1)(vii) above: one PWR fuel assembly; two BWR fuel assemblies; or one consolidated fuel canister. Fuel assemblies to be contained in their respective fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 11, or 70886F, Sheet 1, Rev. 2. The consolidated fuel canister to be contained in Configuration (A) fuel basket as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 11.

(ii) Item 5(b)(1)(ii) above: four canisters per cask. The fuel canisters and fuel basket must be in accordance with Configuration (C) above.

5.(b)(2)(continued)

(iii) Item 5(b)(1)(iii) above:

(a) three canisters of unfailed fuel containing up to seven fuel rods per canister. The fuel canisters and fuel basket must be in accordance with Configuration (D) above; or

(b) up to six canisters containing one defective fuel rod per canister. The canisters are 2.75-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D2, Rev. 10, and are placed in the six-rod capacity liner as shown on Nuclear Assurance Corporation Drawing No. 347-029-20, Rev. 1. The maximum decay heat load for a defective fuel rod is limited to 5 watts; or

(c) up to three canisters containing either one defective fuel rod per canister or up to 10 failed fuel filters per canister. The canisters are 4.00-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D1, Rev. 10. The fuel basket is in accordance with Configuration (D) above. The weight of the filters is limited to 125 pounds per canister. The maximum decay heat load for the defective fuel rods and the failed fuel filters is limited to 5 watts per canister. Plutonium content of the filters not to exceed 20 curies plutonium per package.

(iv) Item 5(b)(1)(iv) above, the fuel rods will be shipped in Configuration (A) or (B). PWR fuel rods with burnup in excess of 45,000 MWD/MTU and BWR fuel rods with burnup in excess of 50,000 MWD/MTU will be shipped in Configuration (A) only. The maximum initial uranium content is limited to 58.2 kg per package for PWR rods and 75 kg per package for BWR rods; and

(a) up to 25 PWR fuel rods or up to 25 BWR fuel rods per cask. Up to 2 of the 25 PWR rods may have a maximum burnup of 65,000 MWD/MTU; or

(b) up to 18 PWR fuel rods, with a maximum specific power of 60 kW/kgU and a minimum cooling time of 300 days, per cask.

(v) Item 5(b)(1)(v) above, weight not to exceed 1,600 pounds.

(vi) Item 5(b)(1)(vi) above, the maximum mass of U-235 plus plutonium must not exceed 4.0 kg. Fuel rods must be contained in fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 11, or 70886F, Sheet 1, Rev. 2.

(vii) Item 5(b)(1)(viii) above: One Connecticut Yankee intact irradiated fuel assembly.

(viii) Item 5(b)(1)(ix) above: One irradiated MARK 42 fuel assembly in either intact or sectioned form, using Configuration (C) above. If sectioned, each section must be seal welded in a shipping can as shown on Martin Marietta Energy Systems Drawing Nos. M-12821-CP-105E, Rev. 0, and M-12821-CP-106E, Rev. 1. Four shipping cans will be loaded into a MARK 42 Segment Dry Shipping Canister as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-102, Rev. 1, along with a shipping canister spacer, as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-103, Rev. 1. The shipping canister will be loaded on top of a carrier spacer as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-112, Rev. 0. A maximum of 2 shipping canisters may be loaded into a cask.

5.(b)(2)(viii)(continued)

Intact fuel assemblies will be shipped in a MARK 42 Element Wet Shipping Canister as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-114, Rev. 0. A maximum of one intact assembly may be loaded into a cask.

(ix) Item 5(b)(1)(x) above: Two MARK 22 fuel assemblies or one MARK 22 fuel assembly with the two cores separated, using Configuration (C) above. Each assembly or core will be shipped in a shipping canister as shown on Sandia National Laboratory Drawing No. R21563, Sheet 1, Iss. B.

(c) Criticality Safety Index 100

6. Irradiated fuels described in items 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), and 5(b)(1)(iv) above may not have a maximum burnup which exceeds 1.25 times the specified maximum average burnup.

7. The cask cavity and containment vessel (inner container) must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the cask cavity and containment vessel by the methods described in Section XV of the application. Removal of the residual moisture from cask cavity when package is used in Configurations (B), (C), or (D) is not required providing the decay heat load does not exceed 2.0 kW.

8. For the shipment of irradiated fuel assemblies or a canister of consolidated irradiated fuel, the cask cavity canister of consolidated irradiated fuel (if present), and containment vessel must be promptly inerted following removal of the water from the cavity. For contents not vacuum dried, the cask cavity and containment vessel must be purged at least three times with argon, nitrogen, or helium. Each purge volume must be equivalent to or greater than the cask cavity and containment vessel volume. After the final purge, or following vacuum drying, the cavity and containment vessel must be promptly filled with argon, nitrogen, or helium at 1.0 atm pressure.

9. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks must be shipped in Configuration (A).

10. The consolidated fuel canister must be provided with vent and drain lines (openings) to permit free draining of the canister. No valves can be installed on the vent and drain lines.

11. The cask may be shipped in a closed shipping container (Configuration D) provided that the closed shipping container and the transport vehicle (trailer) meet the applicable requirements of the Department of Transportation. Tie-down devices which are a structural part of the cask and the cask support structures must comply with 10 CFR 71.45.

12. When the cask is shipped in a closed shipping container the center of gravity of the combined cask, closed shipping container and trailer must not exceed 75.0 inches.

3. When the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts.

14. The neutron shielding tank must be filled with a mixture of water and ethylene glycol (52% by volume). This mixture must not freeze or precipitate in a temperature range from -40°F to 330°F. The neutron shield tank may be empty when the cask is in Configuration D.

15. The structures used to support the package on the transport vehicle must be as described in the application.

16. Any system used for cooling down the package must be provided with a pressure relief device set so that during the cool-down process, the maximum pressure in the containment vessel cannot exceed 310 psig when the package is used in Configuration (A) or 365 psig when the package is used in Configuration (B).

17. As needed, appropriate component spacers must be used in the cask cavity to limit movement of contents during shipment.

18. Shipping cans used for sectioned MARK 42 irradiated fuel assemblies must be seal welded and must be leak tested to 1×10^{-7} std cm^3/sec.

19. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package shall be prepared for shipment and operated in accordance with the operating procedures in Section XV of the application, as supplemented.

    (b) The package shall be maintained and tested in accordance with the maintenance program in Section XVI of the application, as supplemented.

    (c) When the package is to be used for the transport of authorized contents having a decay heat load of greater than 4.0 kW, a 220 psig hydrostatic test of the containment cavity, and a 405 psig hydrostatic test of the water jacket and expansion tank shall be performed as part of the maintenance program as specified in Section XVI of the application.

20. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

21. Revision No. 40 of this certificate may be used until April 30, 2007.

21. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

Nuclear Assurance Corporation application dated February 27, 1996, as supplemented March 26, 1996; June 9, 1998; March 29, May 20 and August 13, 1999; February 15, 2001; and March 21, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date April 13, 2006

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9015	21	71-9015	USA/9015/B ( )F	1 OF	5

2. PREAMBLE

 a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

 b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

 a. ISSUED TO *(Name and Address)*

 Transnuclear, Inc.
 7135 Minstrel Way
 Columbia, MD 21045

 b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

 Transnuclear, Inc., application dated March 25, 1991, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

 (1) Model No.: TN-8 AND TN-8L

 (2) Description

 The TN-8 and TN-8L are lead, steel and resin-shielded irradiated fuel shipping casks. The cask approximates a right circular cylinder 1,718 mm in diameter and 5,516 mm long. The cavity consists of three stainless steel square pressure vessels welded to an end plate and a circular stepped top flange, separated by a T-shaped copper plate and surrounded with B4C + Cu plates. Each cavity is 230 x 230 mm and 4,280 mm long. The main shielding consists of 135 mm of lead, 26 mm of steel, and 150 mm of resin. A wet cement layer is located between the lead and the outer shell. Radial copper fins are welded to the outer shell and cover the surface of the cask between each end drum. The Model No. TN-8 has 150 rows of fins and the Model No. TN-8L has 104 rows of fins.

 The lid is a welded stainless steel shell containing lead and resin shields. The pressure vessel is closed and sealed by sixteen, 1-1/4-inch diameter bolts and two silicone rubber or Viton O-rings located within recessed grooves on the top flange. Each extremity of the cask is surrounded by circular stainless steel drums reinforced by radial gusset plates and filled with balsa wood. A disk shaped impact limiter, constructed of carbon steel and balsa wood, is fastened to each drum with four, 1-1/4-inch bolts. The vent and drain lines which penetrate the inner cavity are equipped with positive closures. In addition, all access ports are protected by the impact limiters.

 The lid of the cask may be replaced with a modified lid which increases the cavity length to 4,362 mm or to 4,394 mm with the lid plate removed. This arrangement is referred to as "Configuration X."

5.(a)(2) (Continued)
Trunnions are used for lifting and tie-down of the package. The package weighs approximately 36,000 kg.

(3) Drawings

The Model No. TN-8 packaging is constructed in accordance with Transnuclear Drawing No. 9317.01, Rev. J. The Model No. TN-8L is constructed in accordance with Transnuclear Drawing No. 9317.138, Rev. A. The materials of construction and welds shall be in accordance with Annexes A, B, and C to Chapter II of the application.

The lid for Configuration X is constructed in accordance with Transnuclear Drawing Nos. 9040-500-1, Rev. 1, 9040-500-2, Rev. 1 and 9040-500-3, Rev. 0.

(b) Contents

(1) Type and form of material

(i) Irradiated PWR uranium oxide fuel assemblies of the following specifications:

Fuel form	Clad UO_2 Pellets
Cladding material	Zr or SS
Maximum initial U content/assembly, kg	469
Maximum average initial U-235 enrichment with Zr cladding, w/o	3.2
Maximum average initial U-235 enrichment with SS cladding, w/o	4.0
Maximum bundle cross section, in	8.5
Maximum active fuel length, in	146
Minimum cooling time, day	150
Maximum weight/fuel assembly, kg	733; and

Group I fuel assemblies

Initial fuel pin pressure at 100°F, psig	250
Maximum average burnup, MWD/MTU	38,500; or

Group II fuel assemblies

Maximum average burnup, MWD/MTU	36,000

For the casks in Configuration X, the minimum cooling time of the fuel assemblies shall be 1,460 days with the lid plate installed and 2,190 days with the lid plate removed.

(ii) Solid non-fissile irradiated hardware. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask cavity to limit movement of the contents during accident conditions of transport.

(iii) Intact BWR and PWR fuel rods. The rods shall be constrained by a basket or grid structure; initial U-235 content shall be less than 15.0 kg per rod bundle; cross sectional area of the rods, tubes, and full length structural material shall not be less than 29.6 square inches; and the bundle cross section shall not be greater than 8.5 inches. Maximum weight per bundle shall not exceed 733 kg. The Group I and Group II burnup limits of paragraph 5.(b)(1)(i) apply.

(2) Maximum quantity of material per package

(i) For the contents described in Item 5.(b)(1)(i), Group I fuel assemblies:

Three PWR assemblies. The maximum decay heat load is not to exceed 35.5 kilowatts per package and 12 kilowatts per assembly for the Model No. TN-8 packaging and 23.7 kilowatts per package and 7.9 kilowatts per assembly for the Model No. TN-8L packaging.

(ii) For the contents described in Item 5.(b)(1)(i), Group II fuel assemblies:

Three PWR assemblies. The maximum decay heat load and the maximum free gas volume are not to exceed the limits listed in the table below:

Decay Heat per Shipment, kw(a)	Maximum Free Gas for 3 Assemblies m^3 (NTP)(b)	Configuration X Maximum Free Gas for 3 Assemblies m^3 (NTP)(b)
1.5	0.558	0.601
3.0	0.543	0.585
9.0	0.483	0.520
15.0	0.441	0.475
21.0	0.408	0.439
27.0	0.384	0.413

Notes: (a) Decay heat load per assembly must not exceed 7.9 kilowatts for Model No. TN-8L packaging.

(b) NTP conditions are 25°C and one (1) bar.

5.(b)(2) (Continued)

(iii) For the contents described in Item 5.(b)(1)(iii):

Three rod bundles. The maximum decay heat load and maximum free gas volume are not to exceed the limits listed in Paragraph 5.(b)(2)(ii).

(c) Criticality Safety Index: 100

6. Group I and Group II fuel assemblies, either Zr or SS clad, and bundles of PWR and/or BWR fuel rods that individually meet all the appropriate specifications of 5.(b)(1)(i), 5.(b)(2)(i), 5.(b)(1)(iii), and 5.(b)(2)(iii) above may be packaged in any combination.

7. PWR assemblies may be shipped either with or without burnable poison rod, thimble plug, or control rod assemblies.

8. As needed, appropriate component spacers may be used in the cask cavity to properly position the fuel assemblies.

9. The maximum weight of the contents (fuel assemblies, component spacers, inserts, irradiated hardware, etc.) must not exceed 2,200 kg.

10. The cask cavity must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the cask cavity by the methods described in Annex I to Chapter VIII of the application. For contents 5.(b)(1)(i) and 5.(b)(1)(iii), the cavity must be promptly backfilled with 1.0 atm of helium, nitrogen, or argon gas.

11. Known or suspected failed fuel assemblies (rods) and fuel cladding defects greater than pin holes and hairline cracks are not authorized.

12. For contents 5.(b)(1)(ii), the dryness verification test is required but leakage tests for containment assembly verification are not required.

13. The package contents must be so limited that under normal conditions of transport, the total dose rates must not exceed 17 mrem/hr at one meter from the surface of the package.

14. Any system used for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 7 atmospheres during the cool-down process.

15. The systems and components of each packaging must meet the periodic tests and criteria specified in Chapter VIII of the application. The Keff verification and shielding efficiency verification tests in Chapter VIII of the application must be performed on each packaging within the two year period preceding any shipment of contents listed in 5.(b)(1)(i) and 5.(b)(1)(iii). The Keff verification and shielding efficiency verification tests need not be performed on packaging during periods (which may exceed two years) when only irradiated hardware as specified in 5.(b)(1)(ii) is shipped.

16. In addition to the requirements of 10 CFR Part 71:

    (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in the application dated March 25, 1991.

    (b) Each package must be tested, repaired, and maintained in accordance with the Acceptance Tests and Maintenance Procedures in the application dated March 25, 1991.

17. All valves, fittings, seals, and relief devices must be of the type, size, model and manufacture as indicated on the design drawings. The resin material must be of the specifications stated in Annex A to Chapter II of the application.

18. In accordance with Annex L to Chapter VIII, at periodic intervals not to exceed two years, the thermal performance of the cask must be analyzed to verify that the cask operation has not degraded below that which is licensed*. Following the initial acceptance tests, the heat source may be that provided by the decay heat from the loading of the package, provided that the heat source is equal to at least 25% of the design heat load for the package. Each cask that fails to meet the thermal acceptance criteria given in Annex L of the application must be withdrawn from service until corrective action can be completed or the license amended to limit the package to a lower heat load.

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*The thermal performance test is not required at periodic intervals when the maximum decay heat load per package does not exceed 25% of the design heat load.

19. The Configuration X lid shall be operated and maintained in accordance with Annex N to Chapter VIII, in the application dated March 25, 1991.

20. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

21. Revision 20 of this certificate may be used until May 31, 2007.

22. Expiration date: October 1, 2008.

REFERENCES

Transnuclear, Inc., application dated March 25, 1991, and supplements dated April 22, 1991; April 22, 1996; March 22, 2001 and April 26, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

James R. Hall for

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: May 9, 2006

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9016	14	71-9016	USA/9016/B( )F	1 OF	4

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Transnuclear, Inc.
   7135 Minstrel Way
   Columbia, MD 21045

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Transnuclear, Inc., application dated March 25, 1991, as supplemented

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: TN-9

(2) Description

The TN-9 is a lead, steel and resin shielded irradiated fuel shipping cask. The cask approximates a right circular cylinder 1,718 mm in diameter and 5,756 mm long. The cavity consists of three rectangular, stainless steel pressure vessels welded to end plates and a circular stepped top flange, separated by thin copper plates. The bays are divided into a total of seven square compartments, 150 x 150 mm and 4,520 mm long. The main shielding consists of 128 mm of lead, 26 mm of steel, and 150 mm of resin. A wet cement layer is located between the lead and the outer shell. Radial copper fins are welded to the outer shell and cover the surface of the cask between each end drum.

The lid is a welded stainless steel shell containing lead and resin shields. The pressure vessel are closed and sealed by sixteen, 1-1/4-inch diameter bolts and two silicone rubber or Viton O-rings located within recessed grooves on the top flange. Each extremity of the cask is surrounded by circular stainless steel drums reinforced by radial gusset plates and filled with balsa wood. A disk shaped impact limiter, constructed of carbon steel and balsa wood, is fastened to each drum with four, 1-1/4-inch bolts. The vent and drain lines which penetrate the inner cavity are equipped with positive closures. In addition, all access ports are protected by the impact limiters. Trunnions are used for lifting and tie-down of the package. The weight of the package is approximately 36,000 kg.

(3) Drawings

The package is constructed in accordance with Transnuclear Drawing No. 9317.03, Rev. J. The materials of construction and welds must be in accordance with Annex A, B, and C to Chapter II of the application.

5.(b) Contents

(1) Type and form of material

(i) Irradiated BWR uranium oxide fuel assemblies of the following specifications:

Fuel form	Clad UO2 Pellets
Cladding material	Zr or SS
Initial fuel pin pressure at 100°F, psig	200
Maximum initial U content/ assembly, kg	201
Maximum average initial U-235 enrichment, w/o	2.65
Maximum bundle cross section, in	5.52
Maximum active fuel length, in	144
Average burnup, MWD/MTU	36,500
Minimum cooling time, day	150
Maximum weight/fuel assembly, kg	300

(ii) Solid non-fissile irradiated hardware. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask cavity to limit movement of the contents during accident conditions of transport.

(2) Maximum quantity of material per package

(i) Seven BWR assemblies. The maximum decay heat load per package is not to exceed 24.4 kilowatts and 3.5 kilowatts per assembly. As needed, appropriate component spacers may be used in the cask cavity to properly position the fuel assemblies.

(ii) The maximum weight of the contents (fuel assemblies, component spacers, inserts, irradiated hardware, etc.) must not exceed 2,110 kg.

(c) Criticality Safety Index: 100

6. The cask cavity must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the cask cavity by the methods described in Annex I to Chapter VIII of the application. For contents 5.(b)(1)(i), the cavity must be promptly backfilled with 1.0 atm of helium, nitrogen, or argon gas.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter VIII of the application.

   (b) Each package must be tested and maintained in accordance with the Acceptance Test and Maintenance Procedures in Chapter VIII of the application.

8. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.

9. For contents 5.(b)(1)(ii), the dryness verification test is required but leakage tests for assembly verification are not required.

10. The package contents must be so limited that under normal conditions of transport, the total dose rates must not exceed 14 mrem/hr at one meter from the surface of the package.

11. Any system used for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 7 atmospheres during the cool-down process.

12. The systems and components of each packaging must meet the periodic tests and criteria specified in Chapter VIII of the application. Each packaging that fails to meet these criteria must be withdrawn from service until corrective action has been completed.

13. All valves, fittings, seals, and relief devices must be of the type, size, model, and manufacture as indicated on the design drawings. The resin material must be of the specifications stated in Annex A to Chapter II of the application.

14. In accordance with Annex L to Chapter VIII, at periodic intervals not to exceed two years, the thermal performance of the cask must be analyzed to verify that the cask operation has not degraded below that which is licensed*. Following the initial acceptance tests, the heat source may be that provided by the decay heat from the loading of the package, provided that the heat source is equal to at least 25% of the design heat load for the package. Each cask that fails to meet the thermal acceptance criteria given in Annex L of the application must be withdrawn from service until corrective action can be completed or the license amended to limit the package to lower heat load.

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* The thermal performance test is not required at periodic intervals when the maximum decay heat load per package does not exceed 25% of the design heat load.

CERTIFICATE OF COMPLIANCE
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15. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

16. Revision No. 12 and Revision No. 13 of this certificate may be used until May 31, 2007.

17. Expiration date: October 1, 2008.

REFERENCES

Transnuclear, Inc., application dated March 25, 1991, and supplements dated April 22, 1991; April 22, 1996; March 22, 2001, and April 26, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

for Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: May 19, 2006

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9027	20	71-9027	USA/9027/B(U)-96	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

QSA Global Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

AEA Technology, QSA Inc., application dated July 19, 2001, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

(a) Packaging

(1) Model No.: 741-OP

(2) Description

The Model No. 741-OP consists of a gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 19 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.

The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B, and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A ¼-inch thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 11 3/8 inches in height. The maximum weight of the package is 510 pounds, and the maximum weight of the projector is 360 pounds.

(3) Drawings

The package is constructed in accordance with QSA Global Inc. Drawing Nos. R74190, Rev. G, Sheets 1-7; and R741-OP, Rev. G, Sheets 1-7.

5\.
(b) Contents

(1) Type and form of material

Cobalt-60 or Iridium-192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package:

33 curies of Cobalt-60; or
240 curies of Iridium-192 (output).

Output curies are determined in accordance with American National Standards Institute N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."

The source shall be secured in the shielded position of the packaging by the source assembly lock, lock cap and safety plug assembly. The source assembly lock, lock cap and safety plug must be fabricated of materials capable of resisting a 1475°F fire environment for one half hour and maintaining their positioning function. The locking ball of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

7\. The nameplate shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

8\. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7 of the application; and

(b) The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.

9\. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10\. Revision No. 18 of this certificate may be used until June 30, 2009.

11\. Expiration date: August 31, 2011.

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CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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REFERENCES

AEA Technology, QSA Inc., application dated August 31, 2005.

Supplements dated: October 25, 2005, February 20, July 17, August 11, and August 15, 2006; and February 14, and May 19, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Eric Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: June 16, 2008.

UNITED STATES NUCLEAR REGULATORY COMMISSION

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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9030	10	71-9030	USA/9030/B( )	1	OF	3

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Department of the Navy
   Naval Sea Systems Command
   Detachment
   Radiological Affairs Support Office
   PO Drawer 0260
   NWS Yorktown, VA 23691-0260

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Teledyne Energy Systems application
   dated November 12, 1990, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

Packaging

(1) Model Nos.: MW-3000 and Sentinel-8

(2) Description

The packages are thermoelectric generators. The major components include: the main housing, tungsten shield, housing flange, and electrical connectors. The approximate dimensions and weights for the Model Nos. are as follows:

Model No.	Dimension (inch)	Weight (lb)
MW-3000	24 OD x 23	2,700
Sentinel-8	24 OD x 25	3,200

(3) Drawings

The packagings are constructed in accordance with the following Drawing Nos.:

Model No.	Drawing Nos.
MW-3000	Martin Co. Drawing No. 471A1000000
Sentinel-8	Isotopes, Inc. Drawing No. J-30856-003-10000

(b) Contents

(1) Type and form of material

Strontium 90 titanate doubly encapsulated in Hastelloy fuel capsule which meet the requirements of special form radioactive material.

(2) The maximum quantity of material per package

Model No.	Quantity
MW-3000	25,000 Curies
Sentinel-8	40,000 Curies

6. Eye-bolts shall be removed or covered during transportation to prevent their use as tie-down devices of packages.

7. The MW-3000 and Sentinel-8 shall have their top steel cover plate bolted to the outer wrought steel shield at all times except when maintenance operations are being performed on the generator which require removal of the top steel cover plate.

8. Fabrication of additional units is not authorized.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the supplement dated February 1, 1991.

(b) The package shall be maintained in accordance with the maintenance program in the supplement dated February 1, 1991.

10. The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR 71.17.

11. Expiration date: October 1, 2008. This certificate is not renewable.

12. Revision No. 9 of this certificate may be used until November 1, 2006.

REFERENCES

Teledyne Energy Systems application dated November 12, 1990.

Teledyne supplement dated: February 1, 1991.

Department of the Navy supplement dated: February 7, 1994; September 20, 1995; April 16, 1998; April 27, 2000; and September 27, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: October 19, 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   General Atomics
   P.O. Box 85608
   San Diego, CA 92186-9784

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   General Atomics application dated October 4, 1995, as supplemented.

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: TRIGA-I

(2) Description

TRIGA fuel element shipping container. The outer packaging is a steel drum, approximately 22.5 inches in diameter by 39-1/4 inches high. The inner vessel is a 5-inch Schedule 40 carbon steel pipe. Dimensions of the inner vessel are approximately 31 inches in height with a 1/4-inch thick wall and a 5-inch inside diameter. The top of the inner vessel is a threaded pipe cap and the bottom is a welded 1/4-inch thick flat disc. The inner vessel is centered and supported within the outer packaging by eight, 3/8-inch diameter braced, support spacer rods. The void between the inner vessel and the outer packaging is filled with vermiculite tamped to a minimum density of 4.5 lbs/ft^3. Maximum gross weight including contents is approximately 235 pounds.

(3) Drawing

The packaging is constructed in accordance with General Atomic Company Drawing No. TOS396C160, Rev. G.

5. (b) Contents

(1) Type and form of material

TRIGA fuel elements containing uranium-zirconium-hydride or erbium-uranium-zirconium-hydride with nominal fuel composition (excluding erbium content) as described in Table A.1-1 of the October 4, 1995 application, and clad with stainless steel, aluminum or incoloy. Uranium enriched to a maximum 93.5 w/o in the U-235 isotope. The H to Zr atomic ratio within the fuel meat must not exceed 1.65.

(2) Maximum quantity of material per package

U-235 content not to exceed 1.39 kg, contained in a maximum of 7 1.5-inch diameter fuel elements, or a maximum of 25 0.5-inch diameter fuel elements, with nominal fuel composition (excluding erbium content) as described in Table A.1-2 (Rev. 1) of the October 4, 1995, application. For enrichments greater than 5 weight percent U-235, uranium content not to exceed an A_2 quantity.

(c) Criticality Safety Index 0.4

In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 8 of the application.

(b) The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 9 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Expiration date: December 31, 2010.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
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REFERENCES

General Atomic Company application dated October 4, 1995.

Supplements dated: December 5, 1995, October 16, 2000, and November 16, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: December 8, 2005

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

QSA Global Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

AEA Technology/QSA, Inc., application dated August 29, 2005.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 680-OP

(2) Description

The Model No. 680-OP consists of a gamma ray projector within a protective steel container. The protective container is of welded steel construction and is approximately 32 inches long, 19 inches wide, and 18-1/2 inches high. Polyurethane foam and wood inserts locate the Model 680 series projectors in the center of the container and provide impact protection.

The 680 series projectors include the Model Nos. 680, 680E, 680A, 680AE, 680B and 680BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-inch thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 21 inches long, 14-5/8 inches wide, and 11-13/16 inches high. The maximum weight of the package is 615 pounds, and the maximum weight of the projector is 465 pounds.

(3) Drawings

The packaging is constructed in accordance with QSA Global Inc., Drawing No. R68090, Sheets 1-7, Rev. H, and R680-OP, Sheets 1-7, Rev. K.

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5.(b) Contents

(1) Type and form of material:

Cobalt-60 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package:

110 curies (4.1 TBq) (output)

Output curies are determined by measuring the source output at 1 meter and expressing its activity in curies derived from the following: 1.30 R/h-Ci cobalt-60 at 1 meter (Ref: American National Standards Institute, N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography").

6. The source shall be secured in the shielded position of the packaging by the source assembly lock; lock cap and safety plug assembly. The source assembly lock, lock cap and safety plug assembly must be fabricated of materials capable of resisting a 1475°F fire environment for one half hour and maintaining their positioning function. The locking ball of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

7. The nameplates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must meet the Acceptance Tests and Maintenance Program of Section 8 of the application; and

(b) Each package shall be operated and prepared for shipment in accordance with Section 7 of the application.

9. Revision No. 20 of this certificate may be used until April 30, 2009.

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

11. Expiration date: June 30, 2010.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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REFERENCES

AEA Technology/QSA, Inc., application dated August 29, 2005.

Supplements dated: October 25, 2005; February 20, August 1, August 11, and August 15, 2006; and January 18, February 8, and April 3, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Meraj Rahimi, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: April 23, 2008.

NRC FORM 618 (8-2000) 10 CFR 71				U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Source Production & Equipment Co.
113 Teal Street
St. Rose, LA 70087-9691

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Source Production & Equipment Company application dated February 28, 2001.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: C-1

(2) Description

The packaging consists of a steel inner unit inside an outer overpack. The inner unit is a rectangular box approximately 9" high x 7.5" wide x 7.5" deep around a depleted uranium shield. All fittings and source locking components are protected and enclosed within the 1/8" carbon steel outer shell. The inner receptacle consists of a uranium shield equipped with two closed bottom Zircalloy or titanium "J" tubes, each of which may house one "pigtail type" special form source. The overpack is a 12-gallon, 20- or 22-gage steel drum partially filled with foam. The weight of the inner unit is 51 to 70 lbs. The weight of the overpack is 19 to 22 lbs. Up to 8 lbs. of ancillary equipment may be included within the overpack. The maximum gross weight of the package is 100 lbs.

(3) Drawings

The package is constructed in accordance with Source Production & Equipment Company Inc. Drawing Nos. B322000, Rev. (3); B311000, Rev. (2); B311001, Rev. (1); and B311002, Rev. (0).

(b) Contents

(1) Type and form of material

Iridium-192, Selenium-75, and Ytterbium-169 as sealed sources that meet the requirements of special form radioactive material.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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(b) Contents cont'd

(2) Maximum quantity of material per package

Two sealed sources with a combined activity not to exceed 300 curies.

6. Tungsten shield pads, with dimensions up to approximately 2-inches diameter and 1/2-inch thick, may be welded to the inside surface of the source changer housing.

7. The nameplate shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

   a. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the consolidated application dated February 28, 2001, as supplemented June 23, 2006.

   b. The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the consolidated application dated February 28, 2001, as supplemented June 23, 2006.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Revision No. 10 of this certificate may be used until October 31, 2007.

11. Expiration date: October 31, 2011.

REFERENCES

Source Production & Equipment Company applications dated September 27, 2000, and February 28, 2001.

Supplements dated: April 11 and May 11, 2001; and May 1, June 14 and June 23, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Christopher Regan, Acting Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: August 7, 2006.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9037	13	71-9037	USA/9037/AF	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

General Atomics
P.O. Box 85608
San Diego, CA 92186-9784

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Atomics application dated October 4, 1995, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: TRIGA-II

(2) Description

TRIGA fuel element shipping container. The outer packaging is a steel drum, approximately 22.5 inches in diameter by 57.5 inches high. The inner vessel is a 5-inch Schedule 40 carbon steel pipe. Dimensions of the inner vessel are approximately 50 inches in height with a 1/4-inch thick wall and a 5-inch inside diameter. The top of the inner vessel is a threaded pipe cap and the bottom is a welded 1/4-inch thick flat disc. The inner vessel is centered and supported within the outer packaging by eight, 3/8-inch diameter braced, support spacer rods. The void between the inner vessel and the outer packaging is filled with vermiculite tamped to a minimum density of 4.5 lbs/ft^3. Maximum gross weight including contents is approximately 330 pounds.

(3) Drawing

The packaging is constructed in accordance with General Atomic Company Drawing No. TOS396C161, Rev. F.

5. (b) Contents

(1) Type and form of material

Special function TRIGA fuel elements containing uranium-zirconium-hydride or erbium-uranium-zirconium-hydride whose fuel portion has nominal compositions (except erbium content) as described in Table A.1-1 of the October 4, 1995, application, and clad with stainless steel, aluminum or incoloy. Uranium enriched to a maximum 93.5 w/o in the U-235 isotope. The H to Zr atomic ratio within the fuel meat must not exceed 1.65.

(2) Maximum quantity of material per package

U-235 content not to exceed 1.39 kg, contained in a maximum of 7 1.5-inch diameter fuel elements, or a maximum of 25 0.5-inch diameter fuel elements, whose fuel portion has nominal compositions (except erbium content) as described in Table A.1-2 (Rev. 1) of the October 4, 1995, application. For enrichments greater than 5 weight percent U-235, uranium content not to exceed an A_2 quantity.

(c) Criticality Safety Index 0.4

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 8 of the application.

(b) The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 9 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Expiration date: December 31, 2010.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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REFERENCES

General Atomic Company application dated October 4, 1995.

Supplements dated: December 5, 1995, October 16, 2000, and November 16, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: December 7, 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9056	12	71-9056	USA/9056/B(U)	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Source Production and
Equipment Company, Inc.
113 Teal Street
St. Rose, LA 70087

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Source Production and Equipment Company, Inc. application dated March 24, 2000, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

) Packaging

(1) Model No.: SPEC 2-T

(2) Description

A steel encased, uranium shielded Gamma Ray Projector. Primary components consist of an outer steel shell, internal bracing, depleted uranium shield, and a Zircalloy "S" tube. The contents are securely positioned in the Zircalloy "S" tube by a source cable locking device and shipping plug. The unit resembles a rectangular box approximately 13-3/8" long by 4-11/16" high by 4-3/8" wide with a maximum gross weight of 56 pounds.

(3) Drawings

The packaging is constructed in accordance with Source Production and Equipment Company, Inc. Drawing Nos. 12688-1, Rev. (2); 788-1, Rev. (4); and 788-2, Rev. (0).

The packaging may also be as shown in Source Production and Equipment Company Drawing No. 1000, Rev. (0), provided fabrication was completed prior to June 8, 1989.

The overpack is a 12 gallon open head 20 or 22 gauge National Motor Freight Classification 100-H, or succeeding issues, Item 260 steel drum constructed in accordance with Source Production and Equipment Company, Inc. Drawing No. 53189-2, Rev. (2).

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5.(b) Contents

(1) Type and form of material

Iridium 192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

225 curies

6. The source must be secured in the shielded position of the packaging by the shipping plug, source assembly, and locking device. The shipping plug and source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly ball stop must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

The nameplates must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

8. For transportation of more than 45 curies per package in private carriage the shipment must be in accordance with 49 CFR 173.441(b).

9. For transportation of more than 45 curies per package by a common carrier, the package must be within a protective overpack as described and constructed in accordance with 5(a)(3).

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application, as supplemented; and

(b) The package must meet the Acceptance Test and Maintenance Program of Section 8.0 of the application, as supplemented.

11. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

12. Expiration date: April 30, 2010.

NRC FORM 618
(8-2000)
'FR 71

U.S. NUCLEAR REGULATORY COMMISSIOI

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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REFERENCES

Source Production and Equipment Company, Inc. application dated March 24, 2000.

Supplements dated: March 30, 2000, and March 14, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert J. Lewis, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 04 April 2005

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9070	18	71-9070	USA/9070/B(U)	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

AREVA Federal Services LLC
1102 Broadway Plaza, Suite 300
Tacoma, WA 98402-3526

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

VECTRA Technologies, Inc., application dated July 21, 1994, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: N-55

(2) Description

A low carbon steel overpack filled with rigid polyurethane foam. The containment vessel is a 55-gallon steel drum. The overpack is a right circular cylinder 48 inches high by 32 inches diameter with a 34-1/2-inch high by 24-inch diameter cavity. The 18 or 20-gauge galvanized steel shell is filled with 3-pound per cubic foot rigid polyurethane foam. The inner shell is molded fiberglass. Closure of the upper and lower (lid and body) sections of the overpack is provided by four toggle clamps, and a neoprene gasket at the stepped joint between the two sections. Four lugs are provided for lifting. The steel drum is minimum 18-gauge steel with a minimum 14-gauge lid and a gasket. Closure of the drum is by way of a 12-gauge locking ring with dropped forged lugs and a 5/8-inch diameter bolt and lock nut. The package gross weight is approximately 750 pounds.

(3) Drawing

The packaging is constructed in accordance with Nuclear Packaging, Incorporated Drawing No. X-60-200D, Rev. C, or X-60-200D-SP, Rev. J.

(b) Contents

(1) Type and form of material

(a) Radioactive material in the form of dewatered, solid or solidified materials meeting the requirements of low specific activity material, contained in steel drums.

(b) Radioactive material meeting the requirements of special form radioactive material, contained in steel drums.

(c) Radioactive material in the form of solid metal pieces or activated solid metal components, contained in steel drums.

(2) Maximum quantity of material per package

Greater than Type A quantities of radioactive material. Fissile material contents not to exceed the generally licensed mass limits as specified in 10 CFR 71.15. Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements, or must meet the requirements of special form radioactive material. Internal decay heat not to exceed 3 watts.

6. The maximum weight of contents, including drum, not to exceed 550 pounds.

7. The steel drum must be in accordance with Appendix 1.3.2 of the supplement dated October 20, 1994.

8. The drum must be securely positioned in the overpack.

9. Contents must be securely positioned so that protrusions will not puncture the drum under normal or accident conditions.

10. The lifting lugs must be rendered inoperable for tie-down during transport.

11. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8.0 of the application; and

(b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7.0 of the application.

(c) Authorization by this certificate only applies to the N-55 package S/N PT-001, fabricated by Packaging Technology on January 21, 1999.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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12. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Revision No. 17 of this certificate may be used until December 31, 2008.

14 Expiration date: January 31, 2010.

REFERENCES

VECTRA Technologies, Incorporated, application dated July 21, 1994.

Supplements dated: August 22 and October 20, 1994; and February 6, 1998.

Transnuclear, Inc., supplement dated February 5, 1998, and December 3, 1999.

Packaging Technology, Incorporated, letters dated April 11, 2000, December 17, 2004, and November 26, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Transportation and Storage
Office of Nuclear Material Safety
and Safeguards

Date: January 1, 2008

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9081	15	71-9081	USA/9081/B( )	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Chem-Nuclear Systems, Inc., application dated November 24, 1987, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: CNS 1-13C

(2) Description

A steel encased lead shielded shipping cask. The packaging is a steel double-walled, lead-filled circular cylinder. A steel, plug-type, lead-filled lid is attached with twelve, 1-1/4" bolts; and a silicone gasket. Outer steel sheets are separated from the cask walls with small diameter wires. The lead shielding is 5" in the sides, 6" in the base and 5-3/4" in the lid. Two bolted-on steel lugs are for lifting only. The lid has a steel U-bar for lifting. The cavity drain line is closed with a plug. The cask is 39" in diameter and 68-1/2" long. The cavity is 26-1/2" in diameter and 54" long. The package weight is about 26,000 pounds.

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc., Drawing Nos. C-110-E-0005, Sheets 1, 2, and 3, Rev. 7; and C-112-B-0006, Rev. A.

5. (b) Contents

Type, form, and maximum quantity of material per package

(i) Greater than Type A quantity of byproduct material as solid metal. Decay heat not to exceed 600 watts; or

(ii) Decay heat not to exceed 5 watts, and:

Process solids, either dewatered, solid, or solidified, in a secondary sealed container, meeting the requirements for low specific activity material; or solid reactor components in secondary containers, as required, that meet the requirements for low specific activity material.

6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

7. Shoring must be provided to minimize movement of contents during accident conditions of transport.

8. Maximum gross weight of the contents, secondary container, and shoring is limited to 5,000 pounds.

9. The lid closure to the cask shall be secured by twelve, SA-354, Type BD, 1-1/4"-7 UNC x 2-1/4" long bolts torqued to 320 ft-lbs ± 10% (lubricated) or 420 ft-lbs ± 10% (dry).

10. The cask shall be delivered to a carrier dry and the cavity drain line shall be sealed with appropriate sealant applied to threads of pipe plug.

11. Prior to each shipment, the leak test described in Section 8.2 of the application must be performed. No package is to be delivered to a carrier for transport with a detectable leak using the method of Section 8.2.

12. Radiation measurements shall be made to determine that the dose rate does not exceed 30 mrem/hr at one meter from the surface of a dry loaded cask.

13. Prior to each shipment, the lift lugs must be removed from the packaging.

14. The contents described in 5(b)(ii) shall be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel assigned for sole use of the licensee.

15. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package shall be prepared for shipment and operated accordance with the Operating Procedures in Chapter 7 of the application.

    (b) The package shall be maintained in accordance with the Maintenance Program in Chapter 8 of the application.

16. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

17. Revision No. 14 of this certificate may be used until October 1, 2008.

18. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

Chem-Nuclear Systems, Inc. application dated November 24, 1987.

Supplements dated: November 24, 1992; October 31, 1997; July 28, 1999; January 5, 2000; April 23, 2001; December 17, 2002; and May 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 16, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*
   U.S. Department of Energy
   Washington, DC 20585

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
   ATR Fresh Fuel Shipping Container
   Safety Analysis Report, INEL-94/0275
   Application dated January 27, 1999, as supplemented.

4. CONDITIONS
   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

Packaging

(1) Model No.: ATR

(2) Description

The inner container is a right parallelepiped, 69-7/16 inches x 26-13/16 inches x 6-15/16 inches, constructed of 3/4-inch plywood, covered with 16-gauge steel. The top and bottom are lined with high density polyethylene foam and with a 0.020-inch cadmium plate. Wood spacers covered with sponge rubber and with a 0.020-inch thick cadmium plate provide separation for four fuel assemblies. Positive closure is provided by a continuous hinge, and two wire sealed hinge pins provide access.

The inner container is enclosed within an overpack, 73-15/16 inches x 31-3/4 inches x 11-3/16 inches, constructed of 1-inch plywood, framed by steel angle members and covered with 18-gauge steel. Aluminum, honeycomb impact limiters are fixed to the ends of the overpack. Positive closure of the overpack is provided by four hinge pins which are secured in place using 1/16-inch diameter cotter pins. The package weight is approximately 853 pounds.

(3) Drawings

The packaging is fabricated in accordance with EG&G Idaho, Inc., Drawing No. 445721, Sheets 1, 2, and 3; and EG&G Idaho, Inc., Drawing No. 445722, Sheets 1 and 2.

(h) Contents

(1) Type and form of material

Unirradiated ATR fuel elements. Each element contains 19 formed fuel plates, clad in Aluminum 6061. Each element contains a maximum of 1,100 grams of U-235 in uranium that is enriched to a maximum of 94 wt% in the U-235 isotope.

(2) Maximum quantity of material per package

Up to four (4) unirradiated ATR fuel elements. Total U-235 content not to exceed 4,400 grams pe package.

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on label for nuclear criticality control: 4.2

6. The contents must be maintained within its compartment and the active fuel length must be completely within the region of the cadmium covered spacers. Wood spacers may be used to accomplish this.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) *The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.*

(b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

8. The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.12.

9. Expiration date: January 31, 2009.

UNITED STATES NUCLEAR REGULATORY COMMISSION

REFERENCES

ATR Fresh Fuel Shipping Container Safety Analysis Report, INEL-94/0275, January 27, 1999.

Supplements dated: February 18, 1999, April 27, 2000, and December 5, 2003.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

te: 12/30/2003

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9102	11	71-9102	USA/9102/B( )	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Neutron Products, Inc.
22301 Mt. Ephraim Road
Dickerson, MD 20842

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Neutron Products, Inc., application dated August 31, 1977, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

(a) Packaging

(1) Model No.: NPI-20WC-6

(2) Description

A steel encased lead shielded cask contained within a wooden overpack. The cask is 24 inches in diameter with a 3/8-inch thick steel spherical shell and a cavity formed by an 8-1/4-inch ID by 3/8-inch thick steel tube. Positive closure of the shielded cask is accomplished by bolted end covers at each end of the cavity. The overpack is a 48-inch diameter, 12 gauge steel body with a wooden shell 38-1/4 inches in height made of 3/4-inch thick plywood sheets glued together and reinforced by 16 steel tie rods and 32 lug screws. Positive closure of the overpack lid is accomplished by 3 equally spaced bracket assemblies with attached chains and held together with a 3/8-inch by 4-inch welded ring. The maximum package gross weight is 6,000 pounds.

(3) Drawings

The Model No. NPI-20WC- packaging is constructed in accordance with Neutron Products, Inc. Drawing No. 240010, Rev. C.

The overpack is constructed in accordance with Neutron Products Inc., Drawing Nos. 240116, Rev G, except as noted in Condition No. 8 below.

(b) 5. Contents

(1) Type and form of material

Cobalt 60, as sealed sources which meet the requirements of special form radioactive material.

(1) Maximum quantity of material per package

The maximum activity must not exceed 9,500 curies. The maximum internal decay heat must not exceed 150 thermal watts.

6. The contents must be secured in the drum assembly (Item 11) so as to restrict movement in any direction to less than 0.25 inch by lead, steel or tungsten full diameter plugs and spacers.

The gross weight of the packaging must not exceed 6,000 pounds and the inner shielded cask shall be snug-fitting within the wooden overpack.

8. The two permanent package identification labels and the single temporary package identification holder are attached with 3/16 inch aluminum pop rivets. The two manufacture's stamped name and date labels are attached with 1/8 inch aluminum pop rivets. The temporary identification labels are held in their holder with a single 1/4 - 20 stainless steel scre w. The eight one-quarter inch holds remaining fro m previous permanent package identification labels and the twelve half inch vent holes are covered by wa terproof tape.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be prepared for shipment and operated in accordance with the operating procedures in the supplement dated October 7, 2003.

(b) The package must meet the Acceptance Test and Maintenance program in the supplement dated October 7, 2003.

10. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

11. Revision No. 10of this certificate may be used until August 31, 2008.

12. Expiration date: October 1, 2008. This package is not renewable.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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REFERENCES

Neutron Products, Inc., application dated August 31, 1977.

Supplements dated: February 6, 1978; July 31, 1985; August 2 and September 7, 1988; September 21, 1993; September 23, 1998; September 29 and October 7, 2003, and February 16, and March 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 9, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

AEA Technology QSA, Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

AEA Technology QSA, Inc. application dated December 21, 2001, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 770

(2) Description

A steel encased uranium shielded source changer for radiographic sources in special form. The source changer measures 23 inches long, 24 inches wide, and 19.75 inches high. The radioactive source assembly is housed in a titanium "S" tube. The "S" tube is surrounded by depleted uranium metal shield. The depleted uranium shield assembly is encased in two steel containers. The void space between the depleted uranium shield assembly and the inner container is filled with a rigid polyurethane foam. The gross weight of the container is 970 pounds.

(3) Drawing

The packaging is constructed in accordance with AEA Technology QSA, Inc. Drawing No. R77090 - Sheets 1 through 6, Rev. D.

(b) Contents

(1) Type and form of material

Sources which meet the requirements of special form radioactive material. Authorized isotopes include Ir-192, Co-60, Sc-46, and Cs-137

(2) Maximum quantity of material per package

Isotope	Output Curies
Ir-192	1,000
Co-60	800
Sc-46	800
Cs-137	1,000

(3) Maximum decay heat per package:

14 watts.

6. Name plates must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the application; and

(b) The package shall be maintained in accordance with the maintenance program in the application.

8. The packaging authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.17.

9. Expiration date: March 31, 2013.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9148	8	71-9148	USA/9148/B(U)-85	3	OF	3

REFERENCES

AEA Technology QSA, Inc. application dated December 21, 2001.

Supplements dated: September 13, November 7, and November 14, 2002; September 14, 2004; September 20, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: October 2, 2007

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
U.S. Department of Energy
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
U.S. Department of Energy application dated February 26, 1988, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: CNS 1-13C II

(2) Description

A shipping cask for radioactive waste. The packaging consists of a double-walled steel circular cylinder separated by 16-gauge wires, 39-1/8" in diameter and 68-1/2" high with a central steel lined cavity 26-1/2" in diameter and 45-1/6" high, approximately 5" of lead surrounds the central cavity. Closure is accomplished by a steel, plug type, lead filled cover secured by twelve (12), 1-1/4" bolts and seal provided by a flat silicone rubber gasket and a silicone rubber O-ring with a sealed 3/8" test port between the gaskets. Approximately 6" of lead are in the base and cover. The cask is equipped with a cavity drain line sealed with a 3/8" cap screw and gasket, a steel lifting hook for the cover, and top and bottom impact limiters filled with 16.5 lb/ft^3 rigid polyurethane foam clad in steel. The impact limiters are attached to the cask by six (6), 1" ratchet binders. The overall dimensions with impact limiters is 60" in diameter and 99-5/8" high. The package gross weight is approximately 27,000 lbs.

(3) Drawing

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc., Drawing No. E-1-436-111, Sheets 1 and 2, Rev. D.

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5. (b) Contents

(1) Type and form of material

(i) Greater than Type A quantity of nonfissile radioactive material as solidified or dewatered process solids (resins) within a sealed secondary container; or

(ii) Greater than Type A quantity of irradiated solid reactor components within a sealed secondary container.

(iii) Greater than Type A quantity of irradiated fuel (dewatered) within secondary containers described in Chem-Nuclear Systems, Inc. application dated July 16, 1985.

(2) Maximum quantity of material per package

For the contents described in 5(b)(1)(i), (ii), and (iii):

Not to exceed a decay heat generation of 800 watts and 3,000 pounds including weight of the contents and secondary container; and

For the contents described in 5(b)(1)(i):

Residual water in the secondary container not to exceed the activity stated in Table 4.4.2-1 of the application.

For the contents described in 5(b)(1)(iii):

The maximum U-235 enrichment of the uranium oxide fuel material must not exceed 3 w/o. The average burnup of the fuel material must not exceed 3,165 MWD/MTU and must be cooled for at least 6.0 years. Fissile contents not to exceed 400 grams U-235 prior to irradiation.

(c) Criticality Safety Index

Minimum transport index to be shown on label for nuclear criticality control:

For contents described in 5(b)(1)(iii): 100

6. As needed, appropriate shoring must be used in the cask cavity to limit movement of the secondary container during accident condition of transport.

7. The cask cover must be secured by 12, SA-354, Type BD, 1-1/4"-7UNC x 2-1/4" long bolts torqued to 270 ft-lbs ± 10% (lubricated) or 360 ft-lbs ± 10% (dry).

8. Prior to each shipment, the leak test described in Appendix 8B of the application must be performed. No package is to be delivered to a carrier for transport with a detectable leak using the method of Appendix 8B.

9. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

   (i) The hydrogen generated must be limited a to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

   (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

   For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

   (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application, as supplemented.

   The leak tests described in Appendixes 8-A and 8-B of the application may be performed in accordance with EG&G Idaho, Inc. letter dated December 20, 1982 which was submitted with the Department of Energy consolidated application dated February 26, 1988. Maintenance and repair records shall be furnished to the packaging owner.

   (b) The O-ring must be replaced quarterly with new seals. The flat lid gasket must be replaced annually. The test port and drain line seals must be replaced before each loaded shipment.

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12, until October 1, 2004, and under provisions of 10 CFR 71.17 thereafter.

12. Expiration date: October 1, 2008. This certificate is not renewable.

REFERENCES

Department of Energy consolidated application dated: February 26, 1988.

Department of Energy supplements dated: May 12, 1989; April 11, 1994; March 24, 1999; October 14, 2003; March 3, 2004, and May 26, 2004.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date June 14, 2004

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Industrial Nuclear Company
14320 Wicks Blvd.
San Leandro, CA 94577

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Industrial Nuclear Company application dated June 8, 1999, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: IR-100

(2) Description

The Model No. IR-100 package is approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of iridium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a zircalloy or titanium "S" tube within the IR-100. The "S" tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly is encased in a stainless steel housing. The space between the uranium shield assembly and the stainless steel casing is filled with a rigid polyurethane foam. The maximum weight of the IR-100 exposure device is 53 pounds and the maximum shield weight is 38 pounds.

(3) Drawings

The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: IR 100-1A, Rev. 5 and IR 100-1B, Rev. 2.

(b) Contents

(1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

5. (b) Contents (continued)

(2) Maximum quantity of material per package

120 (output) curies

Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."

6. The source must be secured in the shielded position of the packaging by the shipping plug, source assembly lock, and lock cap. The shipping plug, source assembly lock, and lock cap used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly lock must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

7. The name plate on the exposure device must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.

In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must meet the Acceptance Tests and Maintenance Program of Section 8 of the application; and

(b) Each package shall be operated and prepared for shipment in accordance with the operating procedures in accordance with Section 7 of the application.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Revision No. 11 of this certificate may be used until June 30, 2008.

11. Expiration date: September 30, 2009.

NRC FORM 618
(8-2000)
10 CFR 71

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

U.S. NUCLEAR REGULATORY COMMISSION

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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REFERENCES

Industrial Nuclear Company application dated June 8, 1999.

Supplements dated: June 9, August 6 and September 14, 1999; October 24, 2003; August 20, 2004; and March 22, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: June 21, 2007

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9168	16	71-9168	USA/9168/B(U)	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Chem-Nuclear Systems, Inc. application dated February 26,1990, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: CNS 8-120B

(2) Description

The packaging is a carbon steel encased, lead shielded 74-inch OD by 88-inch high cask for radioactive waste materials. The cask is a right circular cylinder with a 62-inch ID by 75-inch high cavity. The walls of the cask contain a lead thickness of 3.35 inches encased in 0.75-inch thick inner steel shell and 1-1/2-inch thick outer steel shell. The exposed sides of the package are provided with a thermal barrier consisting of a 5/32-inch diameter wire wrap on 12-inch centers and covered with a 3/16-inch thick steel jacket. The bottom weldment is made of two, 3-1/4-inch thick carbon steel plates. The primary lid is sealed with a double silicone O-ring and 20 equally spaced 2-inch diameter bolts. The centered secondary lid is sealed with a double silicone O-ring and twelve equally spaced 2-inch diameter bolts, and covers a 29-inch opening in the primary lid. The optional drain line is sealed with a 3/4-inch diameter cap screw and a silicone O-ring. The lid sealing surfaces are stainless steel and the space between the double O-ring seals is provided with a test port for leak testing.

The top and bottom of the cask are provided with steel encased, rigid polyurethane foam impact limiters. The impact limiters are secured to each other about the cask with eight 1-inch diameter ratchet binders. The impact limiters are 102 inches in diameter and the overall height of the package with the impact limiters attached is 132 inches.

The package is provided with four tie-down and two removable lifting devices. Each lid is provided with three lifting lugs. The gross weight of the packaging and contents is approximately 74,000 pounds.

(a) Packaging (Continued)

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing No. C-110-E-0007, Sheets 1, 2, and 3, Revision No. 12.

(b) Contents

(1) Type and form of material

(i) Byproduct material in the form of dewatered resins, solids, or solidified waste contained within secondary containers; or

(ii) Radioactive material in the form of activated reactor components.

(2) Maximum quantity of material per package

Type B quantity of radioactive material, not to exceed 2,000 times a Type A quantity, 100 thermal watts, and 14,680 pounds including weight of the contents, secondary containers, and shoring. The contents may include fissile materials provided the mass limits of 10 CFR 71.15 are not exceeded.

6. Except for close fitting contents, wood shoring must be placed between the secondary containers, or activated components, and the cask cavity to prevent movement during accident conditions of transport.

7. The cask primary lid must be secured by twenty and the secondary lid by twelve, 2"-8UNC-2A x 4-3/4" or twelve, 2"-8UNC-2A x 4" long hex cap screws with a flat washer torqued to 500 ft-lbs ± 50 ft-lbs (lubricated).

8. Prior to each shipment, the package must be leak tested in accordance with Section 8.2.2.2 of the application. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.14(b)(3)(i), the pre-shipment leak test is not required.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(i) Each package must meet the acceptance tests and be maintained in accordance with the Acceptance Tests and Maintenance Program of Section 8.0 of the application,

(ii) The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. The tests ports and optional drain line must be appropriately plugged and sealed prior to transport, and

(iii) The package must be prepared for shipment and operated in accordance with the operating procedures of Section 7.0 of the application.

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10. (a) For any package containing water or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

    (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

    (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

    For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

    (b) For any package containing materials with a radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Revision No. 15 of this certificate may be used until August 31, 2008.

13. Expiration date: June 30, 2010.

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9168	16	71-9168	USA/9168/B(U)	4	OF	4

REFERENCES

Chem-Nuclear Systems, Inc., application dated February 26, 1990.

Supplements dated: February 22, 1994; February 23, 1995; September 1, 1998; May 25 and June 1, 1999; and May 26, August 23 and 30, December 8, 2000, January 30, 2001 and May 10, 2005.

Duratek supplements dated: April 23, 2001; October 31 and November 26, 2002; April 4 and November 6, 2003.

EnergySolutions supplement dated May 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 16, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9184	7	71-9184	USA/9184/B(U)	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

AREVA Federal Services LLC
1102 Broadway Plaza, Suite 300
Tacoma, WA 98402-3526

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Nuclear Packaging, Inc. consolidated application dated March 31, 1989, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: PAS-1

(2) Description

The packaging consists of a primary containment vessel (20.5" OD x 23.4" OH) enclosed inside a secondary containment vessel and radiation shield (32.5" OD x 39.0" OH). The 15 milliliter water sample is contained within a undefined sample cask. Additionally, four iodine collection cartridges and four offgas vials are maintained inside the foam shoring above the sample cask. Loose vermiculite surrounds the perimeter of the sample cask to absorb the water sample should leakage occur. Completely surrounding the secondary containment vessel and radiation shield is a foam filled steel encased overpack (48.0" OD x 66.0" OH) which provides impact and thermal protection.

The primary containment vessel, which is constructed of 304 stainless steel varying in thickness from 3/4" to 1.25", is provided with double Viton O-ring seals and a sealed test port between the seals for leak testing. The assembly is secured with eight, 3/8"-16 UNC x 8" long screws.

The secondary containment vessel and radiation shield provides 0.75" thick steel and 5.1" thick lead shielding in the radial direction, 2.0" thick steel and 5.1" thick lead shielding on the bottom, and 3.5" thick steel and 4.8" thick lead shielding on the top. The lid is secured with eight, 1.0"-8 UNC x 3.0 long bolts. The lid is sealed with two Viton O-rings with a sealed test port between the seals for leak testing.

5.(a) Packaging Continued

(2) Description continued

The overpack provides about 7.25" thick foam on the sides and about 13" on the top and bottom. The two halves of the overpack are held together by eight, 3/4"-10 UNC x 1.5" long bolts. A Neoprene gasket prevents rain water from entering the overpack.
The weight of the package including a maximum sample cask weight of 1,375 pounds, is about 12,800 pounds.

(3) Drawings

The package is constructed in accordance with Nuclear Packaging, Inc. Drawing No. X-20-218D, Sheets 1 and 2, Rev. C.

(b) Contents

(1) Type and form of material

(i) Radioactive material in form of liquid or gaseous samples in sample casks, cartridges and vials.

(ii) Byproduct and activation materials as solids and process solids or resins, either dewatered, solid, or solidified in secondary containers.

(2) Maximum quantity of material per package

50 Ci of mixed fission and activation products, 15 milliliters of liquid, one sample cask or secondary container and four cartridges and four vials.

6. In addition to the requirements of Subpart G of 10 CFR Part 71, each package prior to first use must meet the acceptance tests and criteria specified in Section 8.1, must be maintained in accordance with Section 8.2, and must be prepared for shipment in accordance with Chapter 7.0 of the application, and the supplement dated July 8, 1994.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17, provided the fabrication of the packaging was satisfactorily completed by April 1, 1999.

8. Revision No. 6 of this certificate may be used until December 31, 2008.

Expiration date: July 31, 2009.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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REFERENCES

Nuclear Packaging, Inc., consolidated application dated March 31, 1989.

Supplement dated: April 7, 1989.

VECTRA Technologies, Inc., supplements dated: July 8, 1994 and January 30, 1998.

Transnuclear, Inc., supplement dated January 30, 1998.

Packaging Technology, Inc., Supplement dated: April 30,1999, March 16, 2004, and November 26, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: January 1, 2008

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9185	7	71-9185	USA/9185/B(U)-96	1	OF	3

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*
   Industrial Nuclear Company, Inc.
   14320 Wicks Blvd.
   San Leandro, CA 94577

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
   Industrial Nuclear Company application dated July 1, 1999, as supplemented.

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: OP-100

(2) Description

The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.

The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of iridium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a zircalloy or titanium "S" tube within the IR-50 or IR-100. The "S" tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly is encased in a stainless steel housing. The space between the uranium shield assembly and the stainless steel casing is filled with a rigid polyurethane foam. The maximum weight of the IR-50 source changer is 55 pounds, the maximum weight of the IR-100 exposure device is 53 pounds, and the maximum gross weight of the Model No. OP-100 package is 77 pounds.

(3) Drawings

The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 5, IR 50-1A, Rev. 3, IR 50-1B, Rev. 1, IR 100-1A, Rev. 5, and IR 100-1B, Rev. 2.

5. (b) Contents

(1) Type and form of material

Iridium-192 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 (output) curies

Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."

6. The source shall be secured in the shielded position of the packaging by the source assembly lock, lock cap, and the shipping plug (IR-100 only). The source assembly lock, lock cap, and the shipping plug (IR-100 only), must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the source assembly lock. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

7. The name plate on the overpack must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintain its legibility. The two vent holes in the side of the overpack must be covered with tape or rubber (plastic) plugs to prevent entry of rain water.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application and

(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Revision No. 6 of this certificate may be used until August 31, 2008.

11. Expiration date: December 31, 2008.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9185	7	71-9185	USA/9185/B(U)-96	3	OF	3

REFERENCES

Industrial Nuclear Company application dated July 1, 1999.

Supplements dated: September 14 and December 29, 1999; October 24, 2003; and March 22, and July 12, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 17, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
9186	15	71-9186	USA/9186/B(U)F-96	1 OF 5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20858

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis for Shipping S8G Power Units in the S-6213 Container, Rev. 7, dated June 16, 1975, as supplemented; and Safety Analysis for Shipment of S6W Shipboard Power Units in the Model 2 S-6213 PUSC, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model Nos.: Model 1, S-6213 Power Unit Shipping Container

Model 2, S-6213 Power Unit Shipping Container

(2) Description

A power unit shipping container (PUSC) for shipment of a power unit complete with control rods and control rod drive mechanisms installed.

The Model 1 S-6213 PUSC consists of a carbon steel cylindrical shell approximately 9-1/4 feet in outside diameter by 39-1/2 feet long, including hemispherical steel end impact limiters, with 10-3/4-foot outside diameter central flanges joining the barrel and cover halves. The Model 2 S-6213 PUSC is of the same design as the Model 1, except that the primary container material is HY-80 steel. A power unit is supported in the PUSC by a centrally *located thick circular steel plate (PU head) which is clamped between the central mating* flanges of the PUSC and fastened by 94, 2-inch diameter high strength studs. The upper and lower extremities of the power unit cantilever into the barrel and cover halves without additional support except for the longest control rod drive mechanisms (S8G Power Unit Type B only). A lower support adapter is installed in the barrel end of the container during shipment of the S6W prototype power unit and the S6W shipboard power unit. A *shipping/lifting ring, a flange adapter, and a lower support adapter are installed in the* container during shipment of the S9G shipboard power unit.

5.(a) Packaging (Continued)

(2) Description (Continued)

The PUSC is shipped in the horizontal position on a support frame which is secured to a specially built flatbed rail car. The PUSC, including frame and contents, weighs approximately 490,000 pounds for shipments of Type A and B, S8G power units.

The weight of the PUSC, including frame and contents is approximately 438,900 pounds for shipment of the S6W prototype power unit, 429,900 pounds for shipment of the S6W shipboard power unit, and 329,000 pounds for shipment of the S9G shipboard power unit.

(3) Drawings

The Model 1 and Model 2 S-6213 PUSC are constructed in accordance with the Drawings included in the applications (see references, below).

5.(b) Contents

(1) Type and form of material

(i) Unirradiated Naval Reactors Type A or B S8G power unit as described in Chapter 5 of the application and containing uranium enriched in the U-235 isotope.

(ii) Unirradiated S6W advanced fleet reactor prototype power unit or unirradiated S6W advanced fleet reactor shipboard power unit as described in Chapter 6 of "S6W Prototype Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report" WAPD-REO(c)1219, Revision 1, and containing uranium enriched in the U-235 isotope.

(iii) Unirradiated S6W high performance fleet core shipboard power unit, as described in addendum to Chapter 6 of "S6W Shipboard Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report For Packaging," WAPD-REO(c)-1457 and WAPD-REO(c)-1566, and containing uranium enriched in the U-235 isotope.

(iv) Unirradiated S9G shipboard power unit, as described in Chapter 6 of "S9G Shipboard Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report For Packaging," Revision 2, and containing uranium enriched in the U-235 isotope.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package

For the Model 1 S-6213 PUSC:

One Type A S8G Power Unit, or
One Type B S8G Power Unit, or
One S6W Advanced Fleet Reactor Prototype Power Unit, or
One S6W Advanced Fleet Reactor Shipboard Power Unit, or
One S6W High Performance Fleet Core Shipboard Power Unit, or
One S9G Shipboard Power Unit.

For the Model 2 S-6213 PUSC:

One S6W Advanced Fleet Reactor Shipboard Power Unit, or
One S6W High Performance Fleet Core Shipboard Power Unit, or
One S9G Shipboard Power Unit.

5.(c) Criticality Safety Index (CSI):

Minimum CSI to be shown on label for nuclear criticality control: 100

6. All control rods shall be restrained in the power unit fuel cells by the control rod holddown latches.

7. Transport by air of fissile material is not authorized.

8. For the Model 1 S-6213 PUSC, in addition to the requirements of Subpart G of 10 CFR Part 71, a determination shall be made, for each shipment, of the "g" forces that the package or packaging has been subjected to during transport.

(a) A nondestructive examination of the entire length of both inner and outer surfaces of the four tie-down support bracket-to-container wall butt welds shall be conducted:

(1) if the packaging (with or without contents) has been subjected to "g" forces in excess of 2 g's in any direction through the center of gravity of the package since the last inspection, and

(2) following the fourth shipment*, and

(3) after every second shipment* following the fourth shipment

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* This requirement shall not be construed to require an inspection if previous shipment had been inspected in accordance with (8(a)(1)) above.

8. (b) The nondestructive examination in accordance with a written procedure may be by either:

(1) The liquid penetrant method in accordance with:

(i) Article 6, Section V, ASME Code, or

(ii) MIL-STD-271E, "Nondestructive Testing Requirements for Metals," Section 5, October 31, 1973, or

(iii) NAVSHIPS 250-1500-1, "Welding Standard," Section 12.5

(2) or the magnetic particle method in accordance with:

(i) Article 7, Section V, ASME Code (Yoke Technique; Dry Particle Method; direct or rectified current), or

(ii) MIL-STD-271E, Section 4; specifically 4.3.1 (General) and 5.6.1(coatings), 4.3.3 (Dry Powder), 4.3.3.3.6 (Continuous), and 4.3.3.3 (Procedure) as excepted by using direct or rectified current, 4.3.3.3.3 (Yoke Technique), 4.3.2.5 (sensitivity and cleaning), and 4.3.1.3 (smoothness), or

(iii) NAVSHIPS 250-1500-1, Section 12.4, 12.4.1 (General), 12.4.3 (Dry powder), 12.4.3.3.2.1 (Yoke Technique) using direct or rectified current.

(c) If any indications, as defined in accordance with either:

(1) Paragraph UA-93(a), Appendix VIII, Division 1, Section VIII, ASME Code (with 7(b)(2)(I), above), or

(2) Paragraphs UA-72 and UA-73, Appendix VI, Division 1, Section VIII, ASME Code (with 7(b)(2)(I), above), or

(3) Class 1 acceptance criteria of NAVSEA 0900-LP-003-8000, "Surface Inspection Acceptance Standards for Metal," with Change 2, July 1, 1974 (with 7(b)(1)(ii) or 7(b)(2)(ii), above), or

(4) NAVSHIPS 250-1500-1, Section 10.3.2 (with 7(b)(1)(iii) or 7(b)(2)(iii), above), as noted,

are detected, the packaging shall be repaired and reinspected prior to use and shall be inspected prior to each shipment thereafter. Any defects shall be reported in accordance with 10 CFR §71.95.

Expiration date: March 31, 2012.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9186	15	71-9186	USA/9186/B(U)F-96	5	OF	5

REFERENCES

For the Model 1 S-6213 PUSC:

U.S. Naval Reactors application dated July 24, 1975.

Supplements dated: June 3, 1977; July 24, 1978; Naval Reactors letter G#C89-2838, dated May 22, 1989; Naval Reactors letter G#C90-03664, dated September 5, 1990; Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; Naval Reactors letter G#C97-03614, dated September 29, 1997; Naval Reactors letter G#01-03619, dated December 11, 2001; Naval Reactors letter G#06-04833, dated December 18, 2006; and Naval Reactors letter G#C08-00667, dated March 13, 2008.

For the Model 2 S-6213 PUSC:

U.S. Naval Reactors application G#C91-11165, dated December 19, 1991.

Supplements dated: Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; Naval Reactors letter G#C97-03614, dated September 29, 1997; Naval Reactors letter G#01-03619, dated December 11, 2001; Naval Reactors letter G#06-04833, dated December 18, 2006; and Naval Reactors letter G#C08-00667, dated March 13, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Eric J. Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Dated 11/6/08

NRC FORM 618 (8-2000) 10 CFR 71	CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES			U.S. NUCLEAR REGULATORY COMMISSION
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
9187	7	71-9187	USA/9187/B(U)-96	1 OF 2

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

QSA Global, Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

QSA Global, Inc. application dated March 6, 2006, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 865

(2) Description

A steel encased, uranium shielded radiographic exposure device 5" OD x 12.25" long. The device is provided with 0.88" OD x 9.25" long handle and two 1.38" x 5.5" long triangular shaped legs. Primary components consist of an outer steel shell, internal bracing, depleted uranium shield, and a source tube. The contents are securely positioned in the source tube by a source holder assembly and actuator and locking assembly. Tamper-indicating seals are provided on the packaging and a 0.12-inch thick steel outer cover is bolted over the source actuator and locking assembly for additional protection during transport. The total weight of the package is approximately 59 pounds.

(3) Drawing

The packaging is constructed in accordance with QSA Global Drawing No. R86590, Sheets 1 through 8, Rev. G.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9187	7	71-9187	USA/9187/B(U)-96	2	OF	2

(b) Contents

(1) Type and form of material

Iridium-192 as sealed source must meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

240 curies (output)

Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7 of the application; and,

(b) Each packaging shall be maintained in accordance with the Acceptance Tests and Maintenance Program in Section 8 of the application.

7. The packaging authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.17.

8. Revision No. 6 of this certificate may be used until October 31, 2007.

9. Expiration date: December 31, 2008.

REFERENCES

QSA Global, Inc. application dated March 6, 2006.

Supplement(s) dated: August 24, and September 28, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: October 24, 2006

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a CERTIFICATE NUMBER	b. REVISION NUMBER	c DOCKET NUMBER	d PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9196	23	71-9196	USA/9196/AF-96	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Energy*Solutions*
140 Stoneridge Drive
Columbia, South Carolina 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Duratek, Inc., application dated June 9, 2005, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

(a) Packaging

(1) Model No.: UX-30

(2) Description

Overpack for 30-inch uranium hexafluoride (UF_6) cylinders. The overpack is a right circular cylinder constructed of two stainless steel shells with the volume between the shells filled with 6-inch thick foam (7.8 - 9.8 PCF). A stepped and gasketed horizontal joint permits the top half of the overpack to be removed from the base. The package "halves" are secured with ten indexed, cross-locking "ball lock" pins. The overpack is 43.5" in diameter by 96" long. The maximum gross weight of the package is 8270 lbs.

Two types of 30 inch uranium hexafluoride cylinders may be carried in the UX-30 overpack. These are (1) an ANSI N14.1 Standard 30B cylinder, or (2) an ANSI N14.1 Standard 30C cylinder.

The ANSI N14.1 Standard 30C cylinder is essentially a 30B cylinder equipped with a Valve Protective Cover (VPC) that bolts over and protects the cylinder valve during transport. The VPC is a special design feature that provides additional assurance against the inleakage of water to the containment system and is an enclosure that retains any leakage.

(3) Drawings

The Model No. UX-30 packaging is fabricated in accordance with Duratek, Inc., Drawing No. C-110-B-57922-0002, Sheets 1 through 3, Rev. 3.

(b) Contents

(1) Type and form of material

Unirradiated uranium, in the form of UF_6, with a U-235 mass percentage not to exceed 5 percent.

(2) Maximum quantity of material per package

5,020 pounds UF_6 contained in an ANSI Standard N14.1 30B or 30C cylinder. The maximum H/U atomic ratio for the UF_6 is 0.088.

(c) Criticality Safety Index (CSI)

Criticality safety index for the UX-30 overpack containing a standard ANSI N14.1 30B cylinder	5.0
Criticality safety index for the UX-30 overpack containing a standard ANSI N14.1 30C cylinder	0.0

6. The ANSI standard 30B, 30-inch diameter UF_6 cylinder, must be fabricated, inspected, tested and maintained in accordance with a) American National Standard N14.1-2001 or an earlier version of ANSI N14.1-in effect at the time of fabrication or b) American National Standard N14.1-2001 or an earlier version of ANSI N14.1 in effect at the time of fabrication and ISO 7195:1993(F). Cylinders must be fabricated in accordance with Section VIII, Division I, of the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code and be ASME Code stamped.

7. The ANSI N14.1 Standard 30C cylinder (new or retrofitted cylinders) must be fabricated, inspected, tested, and maintained in accordance with ANSI N14.1-2001 Addendum 2-2004.

8. When the optional 4 lid lifting clips are used instead of the top lugs, the top lid (cover) must be lifted with a spreader bar (saddle).

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Prior to each shipment, the weather/dust seal gasket between the upper and lower shells must be inspected and must be replaced if inspection shows excessive wear or any defects to the gasket.

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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(b) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented.

(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.

(d) Prior to each shipment, the stainless steel components of the packaging must be visually inspected. Packagings in which stainless steel components show pitting, corrosion, cracking, or pinholes are not authorized for transport.

10. The 30-inch diameter UF_6 cylinder valve and plug threads may be tinned with ASTM B32, alloy 50A or Sn50 solder material, or a mixture of alloy 50A or Sn50 with alloy 40A or Sn40A material, provided the mixture has a minimum tin content of 45 percent.

11. Transport by air is not authorized.

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Revision No. 22 of this certificate may be used until November 30, 2009.

14. Expiration date: February 28, 2011.

REFERENCES

Duratek Inc., application dated: June 9, 2005.

Duratek Inc., supplements dated: June 30 and September 9, 2005.

Energy*Solutions* supplements dated: October 29 and November 6, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Eric J. Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: 11/7/08

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9200	12	71-9200	USA/9200/B(M)F	1	OF	5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of Energy
Washington, D.C. 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Nuclear Packaging, Inc., application dated April 6, 1991 as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 125-B

(2) Description

A stainless steel and lead shielded shipping cask. The contents are shipped dewatered. The cask is a right circular cylinder, 65.5-inch outer diameter by 207.5-inch length. The cavity dimensions are 51.25-inch diameter by 192.5-inch length. A 1.0-inch thick stainless steel inner shell, 3.88-inch thick lead annulus and 2.0-inch thick stainless steel outer shell, and 7.50-inch thick welded stainless steel bottom plate make up the cask body. A ten gauge stainless steel thermal shield surrounds the cask outer shell with standoff provided by a wire wrap on a 3.3-inch pitch spacing. The outer lid is 7.50-inch thick stainless steel equipped with a 300 psig rupture disc. The seal is provided by 2 Neoprene O-rings secured by 32, 1-1/2-6 UNC closure bolts. A test port is provided between the O-rings. The lid is also provided with a vent port. Protrusions from the outer cask external cylindrical surface include 2 lifting and 4 tie-down trunnions, 1 shear block for fitting to the shipping skid, and 16 impact limiter attachment lugs (8 at each end of the cask). The impact limiters are 120 inches in diameter by 75 inches long fabricated from 1/4-inch thick stainless steel and filled with closed-cell polyurethane foam. Each impact limiter is secured to the cask by 8, 1-1/4-7 UNC bolts necked down to 1 inch. Plastic pipe plugs are provided in each impact limiter. The overall dimensions of the cask with upper and lower impact limiters are 120-inch outer diameter by 279.5-inch length.

5.(a)(2) Description (continued)

A separate inner vessel (fuel/canister basket) is positioned within the cask cavity. The inner vessel consists of 7, 14.5-inch ID by 0.38-inch wall pipes with a welded bottom plate and top end fixture plate which provides a 151-inch long cavity for the canisters. The pipe assembly is positioned within a 50.25-inch OD by 1.0-inch thick steel shell with a 2.0-inch thick welded bottom plate. The space between the pipes and steel shell contain stainless steel structural members and solid neutron moderator and absorber. The top of each tube is shielded by a 10-inch thick stainless steel plug. The inner lid is 5.0-inch thick stainless steel equipped with 2, 300 psig rupture discs in series. The lid has 2 Neoprene O-rings and is secured to the inner vessel by 24, 3/4-10 UNC closure bolts. A test port is provided between the O-rings. The lid is also provided with a vent port.

A fuel, filter, or knockout canister is positioned within the inner vessel with canister impact limiters and a top 10.0-inch thick stainless steel shield plug. Each canister is 14.0-inch OD by 150.0-inch long by 0.25-inch wall and contains Boral sheets or B_4C rods. Canister containment is not required with closure provided by welded or bolted plate with 2 or 4 fittings.

The weight of the cask (100,500 pounds), impact limiters (11,700 pounds each), inner vessel (37,000 pounds), canisters (1,046 to 1,440 pounds each), and canister contents (1,500 to 1,894 pounds each) is approximately 181,500 pounds.

(3) Drawings

(i) The packaging is constructed in accordance with Nuclear Packaging Inc., Drawing No. X-101-100, Sheets 1 through 7, Rev. T.

(ii) The canisters are constructed in accordance with Babcock and Wilcox Company Drawing Nos.: 1161299D, Rev. 1; 1161300D, Rev. B1; and 1161301D, Rev. 1.

(b) Contents

(1) Type and form of material

(i) Byproduct and special nuclear material in the form of irradiated fuel particles, partial fuel rods, partial assemblies, and core debris. The maximum pre-irradiation U-235 enrichment must not exceed 2.98 weight percent. The average burnup of the fuel material must not exceed 3,165 MWD/MTU and be cooled for at least 6.0 years.

5.(b)(1) *(continued)*

(ii) Irradiated core structural components, contaminated defueling equipment, and filter-aid materials.

Except for close fitting contents, dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the contents and secondary containers relative to the outer packaging under accident conditions.

(iii) Byproduct and special nuclear material in the form of internal contamination inside the inner vessel. Internal contamination shall not exceed the limits for surface contaminated objects as defined in 10 CFR §71.4.

(2) Maximum quantity of material per package

Seven fuel, knockout, or filter canisters or any combination thereof within the inner vessel. The radioactive decay heat load must not exceed 100 watts in each canister. The gross weight of each canister must not exceed 2,940 pounds.

(c) Criticality Safety Index: 100

6. The cask cavity and inner vessel must be dry when delivered to a carrier for transport, except for free water which may be present following drip drying of the canisters for a minimum of 2 minutes after removal from the storage pool. The canisters must be loaded and dewatered in accordance with Section 7.1.1 of the application which includes approximately 2 atm of argon, nitrogen, or helium cover gas. The cask cavity and inner vessel must be filled with argon, nitrogen, or helium at 1.0 atm pressure.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Prior to each shipment, the inner and outer lid seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first; and

(b) Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application, as supplemented.

(c) The package must be prepared for shipment and operated in accordance with Section 7.0 of the application.

8. For any canister containing water and/or organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis of a representative canister that the following criteria are met over a period of time that is twice the expected shipment time:

8. (continued)

The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the canister gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or that oxygen is limited to 5% by volume in those portions of the canister which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the canister must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the canister is closed and must be completed within twice the expected shipment time.

9. Bolt torque:

The outer cask lid must be secured by 32, ASTM A320, Grade L43 (Cadmium plated), 1-1/2-6 UNC-2A x 5.5 long bolts torqued to 780-945 ft-lbs (lubricated).

The inner vessel lid must be secured by 24, ASTM A320, Grade L43 (Cadmium plated), 3/4-10 UNC-2A x 2.25 long bolts torqued to 130-158 ft-lbs (lubricated).

The upper and lower overpack limiters must each be secured by 8, ASTM A320, Grade L43 (Cadmium plated), 1-1/4-7 UNC-2A x 41.75 long bolts torqued to 225-270 ft-lbs (lubricated).

10. Except for the contents specified in 5.(b)(1)(iii), prior to each shipment, the shipper must confirm that the cask and inner vessel are properly sealed by tests as specified in Appendix 7.4 or Section 8.2.2 of the application. The test is satisfied if no leakage is detected using a test with a minimum sensitivity of 1×10^{-3} atm-cm^3/s.

11. The neoprene O-ring seals used in the containment vessel closure must be fabricated from neoprene material specified as Cascade Gaskets compound number CG 100-111-60.

12. The shipper may use a tarpaulin to cover the cask during time of transport.

13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

14. Revision No. 11 of this certificate may be used until June 30, 2007

15. Expiration date: June 30, 2011.

REFERENCES

Nuclear Packaging, Inc. application dated April 6, 1991.

Supplements dated: April 9 and 15, 1991.
Department of Energy supplements dated: February 21, 1996; February 1, 2001; October 14, 2003; March 3, 2004 and February 16, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date June 20, 2006

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9203	14	71-9203	USA/9203/AF	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Framatome ANP, Inc.
P.O. Box 11646
Lynchburg, VA 24506-1646

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Framatome Cogema Fuels application dated January 20, 2006.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: DHTF

(2) Description

The packaging consists of a 14-gauge stainless-steel containment vessel, 9.5 inches by 9.5 inches by 17.5 inches high, with a bolted and gasketed top flange closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a steel drum by industrial cane fiberboard of 16.5 ± 2 lbs/ft^3 density.

Closure of the containment vessel is maintained by a 3/8-inch thick carbon steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The 16-gauge steel outer drum is approximately 34 inches high and 22.5 inches in diameter. The drum closure is a 16-gauge lid with a 12-gauge bolt locking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut.

The gross weight of the packaging and contents is 490 pounds.

(3) Drawings

The packaging is constructed and assembled in accordance with Framatome Cogema Fuels Drawing Nos. 1249874E, Rev. 5; 1259100C, Rev. 0; 1259101C, Rev. 0; and 1215600D, Rev. 6.

5.(b) Contents

(1) Type and form of material

Dry uranium oxide solid pellets, annular pellets, or scrap, packaged either on trays or bagged, as shown in Framatome Cogema Fuels 1215600D, Rev. 6.

(i) Solid pellets on stainless steel trays. The minimum pellet diameter is 0.315 inch and the maximum pellet diameter is 0.4075 inch.

(ii) Bagged solid pellets or scrap, or any combination. The maximum pellet diameter is 0.4075 inch.

(iii) Bagged solid pellets or scrap, or any combination. The maximum pellet diameter is 0.375 inch.

(iv) Bagged annular pellets. The minimum pellet diameter is 0.291 inch and the maximum pellet diameter is 0.304 inch, with an annulus from 0.045 to 0.065 inch in diameter.

(2) Maximum quantity of material per package

The maximum weight of contents and all packaging materials within the inner container is 275 lbs. The maximum quantity of polyethylene is 149 grams per pellet box.

(i) For the contents described in Item 5(b)(1)(i), enrichment and fissile quantities are limited as follows:

Max. Enrichment (wt % U-235)	Max. UO_2 mass (kg)	Max. U-235 mass (kg)	Max. Number Pellet Boxes
5.0	112	4.83	4

(ii) For the contents described in Item 5(b)(1)(ii), enrichment and fissile quantities are limited as follows:

Max. Enrichment (wt % U-235)	Max. UO_2 mass (kg)	Max. U-235 mass (kg)	Max. Number Pellet Boxes
5.0	84	3.62	3

(iii) For the contents described in Item 5(b)(1)(iii), enrichment and fissile quantities are limited as follows:

Max. Enrichment (wt % U-235)	Max. UO_2 mass (kg)	Max. U-235 mass (kg)	Max. Number Pellet Boxes
3.85	112	3.72	4

5.(b) (2) Maximum quantity of material per package (Continued)

(iv) For the contents described in Item 5(b)(1)(iv), enrichment and fissile quantities are limited as follows:

Max. Enrichment (wt % U-235)	Max. UO_2 mass (kg)	Max. U-235 mass (kg)	Max. Number Pellet Boxes
5.0	84	3.55	3
3.75	112	3.55	4

(c) Criticality Safety Index 1.2

6. Each package must have a stainless steel plate (spacer) positioned between pellet boxes, as shown on Framatome Cogema Fuels Drawing No. 1249874E, Rev. 5.

7. For packages containing fewer than four loaded pellet boxes, solid aluminum spacer blocks, as shown on Framatome Cogema Fuels Drawing No. 1259100C, Rev. 0, must be substituted for all missing boxes.

For contents described in Item 5(b)(1)(i) and limited in Item 5(b)(2)(i), stainless steel trays must be positioned between each layer of pellets, and on the top and bottom of the pellet stack. Additional trays must be inserted in partially filled pellet boxes to provide a snug fit.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Prior to each shipment the containment vessel gasket must be inspected. The gasket must be replaced if the inspection shows any defects or signs of degradation.

(b) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.

(c) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented October 29, 1999.

10. The eight, 3/8-inch containment vessel bolts must be torqued to 35 ft-lbs ± 10% and the 5/8-inch closure ring bolt and lock nut must be torqued to 70 ft-lbs ± 10%. Immediately following each loading of a package, the closure ring must be inspected to assure it is fully seated (engaged).

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Revision No. 13 of this certificate may be used until January 31, 2007.

Expiration date: February 28, 2011.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9203	14	71-9203	USA/9203/AF	4	OF	4

REFERENCES

Framatome Cogema Fuels applications dated October 5, 2005, and January 20, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: January 27, 2006

UNITED STATES NUCLEAR REGULATORY COMMISSION

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9204	12	71-9204	USA/9204/B(U)-85	1 OF	5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Chem-Nuclear Systems, LLC, application dated March 22, 2000, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: CNS 10-160B

(2) Description

A cylindrical carbon steel and lead shielded shipping cask, designed to transport radioactive waste material. The cask is transported in the upright position and is equipped with steel encased, rigid polyurethane foam impact limiters on the top and bottom. The package has approximate dimensions, shielding, and weight as follows:

Cask height	88 inches
Cask outer diameter	78-1/2 inches
Cask cavity height	77 inches
Cask cavity diameter	68 inches
Overall package height, with impact limiters	130 inches
Overall package diameter, with impact limiters	102 inches
Lead shielding thickness	1-7/8 inches
Gross weight (packaging and contents)	72,000 lbs
Maximum total weight of contents, shoring, secondary containers, and optional shield insert	14,500 lbs

5.(a)(2) Description (Continued)

The cask body consists of a 1-1/8-inch thick carbon steel (ASME SA516 or SA537) inner shell, a 1-7/8-inch thick lead gamma shield, and a 2-inch thick carbon steel outer shell (ASME SA516). The inner and outer shells are welded to a 5-1/2-inch thick carbon steel bottom plate. The cask cavity has an optional 11-gage stainless steel liner. A 12-gage stainless steel thermal shield surrounds the cask outer shell in the region between the impact limiters. The impact limiters are secured to each other around the cask by eight ratchet binders.

The cask lid is a 5-1/2-inch thick carbon steel plate, and has a 31-inch diameter opening equipped with a secondary lid. The primary lid is sealed with a double elastomer O-ring and 24 equally spaced 1-3/4-inch diameter bolts. The secondary lid is 46 inches in diameter, is centered within the primary lid, and is sealed to the primary lid by a double elastomer O-ring and 12 equally spaced 1-3/4-inch diameter bolts. The space between the double O-ring seals is provided with a test port for leak testing the primary and secondary lid seals.

The optional cask drain and vent ports are sealed with a plug and an O-ring seal.

The package is equipped with four tie-down lugs welded to the cask outer shell. Two lifting lugs and two redundant lifting lugs are removed during transport. The lid is equipped with three lifting lugs which are covered by the top impact limiter and rain cover during transport.

An optional carbon steel shield insert may be used within the cask cavity.

(3) Drawings

The packaging is constructed and assembled in accordance with Chem-Nuclear Systems Drawing No. C-110-D-29003-010, Sheets 1 through 5, Rev. 13.

An optional shield insert is constructed in accordance with Chem-Nuclear Systems Drawing No. C-119-B-0018, Rev. 2.

5.(b) Contents

(1) Type and form of material

(i) Byproduct, source, and special nuclear material in the form of solids, dewatered resins or process solids, or solidified waste, contained within secondary containers. Explosives, corrosives, non-radioactive pyrophorics, and compressed gases are prohibited. Pyrophoric radionuclides may be present only in residual amounts less than 1 weight percent. The total amount of potentially volatile organic compounds present in the headspace of a secondary container is restricted to 500 parts per million; or

(ii) Radioactive material in the form of activated reactor components.

5.(b) (2) Maximum quantity of material per package

Type B quantity of radioactive material, not to exceed 3,000 times a Type A quantity. Decay heat not to exceed 100 watts. Total weight of contents, shoring, secondary containers, and optional shield insert not to exceed 14,500 pounds. Contents may include fissile material contaminants provided the mass limits of 10 CFR 71.15, are not exceeded. Plutonium content not to exceed 0.74 TBq (20 curies).

6. Except for close fitting contents, shoring must be placed between the secondary containers or activated components and the cask cavity to prevent movement during accident conditions of transport.

7. The cask primary lid must be secured by 24, and the secondary lid by 12, 1-3/4"-8UNC x 5-3/8" long hex cap screws with a flat washer, torqued to 300 ft-lbs ± 30 ft-lbs (lubricated). The optional drain and vent port plugs must be torqued to 20 ± 2 ft-lbs.

8. Lift lugs must be removed from the cask body prior to transport.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application; and

   (b) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application; and

   (c) The primary lid, secondary lid, and the optional vent and drain seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first.

10. The package must be leak tested as follows:

   (a) Prior to each shipment, the package must be leak-tested in accordance with Section 8.2.2.2 of the application. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.14(b)(3)(I), the pre-shipment leak-test is not required.

   (b) The packaging containment system must be leak tested in accordance with Section 8.1.3 of the application prior to first use of any packaging, and after the third use.

   (c) The packaging containment system must be leak tested in accordance with Section 8.2.2 of the application within the 12-month period prior to each use, and after seal replacement.

11. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis of a representative package that the following criteria are met over a period of time that is twice the expected shipment time:

(1) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(2) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen is limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with a radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

(c) For any package containing TRU the following additional conditions apply:

(1) Waste content codes and classification, physical form, chemical properties, chemical compatibility, gas distribution, and pressure buildup, container and contents configuration, isotopic characterization and fissile content, must be determined and limited in accordance with Appendix 4.10.2 of the application;

(2) Each waste container must not exceed the decay heat limits in Section 10 of the applicable site specific appendix to Appendix 4.10.2, or must satisfy the requirements of Attachment B, "Methodology for Determination of Decay Heats and Hydrogen Gas Generation Rates for Transuranic Content Codes," for each site specific appendix to Appendix 4.10.2 as listed below:

Appendix 4.10.2.1	Compliance Methodology for TRU Waste From Battelle Colombus Laboratories,
Appendix 4.10.2.2	Compliance Methodology for TRU Waste From Missouri University Research Reactor,
Appendix 4.10.2.3	Compliance Methodology for TRU Waste Form Energy Technology Engineering Center,
Appendix 4.10.2.4	Compliance Methodology for TRU Waste From Lawrence Livermore National Laboratory,

Appendix 4.10.2.5 Compliance Methodology for TRU Waste From Idaho National Engineering and Environmental Laboratory;

(3) One or more filter vents must be installed in the drum payload container. Filter vents must meet the minimum specifications in Section 8, "Payload Container and Contents Configuration" of the applicable site specific appendix to Appendix 4.10.2; and

(4) The payload containers authorized for shipment of TRU in the Model No. CNS 10-160B are the 30-gallon and the 55-gallon drum. Up to ten payload containers of TRU waste may be packaged in the cask.

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Revision No. 11 of this certificate may be used until September 30, 2008.

14. Expiration date: October 31, 2010.

REFERENCES

Chem-Nuclear Systems, LLC, application dated March 22, 2000.

Supplements dated May 10 and November 7, 2000; and January 5 and April 13, 2001.

Duratek supplements dated April 23 and July 24, 2001, June 14, 2002, August 20, 2004, and March 7, April 8, October 26, December 2 and 7, 2005.

EnergySolutions supplements dated May 11, and July 18, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: September 26, 2007.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9208	18	71-9208	USA/9208/B( )	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Allied Technology Group, Inc., application dated May 31, 2002.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 10-142

(2) Description

Steel encased, lead shielded cask for solid radioactive material. The overall dimensions of the cask and impact limiters are 112-inch diameter by 130-inch height. The cask consists of two concentric carbon steel cylindrical shells surrounding a 3-½-inch thick lead shield. The ½-inch thick inner shell has a 66-inch ID, and the 1-inch thick outer shell has a 76-inch OD. The base consists of two, 3-inch thick welded steel plates of 66- and 74-inch diameters. The base is welded to the steel cylindrical shells. A stepped welded lid, secured by 16, 1-1/2-6 UNC-2A bolts or studs and nuts, is comprised of two, 3-inch thick steel plates containing an opening for a secondary lid of similar construction with one additional 1-inch thick upper plate. Within the primary lid there is a 16-inch or 29-inch centered secondary lid. The 16-inch secondary lid is secured by 8, 7/8-inch bolts or studs and nuts, and the 29-inch secondary lid is secured by 16, 1-1/4-inch bolts or studs and nuts. The lids are sealed with a solid silicone flat gasket. The containment cavity is 66 inches in diameter by 72 inches high. A plugged drain port is located at the cask bottom and the lid is provided with a plugged test port. Toroidal impact limiters are located at the top and bottom of the cask. The impact limiters are 10-gauge steel sheets filled with rigid polyurethane and are equipped with plastic plugs. As an option, interior and exterior surfaces of the cask body and interior surfaces of the upper lid may be covered with 12-gauge 304 stainless steel cladding and seal welded.

All exposed side walls are covered with a stainless steel thermal barrier. Four skewed lugs, welded to the outer shell are used for tie-down. The package gross weight is approximately 68,000 pounds.

5.(a) Packaging (Continued)

(3) Drawings

The packaging is constructed and assembled in accordance with ATG Nuclear Services, Inc., Drawing No. X-103-110-SNP, Sheets 1 through 5, Rev. E.

(b) Contents

(1) Type and form of material

(i) Dewatered, solid, or solidified waste which may be in secondary containers;

(ii) Activated components which may be in secondary containers;

(iii) Dewatered, solid or solidified material, meeting the requirements for low specific activity material, which may be in secondary containers; or

(iv) Dewatered or solidified ion exchange resin from light water reactors, in secondary containers.

(2) Maximum quantity of material per package

Decay heat not to exceed 400 watts. Fissile materials not to exceed the limits of 10 CFR 71.53 until October 1, 2004, and 10 CFR 71.15, thereafter. Maximum weight of contents, including dunnage and secondary containers, not to exceed 10,000 pounds.

For the contents specified in 5(b)(1)(i) and 5(b)(1)(ii):

Not to exceed a Type A quantity of transuranic materials.

6.(a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(1) The hydrogen generated must be limited to a molar quantity that would be not more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(2) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package to be delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

7. Except for close fitting contents, dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the contents or secondary containers relative to the outer packaging under normal condition.

8. Bolt/Stud and Nut Torque:

The primary cask lid bolts or studs and nuts must be torqued to 300 ± 25 ft-lbs (lubricated).

The secondary cask lid bolts or studs and nuts must be torqued to 200 ± 10 ft-lbs (lubricated).

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Prior to each shipment, the packaging seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. Cavity drain and test ports must be sealed with appropriate sealant applied to the pipe plug threads.

(b) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Section 7.0 of the application.

(c) Each package must meet the Acceptance Tests and Maintenance Program in Section 8.0 of the application.

(d) For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.14(b)(3)(i), the pre-shipment leak test is not required.

10. Use of intumescent coating fire shield is not authorized.

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Revision No. 17 of this certificate may be used until August 31, 2008.

13. Expiration date: October 1, 2008. This certificate may not be renewed.

REFERENCES

Allied Technology Group, Inc., application dated May 31, 2002.

RWE NUKEM Corporation supplement dated May 8, 2003.

NUKEM Corporation supplement dated September 6, 2006, February 28, 2007, and August 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: September 14, 2007

NRC FORM 618
(8-2000)
71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9212	4	71-9212	USA/9212/B(M)F-96	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of Energy
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Westinghouse TRU Solutions, LLC application dated November 27, 2002, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

Packaging

(1) Model No: RH-TRU 72-B

(2) Description

A stainless steel, lead-shielded cask designed to provide double containment for shipment of transuranic waste materials. The packaging consists of a cylindrical stainless steel and lead cask body, a separate inner stainless steel vessel, and foam-filled impact limiters at each end of the cask body.

The cask body (outer cask) consists of a 1 1/2-inch thick, 41 5/8-inch outer diameter stainless steel outer shell, and a 1-inch thick, 32 3/8-inch inside diameter stainless steel inner shell, with 1 7/8 inches of lead shielding between the two shells. The cask bottom is 5-inch thick stainless steel plate. The cask is closed by a 6-inch thick stainless steel lid, and 18, 1 1/4-inch diameter bolts. The main closure lid has a double bore-type O-ring seal. The containment seal is the inner butyl O-ring seal, which is leak testable. The cask lid has a single vent/sampling port that is sealed with leak testable butyl O-ring seals.

The separate inner vessel consists of a 3/8-inch thick, 32-inch outside diameter stainless steel shell, and a 1 1/2-inch thick stainless steel bottom plate. The inner vessel is closed by a 6 1/2-inch thick stainless steel lid, and eight, 7/8-inch diameter bolts. The inner vessel closure lid has three bore-type O-ring seals. The containment seal is the middle butyl O-ring seal, which is leak testable. The inner vessel lid has a helium backfill port and a combination vent/sampling port that are sealed with leak-testable butyl O-ring seals.

A polyurethane foam-filled stainless steel impact limiter is attached to each end of the cask body using six, 1 1/4-inch diameter bolts. The radioactive contents are packaged within a stainless or carbon steel waste canister that is placed in the inner vessel.

5.(a) (2) Description (Continued)

The approximate dimensions and weights of the package are as follows:

Overall package length	187 3/4 inches
Impact limiter diameter	76 inches
Cask length	141 3/4 inches
Cask outer diameter (OD)	41 5/8 inches
Inner vessel length	130 inches
Inner vessel OD	32 inches
Cask lead shield thickness	1 7/8 inches
Maximum package weight (including contents)	45,000 pounds
Maximum weight of contents (including waste canister)	8,000 pounds

(3) Drawings

The packaging is constructed and assembled in accordance with Packaging Technology Drawing No. X-106-500-SNP, Sheets 1-8, Rev. 4.

The fixed lid waste canister is constructed and assembled in accordance with Packaging Technology Drawing No. X-106-501-SNP, Rev. 4. The removable lid waste canister is constructed and assembled in accordance with Packaging Technology Drawing No. X-106-502-SNP, Rev. 2.

(b) Contents

(1) Type and form of material

Byproduct, source, and special nuclear material in the form of dewatered, solid or solidified materials and waste, within the stainless or carbon steel waste canister described in Item 5(a)(3). Explosives, corrosives (pH less than 2 or greater than 12.5), and compressed gases are prohibited. Within a waste canister radioactive and non-radioactive pyrophorics must not exceed 1 weight percent. Flammable volatile organics are limited along with hydrogen to ensure the absence of flammable gas mixtures in RH-TRU waste payloads as described in RH-TRAMPAC (Revision 0).

(2) Maximum quantity of material per package.

Not to exceed 8,000 pounds, including the weight of the waste canister.

Fissile material not to exceed limits described in Section 3.1, "Nuclear Criticality" of RH-TRAMPAC (Revision 0). Pu-239 equivalent is determined in accordance with RH-TRAMPAC (Revision 0). Low enriched uranium is authorized for waste containers containing material that is primarily uranium (in terms of heavy metal component) and the waste matrix is distributed within the canister in such a manner that the maximum enrichment does not exceed 0.96% uranium (U-235) fissile equivalent mass in any location of the waste material.

Maximum decay heat per package not to exceed 50 watts for organic wastes and 300 watts for inorganic waste, and not to exceed the limits in RH-TRAMPAC (Revision 0).

(c) Criticality Safety Index: 0.0

6. Waste content codes and classification, physical form, chemical properties, chemical compatibility, gas generation, fissile content, decay heat, isotopic inventory, weight, and radiation dose rate must be determined and limited in accordance with RH-TRAMPAC (Revision 0).

7. Each waste canister must not exceed the decay heat limits determined as specified in RH-TRAMPAC (Revision 0), or must be tested for gas generation in accordance with RH-TRAMPAC (Revision 0), Section 5.0, "Gas Generation Requirements."

8. A RH-TRU waste canister may be comprised of inner containers with different content codes provided that the hydrogen gas generation rate limit or decay heat limit for all of the inner containers within the payload is assumed to be the same as the content code with the lowest hydrogen gas generation rate limit or decay heat limit.

The waste canister and any sealed secondary containers greater than 4 liters in size overpacked in the waste canister must be vented in accordance with the minimum specifications in Section 2.4, Filter Vents, of RHTRAMPAC (Revision 0).

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each package must be prepared for shipment and operated in accordance with the procedures described in Chapter 7.0, "Operating Procedures," of the application, as supplemented.

(b) Each packaging must be tested and maintained in accordance with the procedures described in Chapter 8.0, "Acceptance Tests and Maintenance Program," of the application, as supplemented.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9212	4	71-9212	USA/9212/B(M)F-96	4	OF	4

11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Packages may be marked with Package Identification Number USA/9212/B(M)F-85 until July 31, 2007 and must be marked with Package Identification Number USA/9212/B(M)F-96 after July 31, 2007.

13. Revision No. 3 of this certificate may be used until July 31, 2007.

14. This package may not be used for transport by aircraft.

15. Expiration date: February 28, 2010.

REFERENCES

Westinghouse TRU Solutions, LLC, application dated November 27, 2002.

ɔlements dated: Washington TRU Solutions, LLC, November 1, 2004; October 14, 2005; June 5, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Christopher M. Regan, Acting Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: July 28, 2006

NRC FORM 618 (8-2000) 10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9215	9	71-9215	USA/9215/B(U)	1 OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. *THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION*

a. ISSUED TO *(Name and Address)*

Neutron Products, Inc.
22301 Mt. Ephraim Road
P.O. Box 68
Dickerson, MD 20842

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Neutron Products, Inc., application dated September 14, 1992, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

a) Packaging

(1) Model No.: NPI-20WC-6 MkII

(2) Description

A steel encased, lead shielded cask contained within a wooden overpack with a steel outer shell. The cask is 24 inches in diameter with a 3/8-inch thick steel spherical shell and a cavity formed by an 8-1/4-inch ID by 3/16-inch thick steel tube. Positive closure of the shielded cask is accomplished by bolted end covers at each end of the cavity. The overpack is approximately 49 inches in diameter and 59 inches high, including the lid lifting eye and the base support structure. The maximum package gross weight is 6,000 pounds.

(3) Drawings

The Model No. NPI-20WC-6 MkII packaging is constructed in accordance with Neutron Products, Inc., Drawing Nos. 240116, Rev. G; and 240122, Sheet 1 of 2, Rev. H, Sheet 2 of 2, Rev. H, except as noted in Condition No. 9 below.

(b) Contents

(1) Type and form of material

Cobalt-60 as sealed sources which meet the requirements of special form radioactive material.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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5.(b) Contents (Continued)

(2) Maximum quantity of material per package

(i) For sources contained within drum assembly shown as Item 5 on Neutron Products, Inc., Drawing No. 240122, Sheet 1 of 2, Rev. H:

Maximum activity not to exceed 15,000 curies, maximum decay heat not to exceed 240 watts.

(ii) For sources contained within drum assembly shown as Item 4 on Neutron Products, Inc., Drawing No. 240122, Sheet 2 of 2, Rev. H:

Maximum activity not to exceed 9,500 curies, maximum decay heat not to exceed 150 watts.

(iii) For sources contained within drum assembly shown as Item 2 on Neutron Products, Inc., Drawing No. 240122, Sheet 2 of 2, Rev. H:

Maximum activity not to exceed 6,300 curies, maximum decay heat not to exceed 100 watts.

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be maintained in accordance with Teletherapy Shipping Packaging Maintenance Procedure R-2019-G, Revision 1, provided in the supplement dated March 12, 2008.

(b) The package shall be prepared for shipment and operated in accordance with Teletherapy Shipping/Transfer Cask Unloading and Loading Procedures R-2014-G, Revision 1, provided in the supplement dated March 12, 2008.

7. The contents must be secured in the drum assembly so as to restrict movement in any direction to less than 0.25 inch, by lead, steel, or tungsten full diameter plugs and spacers.

8. The gross weight of the package must not exceed 6,000 pounds, and the inner shield cask shall be snug-fitting within the wooden overpack.

9. The two permanent package identification labels and the single temporary package identification holder are attached with 3/16 inch aluminum pop rivets. The two manufacturer's stamped name and date labels are attached with 1/8 inch aluminum pop rivets. The temporary identification labels are held in their holder with a single 1/4 - 20 stainless steel screw. The eight one-quarter inch holes remaining from previous permanent package identification labels and the twelve half inch vent holes are covered d by waterproof tape.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9215	9	71-9215	USA/9215/B(U)	3 OF	3

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

11. Revision No. 8 of this certificate may be used until March 31, 2009.

12. Expiration date: May 31, 2013

REFERENCES

Neutron Products, Incorporated, application dated September 14, 1992.

Supplements dated: October 29, 1992; November 17, 1993; September 8, 1997; September 5, 2002; May 1 and October 7, 2003, and February 16, and March 15, 2007; and March 12, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: March 31, 2008

NRC FORM 618 (8-2000) 10 CFR 71		CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES		U.S. NUCLEAR REGULATORY COMMISSION
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE PAGES
9216	10	71-9216	USA/9216/B( )F	1 OF 5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

EnergySolutions
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Chem-Nuclear Systems, Inc. application dated November 24, 1987, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: CNS 1-13G

(2) Description

Steel-encased lead shielded shipping cask. A double-walled steel cylinder protective jacket encloses the cask during transport. It is bolted to a steel pallet. The cask is closed by a lead-filled flanged plug fitted with a silicone rubber gasket and bolted closure. The cavity is equipped with a drain line and the physical description is as follows:

Cask height, in	67.19
Cask diameter, in	38.5
Cavity height, in	54.0
Cavity diameter, in	26.5
Lead shielding, in	5.0
Protective jacket height, in	81.8
Protective jacket width, in	68.0
Packaging weight, lb	25,500

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing Nos.: C-110-B-06402-001, Rev. A; C-110-B-06402-002, Rev. 2; C-110-B-06402-003, Rev. 4; and C-110-B-06402-004; Rev. A.

5. (b) Contents

(1) Type, form and maximum quantity of material per package

Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements; and

(i) Byproduct material and special nuclear material as solid metal or oxides. Decay heat not to exceed 600 watts. The radioactive material shall be in the form of fuel rods, or plates, fuel assemblies, or meeting the requirements of special form radioactive material.

500 gm U-235 equivalent mass; or

(ii) Neutron sources meeting the requirements of special form radioactive material.

500 gm U-235 equivalent mass. Decay heat not to exceed 50 watts; or

(iii) Irradiated PuO_2 and UO_2 fuel rods clad in Zircalloy or stainless steel. Decay heat not to exceed 600 watts. All fuel rods shall be contained within a closed 5-inch Schedule 40 pipe with a maximum useable length of 39-5/8 inches.

1,200 gm fissile material with no more than 300 gm fissile material per 5-inch Schedule 40 pipe.

(iv) Process solids, either dewatered, solid, or solidified, in a secondary sealed container, meeting the requirements for low specific activity radioactive material. Fissile materials must meet the exemption standards in 10 CFR 71.53 until October 1, 2004, and 10 CFR 71.15, thereafter.

(v) Solid nonfissile irradiated metal hardware, reactor control rods (blades), reactor start-up sources, and segmented boron carbide tubes (tube contents not to exceed a Type A quantity).

(vi) Radioactive (Hot Cell) waste materials immobilized with cement grout and contained in a 55-gallon (or extended 55-gallon drum) DOT Specification 17H or 17C steel drum, lid and closure. The waste material must be packaged in accordance with the Procedural Outline of the Immobilization of Cell Waste Using Cement Grout, Attachment D of the application. The cement grout must be at least 50 volume percent (estimated) of the drum contents and relatively uniformly distributed throughout the drum. At least 3/4" thick layer of grout must cover all radioactive waste contents. Decay heat not to exceed 100 watts, and fissile material not to exceed 500 grams U-235 equivalent mass.

5. (c) Criticality Safety Index

(Minimum transport index to be shown on label for nuclear criticality control)

For contents described and limited in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), and 5(b)(1)(vi): 62.5

6. The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.

7. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

8. For packaging of neutron sources, the cavity drain line must be closed with a plug with a melting temperature of 200°F and the cask cavity must be dry before delivery of the package to a carrier.

9. For packaging of other than neutron sources, the cask must be delivered to a carrier dry and the cavity drain line must be closed with a plug which will maintain its seal at temperatures up to at least 620°F.

10. For the shipment of irradiated metal hardware, the use of the auxiliary shielded inner container and shoring plug shown in Chem-Nuclear Systems, Inc. Drawing Nos. 8651-E-02, Rev. A and 8651-C-01, Rev. B is authorized. The inner container must be provided with vent and drain lines.

11. Shoring must be provided to minimize movement of contents during accident conditions of transport.

12. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package shall be prepared for shipment and operated in accordance with Chem-Nuclear Systems, Inc. Operating Procedures, Section 7.0.

    (b) Prior to each shipment the silicone rubber lid gasket(s) must be inspected. This gasket(s) must be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.

    (c) Prior to each shipment the baseplate to cask shell weld must be visually inspected in accordance with Chem-Nuclear Systems, Inc. Operating Procedures, Section 7.0.

    (d) The packaging must meet Chem-Nuclear Systems, Inc. Acceptance Tests and Maintenance Program, Section 8.0.

13. For packaging of neutron sources, 50 times measured neutron dose rate at one meter from the surface of a cask must be less than 1,000 mrem/hr.

14. The contents described in 5(b)(1)(iv) must be transported on a motor vehicle, railroad car, aircraft, inland water crafts, or hold or deck of a seagoing vessel assigned for sole use of the licensee.

15. The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.17.

16. Transport by air of fissile material is not authorized.

17. Revision No. 9 of this certificate may be used until October 1, 2008.

18. Expiration date: October 1, 2008. This certificate is not renewable.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9216	10	71-9216	USA/9216/B( )F	5	OF	5

REFERENCES

Chem-Nuclear Systems, Inc. application dated November 24, 1987.

Supplements dated: November 24, 1992; October 31, 1997; March 31, 1999; April 23, 2001; December 17, 2002; and May 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 16, 2007

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9217	13	71-9217	USA/9217/AF	1	OF	4

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Framatome ANP Richland, Inc.
2101 Horn Rapids Road
Richland, WA 99352-0130

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Siemens Power Corporation application dated January 26, 2000, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: ANF-250

(2) Description

A uranium oxide powder/pellet shipping container. The packaging consists of a 16-gauge steel inner vessel, approximately 11-1/2 inches ID by 57 inches long, with a bolted and gasketed top flange closure and steel welded bottom plate. The inner vessel is centered and supported in a 22-1/2-inch ID by 68-3/8-inch long, 16-gauge steel drum by twelve 1/4-inch diameter spring steel rods welded to the inner vessel at the top and the bottom of the vessel. A 3/8-inch thick steel flange and a 16-gauge inner band position and support the top of the inner vessel within the outer container. The annulus between the inner vessel and outer container is filled with vermiculite.

The inner vessel is closed by six ½-inch square shank studs with hex head nuts at each end. The outer container is closed with a 12-gauge locking ring with drop forged lugs and a 5/8-inch diameter bolt and lock nut. A product container insert is positioned within the inner vessel.

The maximum gross weight of the packaging and contents is 616 pounds.

(3) Drawings

(i) The ANF-250 shipping container is constructed in accordance with Siemens Power Corporation Drawing No. EMF-306,175, Rev. 16.

(ii) The pellet shipping suit case is constructed in accordance with Siemens Power Corporation Drawing No. EMF-304,306, Rev. 8.

(iii) The powder and pellet product container inserts are constructed in accordance with Siemens Power Corporation Drawing No. EMF-306,176, Rev. 6, Sheets 1 and 2.

5.(b) Contents

(1) Type and form of material

(i) Dry uranium oxide powder enriched to a maximum 5.0 w/o in the U-235 isotope.

(ii) Dry uranium oxide pellets enriched to a maximum 5.0 w/o in the U-235 isotope.

(iii) Uranium oxide pellets enriched to a maximum of 1 w/o in the U-235 isotope.

(iv) Uranium oxide powder enriched to a maximum of 1 w/o in the U-235 isotope.

(2) Maximum quantity of material per package

Not to exceed 310 pounds and:

(i) For the contents described in 5(b)(1)(i):

The contents not to exceed the following:

Maximum Enrichment (wt% U-235)	Maximum Uranium Mass (kg U)	Maximum U-235 Mass (kg U-235)
3.4	62.4	2.12
3.8	41.0	1.56
4.6	31.2	1.44
5.0	27.7	1.38

Not to exceed a maximum mass of 1149 g H, considering all sources of hydrogenous material within the inner vessel. The contents must be contained in product container described in 5(a)(3)(iii).

(ii) For the contents described in 5(b)(1)(ii):

The total contents not to exceed 120 kg U, with the U-235 content not to exceed 6 kg. Not to exceed a maximum mass of 1149 g H, including a maximum mass of 600 g polyethylene, considering all sources of hydrogenous material within the inner vessel. The contents must be contained in product container described in 5(a)(3)(ii).

(iii) For the contents described in 5(b)(1)(iii):

The total contents not to exceed 120 kg U, with the U-235 content not to exceed 1.2 kg. The contents must be contained in product container described in 5(a)(3)(ii).

(iv) For the contents described in 5(b)(1)(iv):

The total contents not to exceed 120 kg U, with the U-235 content not to exceed 1.2 kg. The contents must be contained in product container described in 5(a)(3)(iii).

5.(c) Criticality Safety Index

Minimum criticality safety index to be shown on label for nuclear criticality control:

For contents described in 5(b)(1)(i) and limited in 5(b)(2)(i):	1.8
For contents described in 5(b)(1)(ii) and limited in 5(b)(2)(ii):	0.6
For contents described in 5(b)(1)(iii) and 5(b)(1)(iv), and limited in 5(b)(2)(iii) and 5(b)(2)(iv):	0.4

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

a. The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.

b. The packaging must meet the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Expiration date: June 30, 2010.

REFERENCES

Siemens Power Corporation application dated January 26, 2000.

Supplements dated: January 31, June 6, June 15 and September 29, 2000; February 6 and August 21, 2001; and December 16, 2004

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert Lewis, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: 24 March 2005

NRC FORM 618 (8-2000) 10 CFR 71 | U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9218	18	71-9218	USA/9218/B(U)F-85	1	OF	5

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Department of Energy
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Washington TRU Solutions LLC application dated October 4, 2004, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: TRUPACT-II

(2) Description

A stainless steel and polyurethane foam insulated shipping container designed to provide double containment for shipment of contact-handled transuranic waste. The packaging consists of an unvented, 1/4-inch thick stainless steel inner containment vessel (ICV), positioned within an outer containment assembly (OCA) consisting of an unvented 1/4-inch thick stainless steel outer containment vessel (OCV), a 10-inch thick layer of polyurethane foam and a 1/4 to 3/8-inch thick outer stainless steel shell. The package is a right circular cylinder with outside dimensions of approximately 94 inches diameter and 122 inches height. The package weighs not more than 19,250 pounds when loaded with the maximum allowable contents of 7,265 pounds.

The OCA has a domed lid which is secured to the OCA body with a locking ring. The OCV containment seal is provided by a butyl rubber O-ring (bore seal). The OCV is equipped with a seal test port and a vent port.

The ICV is a right circular cylinder with domed ends. The outside dimensions of the ICV are approximately 73 inches diameter and 98 inches height. The ICV lid is secured to the ICV body with a locking ring. The ICV containment seal is provided by a butyl rubber O-ring (bore seal). The ICV is equipped with a seal test port and vent port. Aluminum spacers are placed in the top and bottom domed ends of the ICV during shipping. The cavity available for the contents is a cylinder of approximately 73 inches diameter and 75 inches height.

5.(a)(3) Drawings

The packaging is constructed in accordance with Packaging Technology, Inc., Drawing No. 2077-500 SNP, Sheets 1 through 11, Rev. V. The contents are positioned within the packaging in accordance with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC), Rev. 2, Section 2.9, "Payload Container/Assembly Configuration Specifications." The standard pipe overpack is constructed and assembled in accordance with Packaging Technology, Inc., Drawing No. 163-001, Rev. 6. The S100 pipe overpack is constructed and assembled in accordance with Packaging Technology, Inc., Drawing No. 163-002, Rev. 4. The S200 pipe overpack is constructed and assembled in accordance with Packaging Technology, Inc., Drawing No. 163-003, Rev. 3. The S300 pipe overpack is constructed and assembled in accordance with Packaging Technology, Inc., Drawing No. 163-004, Sheet 1, Rev. 1. The compacted puck drum spacers needed for the purpose of maintaining subcriticality in 55-, 85-, and 100-gallon drums are constructed and assembled in accordance with Drawing No. 163-006, Rev. 0.

(b) Contents

(1) Type and form of material

Dewatered, solid or solidified transuranic and tritium-contaminated materials and wastes. Materials must be packaged in one of the following payload containers: a 55-gallon drum, an 85-gallon drum, a 100-gallon drum, a standard waste box (SWB), a standard pipe overpack, an S100 pipe overpack, an S200 pipe overpack, an S300 pipe overpack, or ten-drum overpack (TDOP). The payload containers are described in CH-TRAMPAC, Rev. 2, Section 2.9, "Payload Container/Assembly Configuration Specifications." Materials must be restricted to prohibit explosives, corrosives, nonradioactive pyrophorics and pressurized containers. Within a payload container, radioactive pyrophorics must not exceed 1 percent by weight, and free liquids must not exceed 1 percent by volume. Flammable organics and methane are limited along with hydrogen to ensure the absence of flammable gas mixtures in TRU waste payloads as described in Chapter 5.0 of CH-TRAMPAC, Rev. 2. For payloads of content code LA 154 and SQ 154, the absence of flammable gas mixtures is ensured as described in Appendix 6.12 of the CH-TRU Payload Appendices, Rev. 1. For payload configurations with an unvented heat-sealed bag layer, the absence of flammable gas mixtures is ensured as described in Appendix 6.13 of the CH-TRU Payload Appendices, Rev. 1.

(2) Maximum quantity of material per package

Contents not to exceed 7,265 pounds including shoring and secondary containers. The maximum gross weight for a payload container not to exceed the following:

(I) 1,000 pounds per 55-gallon drum,
(ii) 328 pounds per 6-inch standard pipe overpack,
(iii) 547 pounds per 12-inch standard pipe overpack,
(iv) 550 pounds per S100 pipe overpack,
(v) 547 pounds per S200 pipe overpack,
(vi) 547 pounds per S300 pipe overpack,
(vii) 1,000 pounds per 85-gallon drum,

(viii) 1,000 pounds per 100-gallon drum,
(ix) 4,000 pounds per SWB, or
(x) 6,700 pounds per TDOP.

5.(b)(2) Maximum quantity of material per package (continued)

Maximum number of payload containers per package and authorized packaging configurations are as follows:

(I) 14 55-gallon drums,
(ii) 14 standard pipe overpacks,
(iii) 14 S100 pipe overpacks,
(iv) 14 S200 pipe overpacks,
(v) 14 S300 pipe overpacks,
(vi) 8 85-gallon drums,
(vii) 6 100-gallon drums,
(viii) 2 SWBs, or
(ix) 1 TDOP.

Fissile material not to exceed the limits specified in CH-TRAMPAC, Rev. 2, Section 3.1, "Nuclear Criticality."

The S100, S200, and S300 pipe overpack payloads shall meet the curie limits specified in CH-TRAMPAC, Rev. 2, Section 3.3, "Activity Limits."

Maximum decay heat per package not to exceed 40 watts. Decay heat per payload container not to exceed the values given in CH-TRAMPAC, Rev. 2, Table 5.2-1, "List of Approved Alpha-numeric Shipping Categories, Maximum Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages," or calculated for approved shipping categories in accordance with the methodology specified in Section 5.2.3 of CH-TRAMPAC, Rev. 2. For content code LA 154 and SQ 154 payloads, decay heat per payload container not to exceed the values specified in Appendix 6.12 of CH-TRU Payload Appendices.

5. (c) Criticality Safety Index: 0.0

6. Physical form, chemical properties, chemical compatibility, configuration of waste containers and contents, isotopic inventory, fissile content, decay heat, weight, center of gravity, and radiation dose rate must be determined and limited in accordance with CH-TRAMPAC, Rev. 2.

7. Each payload container must be assigned to a shipping category in accordance with CH-TRAMPAC, Rev. 2, Section 5.1, "Payload Shipping Category." For a payload assembly made up of payload containers with the same shipping categories, each payload container and payload assembly must not exceed the allowable wattage in accordance with CH-TRAMPAC, Rev. 2, Section 5.2.3, "Hydrogen Gas Generation Rate and Decay Heat Limits for analytical category" or must be tested for gas generation in accordance with CH-TRAMPAC, Rev. 2, Section 5.2.5, "Unified Flammable Gas Test Procedure." For a payload made up of payload containers with different (nonequivalent) shipping categories, the flammability index of each payload container must not exceed 50,000 in accordance with CH-TRAMPAC, Rev. 2, Section 6.2.4, "Mixing of Shipping Categories," and Appendix 2.4 of the CH-TRU Payload Appendices, "Mixing of Shipping Categories

and Determination of the Flammability Index." Each content code LA 154 and SQ 154 payload container must be assigned to a shipping category in accordance with Appendix 6.12 of CH-TRU Payload Appendices. Content code LA 154 payload containers may only be assembled with other payload containers belonging to content code LA 154 or dunnage in accordance with Appendix 6.12 of CH-TRU Payload Appendices. For a payload of content code LA 154 or SQ 154 containers with different shipping categories, the flammability index of each payload container must not exceed 50,000 in accordance with Appendix 6.12 of CH-TRU Payload Appendices.

8. Payload containers within a package shall be selected in accordance with CH-TRAMPAC, Rev. 2, Section 6.0, "Payload Assembly Requirements." Payload containers of content code LA 154 shall be assembled in accordance with Appendix 6.12 of CH-TRAMPAC, Rev. 2.

9. Each payload container must be vented in accordance with Section 2.5, "Filter Vents," of the CH-TRAMPAC, Rev. 2. Drums which were not equipped with filtered vents during storage must be aspirated in accordance with CH-TRAMPAC, Rev. 2, Section 5.3, "Venting and Aspiration."

10. For close-proximity and controlled shipments meeting the conditions specified in Appendices 3.5 and 3.6, respectively, of CH-TRU Payload Appendices, shipping periods of 20 days and 10 days may be applicable. The shipping period for any mode of transport is not to exceed 60 days. For content code LA 154 and SQ 154 shipments, the shipping period as defined in Appendix 6.12 of the CH-TRU Payload Appendices is not to exceed 5 and 10 days, respectively.

11. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) Each package must be prepared for shipment and operated in accordance with the procedures described in Chapter 7.0, "Operating Procedures," of the application, as supplemented. For content code LA 154 payloads, each package must be prepared for shipment and operated in accordance with the procedures described in Chapter 7.0 of the application, as modified by Appendix 6.12 of CH-TRU Payload Appendices.

    (b) Each package must be tested and maintained in accordance with the procedures described in Chapter 8.0, "Acceptance Tests and Maintenance Program," of the application, as supplemented.

    (c) Prior to each shipment, the lid and vent port seals on the inner and outer containment vessels must be leak tested in accordance with Sections 7.1.5 and 7.1.6 of the Safety Analysis Report.

    (d) All free standing water must be removed from the inner containment vessel cavity and the outer containment vessel cavity before shipment.

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

Expiration date: August 31, 2009.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9218	18	71-9218	USA/9218/B(U)F-85	5	OF	5

REFERENCES

Washington TRU Solutions, LLC, October 4, 2004 and March 4 and June 8, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Michael T. Markley

Michael T. Markley, Acting Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

UNITED STATES NUCLEAR REGULATORY COMMISSION

Date: 07/19/2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9221	5	71-9221	USA/9221/B( )F	1	OF	3

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20585

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Safety Analysis for Radioactive Material Shipping Cask NRBK-41 dated November 2, 1995, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: NRBK-41

(2) Description

Top loading cylindrical lead-shielded 304L stainless steel clad casks for the shipment of irradiated test specimens. The cask has an outside diameter of 27.16 inches and is 40 inches high. The outer shell is 1/2-inch thick stainless steel. The cask cavity is 5 inches in diameter by 16 inches deep and is provided with a bottom drain. The cavity shell is 1/4-inch thick stainless steel and is shielded by 10 inches of lead. The cask is closed by a lead-filled flanged plug fitted with an elastometer O-ring gasket and bolted closure. The cask has a seal-welded, 1/4-inch thick stainless steel outer thermal shield which provides a 1/16-inch air gap between the outer surface of the cask outer shell and the inside surface of the thermal shield. A one-inch thick stainless steel plate is welded to the bottom of cask. A second one-inch thick stainless steel plate with a 1/8-inch deep, 25.5-inch diameter recess is welded to the first plate to provide a thermal shield for the bottom surface of the cask. The cask is bolted to a 48-inch square, all welded, "I" beam skid. Gross weight of the package is approximately 9,000 pounds.

(3) Drawings

The packaging is constructed in accordance with Battelle Memorial Institute Drawing No. 41-0001, Sheet 1, Rev. D, and Sheet 2, Rev. E, and Westinghouse Electric Corporation Drawing No. 1755E01, Rev. D.

5. (b) Contents

(1) Type and form of material

Byproduct and special nuclear material in solid form, contained within either the MIN-41 or the HIP-41 product containers. The MIN-41 container is constructed in accordance with Westinghouse Electric Corporation, Drawing No. 2D77456 Rev. F. The HIP-41 product container is constructed in accordance with Westinghouse Electric Corporation Drawing No. 5D06622, Rev. B.

For contents exceeding a Type A quantity, the radioactive material must be contained within a specimen with intact, undamaged cladding.

(2) Maximum quantity of material per package

The fissile contents of the package must be limited to a maximum of 350 equivalent grams of U-235. The number of equivalent grams of U-235 is determined by the equation: 1.0 x grams U-235 + 1.4 x grams U-233 + 1.6 x grams plutonium. The maximum decay heat load per package must not exceed 240 Btu/hr.

Plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy or reactor fuel elements.

The total quantity of radioactive material in the form of loose surface contamination within the package must not exceed a Type A quantity.

5. (c) Criticality Safety Index: 0.0

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The package must be operated in accordance with the Operating Procedures in Section 7.0 of the application, as supplemented.

(b) The package must be maintained in accordance with the Maintenance Procedures in Section 8.2 of the application, as supplemented.

7. The NRBK-41 shipping container may be covered with a wrapping of polyvinyl chloride (PVC) during shipment provided the shipment is made in a closed vehicle. The applicable requirements of 10 CFR §71.87 must be satisfied prior to wrapping the shipping container.

8. Expiration date: October 1, 2008.

REFERENCES

Safety Analysis for Radioactive Material Shipping Cask No. NRBK-41 dated November 2, 1995.

Supplements: Naval Reactors letters S#96-11965 dated August 28, 1996, S#01-10827 dated March 16, 2001, S#06-01881 dated May 31, 2006, and S#06-03403 dated September 7, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: September 28, 2006

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

NAC International, Inc.
3930 East Jones Bridge Road
Norcross, GA 30092

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

NAC International, Inc., application dated January 15, 2008, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No.: NAC-LWT

(2) Description

The LWT is a steel-encased, lead-shielded shipping cask. The cask is designed to transport various radioactive contents as listed in 5.(b)(1). The overall dimensions of the package, with impact limiters, are 232 inches long by 65 inches in diameter. The cask body is approximately 200 inches in length and 44 inches in diameter. The cask cavity is 178 inches long and 13.4 inches in diameter. The volume of the cavity is approximately 14.5 cubic feet.

The cask body consists of a 0.75-inch-thick stainless steel inner shell, a 5.75-inch-thick lead gamma shield, a 1.2-inch-thick stainless steel outer shell, and a neutron shield tank. The inner and outer shells are welded to a 4-inch-thick stainless steel bottom end forging. The cask bottom consists of a 3-inch-thick, 20.75-inch-diameter lead disk enclosed by a 3.5-inch-thick stainless steel plate and bottom end forging. The cask lid is 11.3-inch-thick stainless steel stepped design, secured to a 14.25-inch-thick ring forging with twelve 1-inch diameter bolts. The cask seal is a metallic O-ring. A second teflon O-ring and a test port are provided to leak test the seal. Other penetrations in the cask cavity include the fill and drain ports, which are sealed with port covers and O-rings.

The neutron shield tank consists of a 0.24-inch-thick stainless steel shell with 0.50-inch-thick end plates. The neutron shield region is 164 inches long and 5 inches thick. The neutron shield tank contains an ethylene glycol/water solution that is 1% boron by weight.

The cask is equipped with aluminum honeycomb impact limiters. The top impact limiter has an outside diameter of 65.25 inches and a maximum thickness of 27.8 inches. The bottom impact limiter has an outside diameter of 60.25 inches and maximum thickness of 28.3 inches. Both impact limiters extend 12 inches along the side of the cask body.

5.(a)(2) Description (continued)

The maximum weight of the package is 52,000 pounds and the maximum weight of the contents and basket is 4,000 pounds.

(3) Drawings

(i) The packaging is constructed in accordance with the following Nuclear Assurance Corporation Drawings:

LWT 315-40-01, Rev. 7	Cask Assembly
LWT 315-40-02, Rev. 22 (Sheets 1-2)	Body Assembly
LWT 315-40-03, Rev. 22 (Sheets 1-7)*	Transport Cask Body
LWT 315-40-04, Rev. 10	Cask Lid Assembly
LWT 315-40-05, Rev. 9	Upper Impact Limiter
LWT 315-40-06, Rev. 9	Lower Impact Limiter
LWT 315-40-08, Rev. 17 (Sheets 1-5)	Cask Parts Detail

* Packaging Unit Nos. 1, 2, 3, 4, and 5 are constructed in accordance with Drawing No. LWT 315-40-03, Rev. 6 (Sheets 1-6).

(ii) The fuel assembly baskets are constructed in accordance with the following Nuclear Assurance Corporation and NAC International Drawings:

LWT 315-40-09, Rev. 2	PWR Basket Spacer
LWT 315-40-10, Rev. 7 (Sheets 1-2)	PWR Basket
LWT 315-40-11, Rev. 2	BWR Basket Assembly
LWT 315-40-12, Rev. 3	Metal Fuel Basket Assembly
LWT 315-40-045, Rev. 4	42 MTR Element Base Module
LWT 315-40-046, Rev. 4	42 MTR Element Intermediate Module
LWT 315-40-047, Rev. 4	42 MTR Element Top Module
LWT 315-40-048, Rev. 3	42 MTR Element Cask Assembly
LWT 315-40-049, Rev. 4	28 MTR Element Base Module
LWT 315-40-050, Rev. 4	28 MTR Element Intermediate Module
LWT 315-40-051, Rev. 4	28 MTR Element Top Module
LWT 315-40-052, Rev. 3	28 MTR Element Cask Assembly
LWT 315-40-070, Rev. 4	7 Cell Basket TRIGA Base Module
LWT 315-40-071, Rev. 4	7 Cell Basket TRIGA Intermediate Module
LWT 315-40-072, Rev. 4	7 Cell Basket TRIGA Top Module
LWT 315-40-079, Rev. 5	Transport Cask Assembly, 120 TRIGA Fuel Elements or 480 Cluster Rods
LWT 315-40-080, Rev. 2	7 Cell Poison Basket TRIGA Base Module
LWT 315-40-081, Rev. 2	7 Cell Poison Basket TRIGA Intermediate Module
LWT 315-40-082, Rev. 2	7 Cell Poison Basket TRIGA Top Module
LWT 315-40-083, Rev. 0	Spacer, LWT Cask Assembly TRIGA Fuel
LWT 315-40-084, Rev. 4	LWT Transport Cask Assy, 140 TRIGA Elements

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5.(a)(3)(ii) Drawings (continued)

LWT 315-40-085, Rev. 0	Axial Fuel and Cell Block Spacers, MTR, and TRIGA Fuel Baskets
LWT 315-40-090, Rev. 2	35 MTR Element Base Module
LWT 315-40-091, Rev. 2	35 MTR Element Intermediate Module
LWT 315-40-092, Rev. 2	35 MTR Element Top Module
LWT 315-40-094, Rev. 4	35 MTR Element Cask Assembly
LWT 315-40-096, Rev. 3	Fuel Cluster Rod Insert, TRIGA Fuel
LWT 315-40-098, Rev. 3 (Sheets 1-2)	Can Assembly, LWT Pin Shipment
LWT 315-40-099, Rev. 3 (Sheets 1-3)	Can Weldment, PWR/BWR Transport Canister
LWT 315-40-100, Rev. 3 (Sheets 1-3)	Lids, PWR/BWR Transport Canister
LWT 315-40-101, Rev. 0	4 x 4 Insert, PWR/BWR Transport Canister
LWT 315-40-102, Rev. 1	5 x 5 Insert, PWR/BWR Transport Canister
LWT 315-40-103, Rev. 0	Pin Spacer, PWR Transport Canister
LWT 315-40-104, Rev. 3 (Sheets 1-2)	LWT Cask Assembly, PWR/BWR Rod Transport Canister
LWT 315-40-105, Rev. 3 (Sheets 1-2)	PWR Insert, PWR/BWR Transport Canister
LWT 315-40-106, Rev. 1 (Sheets 1-3)	MTR Plate Canister, LWT Cask
LWT 315-40-108, Rev. 1 (Sheets 1-3)	7 Cell Basket, Top Module, DIDO Fuel
LWT 315-40-109, Rev. 1 (Sheets 1-3)	7 Cell Basket, Intermediate Module, DIDO Fuel
LWT 315-40-110, Rev. 1 (Sheets 1-3)	7 Cell Basket, Bottom Module, DIDO Fuel
LWT 315-40-111, Rev. 1	LWT Transport Cask Assy DIDO Fuel
LWT 315-40-113, Rev. 0	Spacer, Top Module DIDO Fuel
LWT 315-40-120, Rev. 2 (Sheets 1-3)	Top Module, General Atomics IFM, LWT Cask
LWT 315-40-123, Rev. 1 (Sheets 1-2)	Spacer, General Atomics IFM, LWT Cask
LWT 315-40-124, Rev. 1	Transport Cask Assembly, General Atomics IFM, LWT Cask
LWT 315-40-125, Rev. 3 (Sheets 1-3)	Transport Cask Assembly, Framatome/EPRI, LWT Cask
LWT 315-40-126, Rev. 2 (Sheets 1-2)	Weldment, Framatome/EPRI, LWT Cask
LWT 315-40-127, Rev. 2 (Sheets 1-2)	Spacer Assembly, TPBAR Shipment
LWT 315-40-129, Rev. 1	Canister Body Assembly, Failed Fuel Can, PULSTAR
LWT 315-40-130, Rev. 1	Assembly, Failed Fuel Can, PULSTAR
LWT 315-40-133, Rev. 1 (Sheets 1-2)	Transport Cask Assembly, PULSTAR Shipment, LWT Cask
LWT 315-40-134, Rev. 1	Body Weldment, Screened Fuel Can, PULSTAR Fuel
LWT 315-40-135, Rev. 1	Assembly, Screened Fuel Can, PULSTAR Fuel
LWT 315-40-139, Rev. 0	Transport Cask Assembly, ANSTO Fuel
LWT 315-40-140, Rev. 0 (Sheets 1-2)	Weldment, 7 Cell Basket, Top Module, ANSTO Fuel

5.(a)(3)(ii) Drawings (continued)

LWT 315-40-141, Rev. 0 (Sheets 1-2)	Weldment, 7 Cell Basket, Intermediate Module, ANSTO Fuel
LWT 315-40-142, Rev. 0 (Sheets 1-2)	Weldment, 7 Cell Basket, Base Module, ANSTO Fuel
LWT 315-40-145, Rev. 0 (Sheets 1-2)	Irradiated Hardware, Lid Spacer, LWT Cask

5.(b) Contents

(1) Type and form of material

All contents listed include both unirradiated and irradiated conditions.

(i) PWR fuel assemblies. The maximum fuel assembly weight is 1650 pounds, the maximum average burnup is 35,000 MWd/MTU, the minimum cool time is 2 years, and the maximum initial fuel pin pressure at 70°F is 565 psig. The fuel assemblies consist of uranium dioxide pellets within zirconium alloy type cladding, with the specifications listed below, and with fuel rod pitch, rod diameter, clad thickness, and pellet diameter as described in Table 1.2-5, of the application.

Fuel Type	No. Fuel Rods	Max. Initial Uranium Enrichment (w/o U-235)	Max. Initial Uranium Mass (MTU)	Max. Active Fuel Length (in.)
B&W 15x15	208	3.5	0.4750	144.0
B&W 17x17	264	3.5	0.4658	143.0
CE 14x14	176	3.7	0.4037	137.0
CE 16x16	236	3.7	0.4417	150.0
WE 14x14 Std	179	3.7	0.4144	145.2
WE 14x14 OFA	179	3.7	0.3612	144.0
WE 15x15	204	3.5	0.4646	144.0
WE 17x17 Std	264	3.5	0.4671	144.0

5.(b)(1)(i) PWR fuel assemblies. (continued)

WE 17x17 OFA	264	3.5	0.4282	144.0
Ex/ANF 14x14 WE	179	3.7	0.3741	144.0
Ex/ANF 14x14 CE	176	3.7	0.3814	134.0
Ex/ANF 15x15 WE	204	3.7	0.4410	144.0
Ex/ANF 17x17 WE	264	3.5	0.4123	144.0

(ii) BWR fuel assemblies. The maximum fuel assembly weight is 750 pounds, the maximum average burnup is 30,000 MWd/MTU, the minimum cool time is 2 years, and the maximum initial fuel pin pressure at 70°F is 565 psig. The fuel assemblies consist of uranium dioxide pellets within zirconium alloy type cladding, with the specifications listed below, and with fuel rod pitch, rod diameter, clad thickness, and pellet diameter as described in Table 1.2-6, of the application.

Fuel Type	No. Fuel Rods	No. Water Rods	Max. Initial Uranium Enrichment (w/o U-235)	Max. Initial Uranium Mass (MTU)	Max. Active Fuel Length (in.)
GE 7x7	49	0	4.0	0.1923	146
GE 8x8-1	63	1	4.0	0.1880	146
GE 8x8-2	62	2	4.0	0.1847	150 (1)
GE 8x8-4	60	4	4.0	0.1787	150 (1,2)
GE 9x9	74	2	4.0	0.1854	150 (1,3,4)
	79	2	4.0	0.1979	150 (1,4)
Ex/ANF 7x7	49	0	4.0	0.1960	144
Ex/ANF 8x8-1	63	1	4.0	0.1764	145.2
Ex/ANF 8x8-2	62	2	4.0	0.1793	150
Ex/ANF 9x9	79	2	4.0	0.1779	150
	74	2	4.0	0.1666	150 (3)

(1) Six-inch natural uranium blankets on top and bottom.
(2) One large water hole - 3.2 cm ID, 0.1 cm thickness.
(3) Two large water holes occupying seven fuel rod locations - 2.5 cm ID, 0.07 cm thickness.
(4) Shortened active fuel length in some rods.

5.(b)(1) Type and form of material (continued)

(iii) Deleted.

(iv) MTR fuel elements composed of U-Al, U_3O_8-Al, or U_3Si_x-Al positioned within the MTR fuel basket specified in 5.(a)(3)(ii). Loose fuel plates must meet the requirements of the MTR fuel element content tables and must be loaded into an MTR plate canister prior to shipment. The fuel elements are composed of aluminum clad plates, with initial uranium enrichment up to 94.0 weight percent U-235. The maximum burnup and the minimum cool time shall be consistent with the decay heat limits in Item 5.(b)(2)(iv) and shall be determined using the operating procedures in Section 7.1.5 of the application.

NISTR MTR fuel elements specifications are listed in Item 5.(b)(1)(iv)(a), generic MTR fuel elements are listed in Item 5.(b)(1)(iv)(b), and expanded fuel specifications applicable to LEU MTR fuel (up to 25.0 wt % ^{235}U) are listed in Items 5.(b)(1)(iv)(c) and 5.(b)(1)(iv)(d).

(a) NISTR MTR Fuel Content Description

Parameter	Plate	Plate (cut in half)
Enrichment, wt % ^{235}U	≤94	
Number of fuel plates	≤17	≤34
^{235}U content per plate	≤22	≤11
Plate thickness (cm)	≥0.115	
Clad Thickness (cm)	≥0.02	
Active fuel width (cm)	≤6.6	
Active fuel height (cm)	≥54 cm	27 to 30
Maximum ^{235}U content per element (g)	≤380	

5.(b)(1) Type and form of material (continued)

(iv) (b) Generic MTR Fuel Content Description

Parameter	Limiting Values[2]					
Enrichment, wt. % ^{235}U	≤94					
Number of fuel plates	≤23	≤19	≤23[1]	≤17	≤19	≤23
^{235}U content per plate	≤18	≤20	≤20[1]	≤21	≤21	≤16.5
Plate thickness (cm)	≥0.115	≥0.115	≥0.123[1]	≥0.115	≥.200	≥0.115
Clad Thickness (cm)	≥0.02					
Active fuel width (cm)	≤6.6	≤6.6	≤6.6	≤6.6	≤6.6	≤7.3
Active fuel height (cm)	≤56					
^{235}U content per element (g)	≤380[2]					

Notes:

1. HEU (>90 wt% ^{235}U enriched) MTR fuel having 23 plates with up to 20 g of ^{235}U per plate, with a minimum plate thickness of 0.123 cm, must have at least 2.0 cm of non-fuel material at the ends of each element. This fuel may also be loaded up to 460 g ^{235}U per element.

2. At enrichments ≤25 wt% ^{235}U, MTR fuel elements with extended fuel characteristics may be loaded with the specifications defined in 5.(b)(1)(iv)(c).

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9225	49	71-9225	USA/9225/B(U)F-96	8	OF	27

5.(b)(1) Type and form of material (continued)

(iv) (c) Expanded LEU MTR Fuel Content Description

Parameter	Base	≤7.0 cm Active Fuel Width			≤7.1 cm Active Fuel Width		≤7.15 cm Active Fuel Width		
Enrichment, wt. % ^{235}U	≤25	≤25			≤25		≤25		
Number of fuel plates	≤23	≤23			≤17	≤23	≤22	≤23	≤23
^{235}U content per plate	≤22	≤22	≤22	≤21.5	≤22		≤22	≤21.5	≤22
Plate thickness (cm)	≥0.115	≥0.119	≥0.115	≥0.115	≥0.115	≥0.200	≥0.119		
Clad Thickness (cm)	≥0.02								
Active fuel width (cm)	≤6.6	≤7.0			≤7.1		≤7.15		
Active fuel height (cm)	≥56	≥56	≥63	≥56	≥56		≥56	≥56	≥61
^{235}U content per element (g)	≤420	≤470			≤470		≤470		

5.(b)(1) Type and form of material (continued)

(iv) (d) Expanded LEU MTR Fuel Content Description for High Fissile Material Mass

Parameter	Limiting Value
Enrichment, wt.% ^{235}U	≤25
Number of fuel plates	≤23
^{235}U content per plate (g)	≤32
Plate thickness (cm)	≥0.115
Clad thickness (cm)	≥0.02
Active fuel width (cm)	≤7.3
Active fuel height (cm)	≥56
^{235}U content per element (g)	≤640

(v) Metallic fuel rods containing natural enrichment uranium pellets with aluminum cladding 0.080-inches thick. The fuel pellet diameter is 1.36 inches and the maximum fuel rod length is 120.5 inches. The maximum weight of uranium per rod is 54.5 Kg with a maximum average burnup of 1,600 MWd/MTU and a minimum cooling time of one year.

(vi) TRIGA damaged and undamaged fuel elements - TRIGA fuel elements that have a cladding breach that allows the escape of gas or intrusion of water are considered damaged and will be loaded and transported in a sealed damaged fuel can.

5.(b)(1) Type and form of material (continued)

(vi) (a) TRIGA fuel elements acceptable for loading in the poisoned TRIGA basket and meeting the following specifications:

	TRIGA HEU (Notes 1, 2, 6, & 7)	TRIGA LEU (Notes 1, 2, 6, & 7)	TRIGA LEU (Notes 1, 2, 6, & 7)
Fuel Form	Clad U-ZrH rod	Clad U-ZrH rod	Clad U-ZrH rod
Maximum Element Weight, lbs	13.2	13.2	13.2
Maximum Element Length, in	47.74	47.74	47.74
Element Cladding	Stainless Steel	Stainless Steel	Aluminum
Clad Thickness, in	0.02	0.02	0.03
Active Fuel Length, in	15	15	14-15 (Note 4)
Element Diameter, in	1.478 max.	1.478 max.	1.47 max.
Fuel Diameter, in	1.435 max.	1.435 max.	1.41 max.
Maximum Initial U Content/Element, kilograms	0.196	0.845	0.205
Maximum Initial ^{235}U Mass, grams	137	169	41
Maximum Initial ^{235}U Enrichment, weight percent	70	20	20
Zirconium Mass, grams (Note 5)	2060	1886 – 2300	2300
Hydrogen to Zirconium Ratio, max. (Note 5)	1.6	1.7	1.0
Maximum Average Burnup, MWd/MTU	460,000 (80% ^{235}U)	151,100 (80% ^{235}U)	151,100 (80% ^{235}U)
Minimum Cooling Time	90 days (Note 3)	90 days (Note 3)	90 days (Note 3)

Notes:
1. Mixed TRIGA LEU and HEU contents authorized.
2. TRIGA Standard, instrumented and fuel follower control rod type elements authorized.
3. Maximum decay heat of any element is 7.5 watts.
4. Aluminum clad fuel with 14 inch active fuel is solid and has no central hole with a zirconium rod.
5. Zirconium mass and H/Zr ratio apply to the fuel material (U-Zr-H_x) and do not include the center zirconium rod.
6. Listed TRIGA fuel elements have a 0.225-inch diameter zirconium rod in the center.
7. Dimensions listed are as-fabricated (unirradiated) nominal values.

5.(b)(1) Type and form of material (continued)

(vi) (b) TRIGA fuel elements acceptable for loading in the nonpoisoned TRIGA basket and meeting the following specifications:

	TRIGA HEU (Notes 1, 2, & 6)	TRIGA LEU (Notes 1, 2, & 6)	TRIGA LEU (Notes 1, 2, & 6)
Fuel Form	Clad U-ZrH rod (Note 4)	Clad U-ZrH rod (Note 4)	Clad U-ZrH rod (Note 4)
Maximum Element Weight, lbs	13.2	13.2	13.2
Maximum Element Length, in	47.74	47.74	47.74
Element Cladding	Stainless Steel	Stainless Steel	Aluminum
Minimum Clad Thickness, in	0.01	0.01	0.01
Maximum Element Diameter, in	1.5 max.	1.5 max.	1.5 max.
Active Fuel Length, in	15	15	15
Maximum Initial U Content/Element, kilograms	0.196	0.845	0.205
Maximum Initial ^{235}U Mass, grams	137	169	41
Maximum Initial ^{235}U Enrichment, weight percent	70	20	20
Hydrogen to Zirconium Ratio, max. (Note 5)	2.0	2.0	2.0
Maximum Average Burnup, MWd/MTU	460,000 (80% ^{235}U)	151,100 (80% ^{235}U)	151,100 (80% ^{235}U)
Minimum Cooling Time	90 days (Note 3)	90 days (Note 3)	90 days (Note 3)

Notes:
1. Mixed TRIGA LEU and HEU contents authorized.
2. TRIGA Standard, instrumented and fuel follower control rod type elements authorized.
3. Maximum decay heat of any element is 7.5 watts.
4. Element may contain a zirconium rod in the center.
5. H/Zr ratio applies to the fuel material (U-Zr-H_x) and does not include the center zirconium rod.
6. Dimensions listed are as-fabricated (unirradiated) nominal values.

5.(b)(1) Type and form of material (continued)

(vii) TRIGA fuel cluster rods. TRIGA HEU fuel cluster rods have a maximum average burnup of 600,000 MWd/MTU (80% ^{235}U depletion) and a minimum cooling time of 90 days. TRIGA LEU fuel cluster rods have a maximum average burnup of 140,000 MWd/MTU (80% ^{235}U depletion) and a minimum cooling time of 90 days. TRIGA fuel cluster rods must meet the following specifications prior to irradiation:

	TRIGA Fuel Cluster Rods	
	HEU	LEU
Fuel Form	Clad U-ZrH rod	
Maximum Rod Weight, lbs	1.5	
Maximum Rod Length, in	31	
Rod Cladding	Incoloy 800	
Minimum Clad Thickness, in	0.015	
Maximum Active Fuel Length, in	22.5	
Maximum Fuel Pellet Diameter, in	0.53	
Maximum U Content/Rod, grams	48.6	289.5
Maximum ^{235}U Mass, grams	45.4	55
Maximum ^{235}U Enrichment weight percent	93.3	20
Maximum Zirconium Mass, grams	421	357
Hydrogen to Zirconium Ratio, max.	1.7	

NOTE: TRIGA fuel cluster rods that have a cladding breach that allows the escape of gas or intrusion of water are considered damaged and will be loaded and transported in a sealed damaged fuel can.

(viii) High burnup PWR rods, consisting of uranium dioxide pellets within zirconium alloy type cladding. The maximum uranium enrichment is 5 weight percent U-235, the maximum active fuel length is 150 inches, and the maximum pellet diameter is 0.3765 inches. The maximum burnup is 80,000 MWd/MTU, and the minimum cool time is 150 days.

5.(b)(1) Type and form of Material (continued)

(ix) High burnup BWR rods, consisting of uranium dioxide pellets within zirconium alloy type cladding. The maximum uranium enrichment is 5 weight percent U-235, the maximum active fuel length is 150 inches, and the maximum pellet diameter is 0.490 inch. The maximum burnup is 80,000 MWd/MTU and the minimum cool time is between 150 - 270 days, as specified in the table below:

BWR Fuel Type Array Size	Burnup, b (GWd/MTU)	Minimum Cool Time (days)
7 x 7	$b \leq 60$ $60 < b \leq 70$ $70 < b \leq 80$	210 240 270
8 x 8[1]	$b \leq 80$	150

Note 1: Includes rods from all larger BWR assembly arrays (e.g., 9 x 9, 10 x 10)

(x) DIDO fuel elements composed of U-Al, U_3O_8-Al, or U_3Si_x-Al positioned within the DIDO fuel basket specified in 5.(a)(3)(ii). The fuel elements are composed of four concentric tubes of varying diameters. The fuel elements have an initial enrichment up to 94.0 weight percent U-235. The fuel elements shall have the specifications listed below:

Parameter	LEU[(1)]	MEU[(1)]	HEU[(1)]
Maximum ^{235}U content per Element	≤ 190 g	≤ 190 g	≤ 190 g
Maximum Uranium content per Element	≤ 1000 g	≤ 475.0 g	≤ 211.1g
Minimum Fuel Tube Thickness	0.130 cm	0.130 cm	0.130 cm
Minimum Clad Thickness	0.025 cm	0.025 cm	0.025 cm
Maximum Outer Diameter	9.535 cm	9.535 cm	9.535 cm
Minimum Inner Diameter	5.88 cm	5.88 cm	5.88 cm
Minimum Initial Enrichment	19 wt% ^{235}U	40 wt% ^{235}U	90 wt% ^{235}U

1 The maximum burnup and minimum cool time shall be consistent with the decay heat limits in Item 5.(b)(2)(ix) and shall be determined using the operating procedures in Section 7.1.4 of the application.

5.(b)(1) Type and form of material (continued)

(xi) General Atomics (GA) Irradiated Fuel Material (IFM) consisting of two separate types of fuel materials: (a) High Temperature Gas Cooled Reactor (HTGR); and (b) Reduced-Enrichment Research and Test Reactor (RERTR) type TRIGA fuel entities.

(a) GA HTGR IFM comprised of four forms: fuel particles (kernels), fuel particles (coatings), fuel compacts (rods), and fuel pebbles. Fuel particles (kernels) are solid, spheridized, high-temperature sintered fully-densified, ceramic kernel substrate, composed of UO_2, UCO_2, $(Th,U)C_2$, or $(Th,U)O_2$. Fuel particles (coatings) are solid , spheridized, isotropic, discrete multi-layered fuel particle coatings with chemical composition including pyrolitic-carbon (PyC) and silicon carbide (SiC). Fuel compacts (rods) are multi-coated ceramic fuel particles, bound in solid, cylindrical, injection molded, high-temperature heat-treated compacts which are composed of carbonized graphite shim, coke, and graphite powder. Fuel pebbles are multi-coated fuel particles, bound in solid, spherical injection-molded, high-temperature heat-treated pebbles composed of carbonized graphite shim, coke and graphite powder. Initial enrichment of the HTGR IFM varies from 10.0 to 93.15 wt% ^{235}U.

(b) GA RERTR IFM comprised of irradiated TRIGA fuel elements which contain three distinct mass loadings of uranium of 20, 30, and 45 wt% U. The average mass of the fuel portion of the elements is 551 g with a maximum initial enrichment of 19.7 wt% U-235.

GA IFM content description:

	GA HTGR IFM	GA RERTR IFM
Fuel material	UC_2, UCO, UO_2 $(Th,U)C_2$, $(Th,U)O_2$	U-ZrH metal alloy
Maximum fuel weight, lbs	23.52	23.73
Maximum overall length, in	n/a	29.92
Maximum active fuel length, in	n/a	22.05
Fuel rod cladding	n/a	Incoloy 800
Maximum Uranium, kg U	0.21	3.86
Maximum initial ^{235}U, wt%	93.15	19.7
Maximum Activity, Ci	483	2920

5.(b)(1) Type and form of material (continued)

(xii) Tritium-producing burnable absorber rods (TPBARs), as described in Section 1.2.3.6 of the application. Each TPBAR is approximately 153 inches in length and 0.381 inches in diameter and is stainless steel clad. The TPBARs contain lithium aluminate annular pellets, with an inner zircaloy liner and an outer nickel-plated zircaloy tube. Each TPBAR contains a maximum of 1.2 grams tritium. The minimum cool time is 30 days.

(xiii) Intact or damaged PULSTAR fuel elements, including fuel debris, pieces and nonfuel components of PULSTAR fuel assemblies as specified below.

Description	Value
Maximum Pellet Diameter (inch)	0.423
Minimum Element (Rod) Cladding Thickness (inch)	0.0185
Minimum Element (Rod) Diameter (inch)	0.470
Maximum Active Fuel Height (inch)	24.1
Nominal Element (Rod) Length (inch)	26.2
Nominal Assembly Length (inch)	38
Maximum Assembly or Loaded Can Weight (lb)	80
Maximum PULSTAR Can Content Weight (lb)	39.6
Maximum Enrichment (wt.% ^{235}U)	6.5
Maximum ^{235}U Content per Element (g)	33
No. of Elements (Rods) per Assembly	25
No. of Elements (Rods) per Can	≤25
Maximum Depletion (% ^{235}U)	45
Minimum Cooling Time (yrs)	1.5
Maximum Heat Load per Assembly (W)	30
Maximum Heat Load per Element (W)	1.2

[1] Damaged PULSTAR fuel elements, including fuel debris, pieces and nonfuel components of PULSTAR fuel assemblies must be loaded into a PULSTAR can. The contents of a PULSTAR can are restricted to the equivalent of the fuel material in 25 intact PULSTAR fuel elements and of the displaced volume of 25 intact PULSTAR fuel elements.

5.(b)(1) Type and form of material (continued)

(xiv) Intact, ANSTO fuel consisting of spiral fuel assemblies and MOATA plate bundles.

Spiral fuel assemblies consist of 10 curved uranium-aluminum alloy fuel plates between an inner and an outer aluminum shell, with the following fuel parameters:

Parameter	Limiting Values
Number of fuel plates per assembly	10
Maximum ^{235}U content per assembly (g)	160
Maximum enrichment (wt % ^{235}U)	85
Maximum assembly weight (lb)	18
Minimum plate thickness (cm)	0.124
Minimum active fuel height (cm)	59.075

MOATA plate bundles consist of uranium-aluminum alloy fuel plates with aluminum cladding, with the following specifications:

Parameter	Limiting Values
Maximum number of fuel plates per assembly	14
Maximum ^{235}U content per plate (g)	22.3
Maximum enrichment (wt % ^{235}U)	92
Maximum plate/spacer thickness (cm)	0.18
Maximum active fuel width (cm)	7.32
Maximum bundle weight (lb)	18

(xv) Segmented TPBARs and associated segmentation debris resulting from post-irradiation examination, as described in Section 1.2.3.6 of the application. Each equivalent TPBAR contains a maximum of 1.2 grams of tritium. The minimum cool time is 90 days.

(xvi) Solid, irradiated and contaminated fuel assembly structural or reactor internal component hardware, which may include fissile material, provided the quantity of fissile material does not exceed a Type A quantity and qualifies as an exempt quantity under 10 CFR 71.15.

(xvii) PWR MOX (mixed oxide) undamaged fuel rods consisting of uranium and plutonium dioxide pellets within zirconium alloy type cladding. The plutonium enrichment is 7.0 weight percent maximum and 2.0 weight percent minimum, the maximum active fuel rod length is 153.5 inches, and the maximum pellet diameter is 0.3765 inch. The maximum burnup is 62,500 MWd/MTHM and the minimum cool time is 90 days.

5.(b)(2) Maximum quantity of material per package

Not to exceed 4,000 pounds, including contents and fuel assembly basket or other internal support structure.

(i) For the contents described in Item 5.(b)(1)(i): one PWR assembly positioned within the PWR fuel assembly basket. Maximum decay heat not to exceed 2.5 kilowatts per PWR assembly.

(ii) For the contents described in Item 5.(b)(1)(ii): two BWR assemblies positioned within the BWR fuel assembly basket. Maximum decay heat not to exceed 1.1 kilowatts per BWR assembly.

(iii) Deleted.

(iv) For MTR fuel elements as described in Item 5.(b)(1)(iv):

Up to 42 fuel elements positioned within the MTR fuel assembly basket (7 fuel elements per basket module). Each of the MTR basket cell openings may contain a loose plate canister. The contents of each loose plate canister are limited to the number of fuel plates, dimensions, and masses that are equivalent to an intact MTR fuel element, as specified in Item 5.(b)(1)(iv).

(a) The maximum decay heat is not to exceed 1.26 kilowatts per package, with each MTR fuel assembly basket module not to exceed 210 watts.

(b) HEU, MEU, and LEU MTR fuel elements with decay heat not exceeding 30 watts per element may be loaded in any basket position.

(c) Mixed HEU, MEU, and LEU MTR contents, with decay heat limits as specified above, are authorized.

(d) MTR fuel elements with corrosion and/or mechanically damaged cladding are authorized, provided the total surface area of through-clad corrosion and/or mechanical damage does not exceed 2,775 cm^2 per package.

(e) For HEU-MTR fuel elements only, the center fuel element in any basket module is not to exceed 120 watts. The two exterior fuel elements vertically in-line with the center assembly for transport are not to exceed 70 watts.

(f) MTR fuel elements containing more than 470 g ^{235}U (more than 22 g ^{235}U per plate) are limited to up to four elements loaded in basket positions 4, 5, 6, and 7 of a seven-element basket per Figure 7.1-1 of the application. Basket positions 1, 2, and 3 are to be blocked by spacer hardware.

5.(b)(2) Maximum quantity of material per package (continued)

(v) For the contents described in Item 5.(b)(1)(v): up to 15 intact metallic fuel rods positioned within the appropriate basket. Maximum decay heat not to exceed 0.036 kilowatts per rod. Total weight of all rods not to exceed 1,805 pounds.

(vi) For failed metallic fuel rods of the type described in Item 5.(b)(1)(v):

(a) Up to six canisters containing one defective metallic fuel rod per canister. The canisters are 2.75-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D2, Rev. 10, and are placed in a six-hole liner as shown on Nuclear Assurance Corporation Drawing No. 315-040-43, Rev. 1. The maximum decay heat load for a defective metallic fuel rod is limited to 5 watts; or

(b) Up to three canisters containing either up to three defective metallic fuel rods per canister or up to 10 failed fuel filters per canister. The canisters are 4.00-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D1, Rev. 10, and are placed in a three-hole basket as shown on Nuclear Assurance Corporation Drawing No. 315-40-12, Rev. 3. The weight of the filters is limited to 125 pounds per canister. For canisters containing fuel rods, the maximum decay heat load is 15 watts per canister; and for canisters containing filters, the maximum decay heat load is 5 watts per canister.

5.(b)(2) Maximum quantity of material per package (continued)

(vii)(a) For TRIGA fuel elements as described in Item 5.(b)(1)(vi)(a):

Up to 140 intact fuel elements in the TRIGA fuel package with poisoned baskets. Up to four fuel elements per basket cell and up to seven cells per basket may be loaded. Damaged TRIGA fuel elements or fuel element debris (up to a total of two equivalent elements) shall be transported in a sealed damaged fuel can (one damaged fuel can per cell). The sealed cans are to be in accordance with NAC International Drawing Nos. 315-40-086, Rev. 1; 315-40-087, Rev. 5; and 315-40-088, Rev. 2.

Mixed intact and damaged fuel contents and fuel debris are authorized. Base and top fuel basket modules may contain intact fuel elements or sealed damaged fuel cans containing damaged fuel and fuel debris. A maximum of seven damaged fuel cans is authorized per top and base basket modules with a maximum of 14 per package. Intermediate fuel basket modules may contain only intact TRIGA fuel elements.

The maximum decay heat shall not exceed 7.5 watts per TRIGA fuel element (or equivalent for damaged fuel) and 1050 watts per package. The basket must be configured as shown in NAC International Drawing Nos. 315-40-080, Rev. 2, 315-40-081, Rev. 2 and 315-40-082, Rev. 2.

(vii)(b) For TRIGA fuel elements as described in Item 5.(b)(1)(vi)(b):

Up to 120 intact fuel elements in the TRIGA fuel package with non-poisoned basket. Up to four fuel elements per basket cell only loaded in the six periphery cells. TRIGA fuel elements or sealed cans may not be loaded in the center cell of the non-poisoned basket. Damaged TRIGA fuel elements or fuel debris (up to two equivalent elements) shall be transported in a sealed damaged fuel can (one damaged fuel can per cell). The sealed cans are to be in accordance with NAC International Drawing Nos. 315-40-086, Rev. 1, 315-40-087, Rev. 5, and 315-40-088, Rev. 2.

Mixed intact and damaged fuel contents and fuel debris are authorized. Base and top fuel basket modules may contain intact fuel elements or sealed damaged fuel cans containing damaged fuel or fuel debris. A maximum of six damaged fuel cans is authorized only in the periphery cells per top and base basket modules with a maximum of 12 per package. Intermediate fuel basket modules may contain only intact TRIGA fuel elements.

Maximum decay heat not to exceed 7.5 watts per TRIGA fuel element (or equivalent for damaged fuel) and 900 watts per package. Fuel may not be loaded in the center cell of the non-poisoned TRIGA fuel basket. The basket must be configured as shown in NAC International Drawing Nos. 315-070, 315-40-071, and 315-40-072.

5.(b)(2) Maximum quantity of material per package (continued)

(viii) For TRIGA fuel cluster rods as described in Item 5.(b)(1)(vii):

Maximum decay heat not to exceed 1.875 watts per TRIGA fuel cluster rod (or equivalent for failed fuel) and 1050 watts per package. TRIGA fuel cluster rods must be positioned in either the non-poisoned TRIGA fuel basket or in the poisoned TRIGA fuel basket. Fuel may not be loaded in the center cell of the non-poisoned TRIGA fuel basket. The non-poisoned basket must be configured as shown in NAC International Drawing Nos. 315-40-070, 315-40-071, and 315-40-072; and the poisoned basket must be configured as shown in NAC International Drawing Nos. 315-40-080, Rev. 2; 315-40-081, Rev. 2; 315-40-082, Rev. 2.

Up to 480 intact cluster rods per package in the non-poisoned TRIGA fuel baskets (up to six periphery cells loaded with 16 cluster rods each), and up to 560 intact cluster rods per package in the poisoned TRIGA fuel baskets (up to 7 total cells loaded with 16 cluster rods each). TRIGA fuel cluster rods must be positioned within the fuel rod inserts as shown on NAC International Drawing No. 315-40-096, Rev. 3.

Damaged TRIGA fuel cluster rods or cluster rod debris (up to six equivalent rods) shall be transported in a sealed damaged fuel can. The sealed cans are to be in accordance with NAC International Drawing Nos. 315-40-086, Rev. 1, 315-40-087, Rev. 5; and 315-40-088, Rev. 2.

Mixed intact and damaged fuel contents and fuel debris are authorized. Base and top fuel basket modules may contain intact fuel cluster rods or sealed DFCs. Intermediate fuel basket modules may contain only intact fuel cluster rods.

(ix) For high burnup PWR fuel rods, as described in Item 5.(b)(1)(viii): up to 25 fuel rods. Maximum decay heat not to exceed 2.3 kilowatts per package.

Intact individual rods may be placed either in an irradiated or unirradiated fuel assembly lattice (skeleton) or in a fuel rod insert. The PWR fuel assembly lattice must be transported in the PWR basket.

Up to 14 of the 25 fuel rods may be classified as damaged. Damaged fuel rods may include fuel debris, particles, loose pellets, and fragmented rods. Damaged fuel rods must be placed in a fuel rod insert. Damaged fuel rods may also be placed in individual failed fuel rod capsules, as shown in Figure 1.2.3-11 of the application, prior to placement in the fuel rod insert. Irradiated guide tubes and guide tube segments may be placed in the fuel rod insert. The fuel rod insert must be transported in a PWR/BWR transport canister, which is positioned in the PWR insert in the PWR basket.

(x) For high burnup BWR fuel rods, as described in Item 5.(b)(1)(ix): up to 25 fuel rods. Maximum decay heat not to exceed 2.1 kilowatts per package.

Intact individual rods may be placed either in a fuel assembly lattice or in a fuel rod insert. The BWR fuel assembly lattice must be transported in the PWR insert in the PWR basket.

5.(b)(2) Maximum quantity of material per package (continued)

Up to 14 of the 25 fuel rods may be classified as damaged. Damaged fuel rods may include fuel debris, particles, loose pellets, and fragmented rods. Damaged fuel rods must be placed in a fuel rod insert. Damaged fuel rods may also be placed in individual failed fuel rod capsules, as shown in Figure 1.2.3-11 of the application, prior to placement in the fuel rod insert. The fuel rod insert must be transported in a PWR/BWR transport canister, which is positioned in the PWR insert in the PWR basket.

(xi) For DIDO fuel as described in Item 5.(b)(1)(x):

Up to 42 DIDO fuel elements with a maximum decay heat not to exceed 25 watts per DIDO fuel element, provided the top basket fuel element active fuel region is spaced a minimum 3.7 inches from the bottom of the cask lid. Spacing of the active fuel may be accomplished by fuel element hardware, lid spacer, or a combination thereof. Maximum decay heat is 1.05 kilowatts per package. At a top basket active fuel region to cask lid spacing of less than 3.7 inches, the maximum decay heat not to exceed 18 watts per DIDO fuel element and a total of 756 watts per package.

(xii) For GA IFM as described in Item 5.(b)(1)(xi):

(a) Mixture of fuel particles (kernels and coatings), fuel compacts (rods), and fuel pebbles, packaged in its own Fuel Handling Unit (FHU).

GA HTGR FHU consists of two redundant canisters. GA HTGR IFM is packaged inside a primary canister with welded closure, as shown in General Atomics Drawing No. 032237, Rev. B, "HTGR Primary Enclosure." The primary canister is packaged inside a secondary canister with welded closure, as shown in General Atomics Drawing No. 032231, Rev. A, "HTGR Secondary Enclosure."

GA HTGR FHU total maximum decay heat not to exceed 2.05 watts, and maximum loaded weight not to exceed 71.5 lbs.

(b) Twenty irradiated TRIGA fuel elements; 13 of the elements are intact, and the remaining 7 are sectioned. GA RERTR IFM is packaged in its own FHU.

GA RERTR FHU consists of two redundant canisters. GA RERTR IFM is packaged inside a primary canister with welded closure, as shown in General Atomics Drawing No. 032236, Rev. B, "RERTR Primary Enclosure." The GA RERTR IFM primary canister is packaged inside a secondary canister with welded closure, as shown in General Atomics Drawing No. 032230, Rev. A, "RERTR Secondary Enclosure."

GA RERTR FHU total maximum decay heat not to exceed 11 watts, and maximum loaded weight not to exceed 76.0 lbs.

5.(b)(2) Maximum quantity of material per package (continued)

(xiii) For TPBARs as described in Item 5.(b)(1)(xii):

Up to 300 TPBARs, including a maximum of 2 damaged rods, positioned within a consolidation canister, as shown in Figure 1.2.3-10 of the application. The maximum decay heat is 2.31 watts per rod and 693 watts per package. The maximum weight of the TPBARs and the consolidation canister is 1,000 pounds. Consolidation canisters with fewer than 300 TPBARs may also contain stainless steel spacers of various geometries. The total weight and volume of the reduced TPBAR contents plus the spacers must be less than or equal to the weight and volume of 300 TPBARs.

(xiv) For PULSTAR fuel as described in Item 5.(b)(1)(xiii):

Up to 700 intact or damaged PULSTAR fuel elements in either assembly or element form, including fuel debris, pellets, pieces and nonfuel components of PULSTAR fuel assemblies. The contents of a PULSTAR can are restricted to the equivalent of the fuel material in 25 intact PULSTAR fuel elements and of the displaced volume of 25 intact PULSTAR fuel elements.

(xv) For ANSTO fuel as described in Item 5.(b)(1)(xiv):

Up to 42 spiral fuel assemblies, MOATA plate bundles, or any combination of spiral fuel assemblies and MOATA plate bundles. ANSTO fuel must be loaded within ANSTO basket modules. Spiral fuel assemblies may be cropped by removing nonfuel-bearing hardware to fit the ANSTO basket modules. Fuel assemblies that are cropped, but are otherwise intact, may be considered intact. For spiral fuel assemblies, the maximum decay heat per assembly is 15.7 watts. The minimum cool time as a function of burnup shall be consistent with the maximum decay heat limit and shall be determined using the procedures for medium enriched DIDO fuel in Section 7.1.4 of the application; the minimum cool time may not be less than 270 days. For MOATA plate bundles, the maximum heat load per bundle is 3 watts, and the minimum cool time is 10 years.

(xvi) For segmented TPBARs as described in Item 5.(b)(1)(xv):

Up to 55 equivalent TPBARs as segments and segmentation debris, placed within a welded waste container, as shown in Figure 1.2.3-16 of the application. The maximum decay heat is 2.31 watts per equivalent TPBAR and 127 watts per package. The maximum weight of the segmented TPBARs and the TPBAR waste container is 700 pounds.

(xvii) For solid irradiated hardware as described in Item 5.(b)(1)(xvi):

Up to 4,000 pounds, including spacers, dunnage and containers, and meeting the gamma source defined in Table 1.2-13 of the application. An irradiated hardware spacer source, per NAC Drawing No. 315-40-145, shall be installed.

5.(b)(2) Maximum quantity of material per package (continued)

(xviii) For intact PWR MOX fuel rods as described in Item 5.(b)(1)(xvii):

Up to 16 undamaged PWR MOX rods or a combination of PWR MOX and high burnup PWR fuel rods as described in Item 5.(b)(1)(viii). Maximum decay heat not to exceed 2.3 kW per package. Individual PWR MOX and PWR UO_2 fuel rods shall be placed in a 5x5 insert loaded into a screened or free flow rod canister in accordance with NAC International Drawing No. 315-40-104, Assembly 97. Up to nine nonstainless burnable poison rods (BPRs) may be loaded in the spare locations in the 5x5 insert. The PWR/BWR fuel rod canister shall be transported in the PWR basket and the PWR insert installed in the cask cavity.

5(c) Criticality Safety Index (CSI)

For PWR fuel assemblies described in 5(b)(1)(i) and limited in 5(b)(2)(i)	100
For BWR fuel assemblies described in 5(b)(1)(ii) and limited in 5(b)(2)(ii)	5.0
For MTR fuel elements described in 5(b)(1)(iv) and limited in 5(b)(2)(iv)	0.0
For metallic fuel rods described in 5(b)(1)(v) and limited in 5(b)(2)(v) and (vi)	0.0
For TRIGA fuel elements (in poisoned TRIGA fuel baskets) described in 5(b)(1)(vi)(a) and limited in 5(b)(2)(vii)(a)	0.0
For TRIGA fuel elements (in nonpoisoned TRIGA fuel baskets) described in 5(b)(1)(vi)(b) and limited in 5(b)(2)(vii)(b)	12.5
For TRIGA fuel cluster rods described in 5(b)(1)(vii) and limited in 5(b)(2)(viii)	0.0
For high burnup PWR rods described in 5(b)(1)(viii) and limited in 5(b)(2)(ix)	0.0
For high burnup BWR rods described in 5(b)(1)(ix) and limited in 5(b)(2)(x)	0.0
For DIDO fuel elements described in 5(b)(1)(x) and limited in 5(b)(2)(xi)	12.5
For General Atomic Irradiated Fuel Material (GA IFM) described in 5(b)(1)(xi) and limited in 5(b)(2)(xii)	0.0
For TPBARS and segmented TPBARS described in 5(b)(1)(xii) and 5(b)(1)(xv) and limited in 5(b)(2)(xiii) and 5(b)(2)(xvi)	0.0
For intact (uncanned) PULSTAR fuel described in 5(b)(1)(xiii) and limited in 5(b)(2)(xiv)	0.0

5(c) Criticality Safety Index (CSI)

For (canned) PULSTAR fuel described in 5(b)(1)(xiii) and limited in 5(b)(2)(xiv) – for a package with any number of PULSTAR cans	33.4
For ANSTO fuel described in 5(b)(1)(xiv) and limited in 5(b)(2)(xv)	0.0
For solid irradiated hardware described in 5(b)(1)(xvi) and limited in 5(b)(2)(xvii)	0.0
For PWR MOX rods described in 5.(b)(1)(xvii) and limited by 5.(b)(2)(xviii)	0.0

6. Known or suspected damaged fuel assemblies (rods) or elements, and fuel with cladding defects greater than pin holes and hairline cracks are not authorized, except as described in Items 5.(b)(2)(iv)(d); 5.(b)(2)(vi); 5.(b)(2)(vii)(a); 5.(b)(2)(vii)(b); 5.(b)(2)(viii); 5.(b)(2)(ix); 5.(b)(2)(x); and 5.(b)(2)(xiv).

7. The cask must be dry (no free water) when delivered to a carrier for transport.

8. Bolt torque: The cask lids bolts must be torqued to 260 +/- 20 ft-lbs. The bolts used to secure the alternate vent and drain port covers must be torqued to 100 +/- 10 inch-lbs. The bolts used to secure the Alternate B port covers must be torqued to 285 +/- 15 inch-lbs.

9. Prior to each shipment, the package must be leak tested to 1×10^{-3} std cm^3/sec, except that replaced seals must be leak tested to 5.5×10^{-7} std cm^3/sec (He). Prior to first use, and at least once within the 12-month period prior to each subsequent use, the package must be leak tested to 5.5×10^{-7} std cm^3/sec (He).

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) The metallic O-ring lid seal must be replaced prior to each shipment; and

(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application; and

(c) The package shall be prepared for shipment and operated in accordance with the Package Operations of Chapter 7 of the application. If the cask is loaded under water or water is introduced into the cask cavity, the cask must be vacuum dried as described in Chapter 7 of the application. The cask cavity must be backfilled with 1.0 atm of helium when shipping PWR or BWR assemblies, individual PWR and BWR rods, or TPBAR contents.

11. When shipping PWR, BWR, PWR MOX, MTR, DIDO assemblies, TRIGA fuel elements, TRIGA fuel cluster rods, high burnup PWR or BWR rods, GA IFM, PULSTAR fuel elements, spiral fuel assemblies, and MOATA plate bundles, the neutron shield tank must be filled with a mixture of water and ethylene

glycol which will not freeze or precipitate in a temperature range from -40 °F to 250 °F. The water and ethylene glycol mixture must contain at least 1% boron by weight.

12. A personnel barrier must be used when shipping PWR or BWR assemblies. Shipments of MTR, DIDO fuel assemblies, TRIGA fuel elements, TRIGA fuel cluster rods, high burnup PWR or BWR rods, PWR MOX rods, TPBAR contents, PULSTAR fuel elements, spiral fuel assemblies, MOATA plate bundles, or irradiated hardware must use the ISO container or a personnel barrier.

13. Packages used to ship metallic fuel rods may be shipped in a closed shipping container provided that the closed container, the cask tie-down and support system and transport vehicle (trailer) meet the applicable requirements of the Department of Transportation. When the cask is shipped in a closed shipping container, the center of gravity of the combined cask, closed shipping container and trailer must not exceed 75 inches.

14. For shipment of TPBAR contents:

    (a) Prior to first use for shipment of TPBAR contents, each packaging must be hydrostatic pressure tested to 450 +15/-0 psig, as described in Section 8.1.2 of the application;

    (b) The package must be marked with Package Identification Number USA/9225/B(M)-96;

    (c) The package must be configured as shown in NAC International Drawing No. 315-40-128, Rev. 2, for the applicable TPBAR contents; and

    (d) Prior to each shipment, after loading, each cask containment seal must be tested to show no leakage greater than 2 x 10^{-7} std-cm^3/s (helium).

15. For shipment of PULSTAR fuel:

    (a) Intact fuel elements may be configured as PULSTAR fuel assemblies, may be placed into a TRIGA fuel rod insert (a 4 x 4 rod holder) or may be loaded into PULSTAR fuel cans. Intact PULSTAR fuel assemblies and PULSTAR fuel elements in a TRIGA fuel rod insert may be loaded in any module of the 28 MTR basket assembly. PULSTAR fuel cans may only be loaded into the top or base module of the 28 MTR basket assembly.

    (b) Damaged PULSTAR fuel elements and nonfuel components of PULSTAR fuel assemblies must be loaded into PULSTAR cans. Damaged PULSTAR fuel, including fuel debris, pellets or pieces, may be placed in an encapsulating rod prior to loading into a PULSTAR fuel can. PULSTAR fuel cans may only be loaded into the top or base module of the 28 MTR basket assembly.

    (c) Loading of modules with mixed PULSTAR payload configuration is allowed.

16. For the shipment of damaged TRIGA fuel elements, cluster rods and/or fuel debris loaded in sealed damaged fuel cans:

    (a) The package must be configured as shown in NAC International Drawing Nos. 315-40-079, Rev. 5 or 315-40-084, Rev. 4, for the applicable TRIGA contents; and

(b) Prior to each shipment, after loading, each cask containment seal must be tested to show no leakage greater than 2×10^{-7} std-cm^3/s (helium).

17. For the shipment of PWR MOX fuel rods in a free flow or screened PWR/BWR fuel rod canister:

(a) The package must be configured as shown in NAC International Drawing No. 315-40-104, Rev. 3; and

(b) Prior to each shipment, after loading, each cask containment seal must be tested to show no leakage greater than 2×10^{-7} std-cm^3/s (helium).

18. Transport by air is not authorized.

19. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

20. Revision 48 of this certificate may be used until October 31, 2009.

Expiration Date: February 28, 2010.

REFERENCES

NAC International, Inc., application dated January 15, 2008.

NAC International, Inc., supplements dated January 17 and 25, February 27, and April 8 and 11, July 1 and 17, and August 6 and 20, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

for

Eric J. Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: October 10, 2008

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9226	2	71-9226	USA/9226/B(U)F-85	1	OF	9

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

General Atomics
3550 General Atomics Court
San Diego, California 92121-1122

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Atomics application dated
August 31, 1994, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

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a. Packaging

(1) Model No.: GA-4

(2) Description

The GA-4 Legal Weight Truck Spent Fuel Shipping Cask consists of the packaging (cask and impact limiters) and the radioactive contents. The packaging is designed to transport up to four intact pressurized-water reactor (PWR) irradiated spent fuel assemblies as authorized contents. The packaging includes the cask assembly and two impact limiters, each of which is attached to the cask with eight bolts. The overall dimensions of the packaging are approximately 90 inches in diameter and 234 inches long.

The containment system includes the cask body (cask body wall, flange, and bottom plate); cask closure; closure bolts; gas sample valve body; drain valve; and primary O-ring seals for the closure, gas sample valve, and drain valve.

Cask Assembly
The cask assembly includes the cask, the closure, and the closure bolts. Fuel spacers are also provided when shipping specified short fuel assemblies to limit the movement of the fuel. The cask is constructed of stainless steel, depleted uranium, and a hydrogenous neutron shield. The cask external dimensions are approximately 188 inches long and 40 inches in diameter. A fixed fuel support structure divides the cask cavity into four spent fuel compartments, each approximately 8.8 inches square and 167 inches long. The closure is recessed into the cask body and is attached to the cask flange with 12 1-inch diameter bolts. The closure is approximately 26 inches square, 11 inches thick, and weighs about 1510 lbs.

5.a. (2) (continued)

The cask has two ports allowing access to the cask cavity. The closure lid has an integral half-inch diameter port (hereafter referred to as the gas sample valve) for gas sampling, venting, pressurizing, vacuum drying, leakage testing, or inerting. A 1-inch diameter port in the bottom plate allows draining, leakage testing, or filling the cavity with water. A separate drain valve opens and closes the port. The primary seals for the gas sample valve and drain valve are recessed from the outside cask surface as protection from punctures. The gas sample valve and the drain valve also have covers to protect them during transport.

<u>Cask</u>
The cask includes the containment (flange, cask body, bottom plate and drain valve seals); the cavity liner and fuel support structure; the impact limiter support structure; the trunnions and redundant lift sockets; the depleted uranium gamma shield; and the neutron shield and its outer shell. The cask body is square, with rounded corners and a transition to a round outer shell for the neutron shield. The cask has approximately a 1.5 inch thick stainless steel body wall, 2.6 inch thick depleted uranium shield (reduced at the corners), and 0.4 inch thick stainless steel fuel cavity liner.

The cruciform fuel support structure consists of stainless steel panels with boron-carbide (B_4C) pellets for criticality control. A continuous series of holes in each panel, at right angles with the fuel support structure axis, provides cavities for the B_4C pellets. The fuel support structure is welded to the cavity liner and is approximately 18 inches square by 166 inches long and weighs about 750 lbs.

The flange connects the cask body wall and fuel cavity liner at the top of the cask, and the bottom plate connects them at the bottom. The gamma shield is made up of five rings, which are assembled with zero axial-tolerance clearance within the depleted uranium cavity, to minimize gaps. The impact limiter support structure is a slightly tapered 0.4 inch thick shell on each end of the cask. The shell mates with the impact limiter's cavity and is connected to the cask body by 36 ribs.

The neutron shield is located between the cask body and the outer shell. The neutron shield design maintains continuous shielding immediately adjacent to the cask body under normal conditions of transport. The details of the design are proprietary. The design, in conjunction with the operating procedures, ensures the availability of the neutron shield to perform its function under normal conditions of transport.

Two lifting and tie-down trunnions are located about 34 inches from the top of the cask body, and another pair is located about the same distance from the bottom. The trunnion outside diameter is 10 inches, increasing to 11.5 inches at the cask interface. Two redundant lift sockets are located about 26 inches from the top of the cask body and are flush with the outer skin.

5.a. (2) (continued)

Materials
All major cask components are stainless steel, except the neutron shield, the depleted uranium gamma shield, and the B_4C pellets contained in the fuel support structure. All O-ring seals are fabricated of ethylene propylene.

Impact Limiters
The impact limiters are fabricated of aluminum honeycomb, completely enclosed by an all-welded austenitic stainless steel skin. Each of the two identical impact limiters is attached to the cask with eight bolts. Each impact limiter weighs approximately 2,000 lbs.

(3) Drawings
The packaging is constructed and assembled in accordance with the following GA Drawing Number:

Drawing No. 031348,
sheets 1 through 19, Revision D (Proprietary Version)
GA-4 Spent Fuel Shipping Cask Packaging Assembly

5.(b) Contents

(1) Type and Form of Material:

(a) Intact fuel assemblies. Fuel with known or suspected cladding defects greater than hairline cracks or pinhole leaks is not authorized for shipment.

(b) The fuel authorized for shipment in the GA-4 package is irradiated 14x14 and 15x15 PWR fuel assemblies with uranium oxide fuel pellets. Before irradiation, the maximum enrichment of any assembly to be transported is 3.15 percent by weight of uranium-235 (^{235}U). The total initial uranium content is not to exceed 407 Kg per assembly for 14x14 arrays and 469 Kg per assembly for 15x15 arrays.

c) Fuel assemblies are authorized to be transported with or without control rods or other non-fuel assembly hardware (NFAH). Spacers shall be used for the specific fuel types, as shown on sheet 17 of the Drawings.

(d) The maximum burnup for each fuel assembly is 35,000 MWd/MTU with a minimum cooling time of 10 years and a minimum enrichment of 3.0 percent by weight of ^{235}U or 45,000 MWd/MTU with a minimum cooling time of 15 years (no minimum enrichment).

(e) The maximum assembly decay heat of an individual assembly is 0.617 kW. The maximum total allowable cask heat load is 2.468 kW (including control components and other NFAH when present).

5.b. (1) (continued)

(f) *The PWR fuel assembly types authorized for transport are listed in Table 1. All parameters are design nominal values.*

(2) Maximum Quantity of Material per Package

(a) For material described in 5.b.(1): four (4) PWR fuel assemblies.

(b) For material described in 5.b.(1): the maximum assembly weight (including control components or other NFAH when present) is 1,662 lbs. The maximum weight of the cask contents (including control components or other NFAH when present) is 6,648 lbs., and the maximum gross weight of the package is 55,000 lbs.

Table 1 - PWR Fuel Assembly Characteristics

Fuel Type Mfr.-Array (Versions)	Design Initial U (kg/assy.)	No. of Fuel Rods	Fuel Rod Pitch (in.)	Pellet Diameter (in.)	Zr Clad Thickness (in.)	Active Fuel Length (in.)
W-15x15 (Std/ZC)	469	204	0.563	0.3659	0.0242	144
W-15x15 (OFA)	463	204	0.563	0.3659	0.0242	144
BW-15x15 (Mk.B,BZ,BGD)	464	208	0.568	0.3686	0.0265	142
Exx/A-15x15 (WE)	432	204	0.563	0.3565	0.030	144
CE-15x15 (Palisades)	413	204	0.550	0.358	0.026	144
CE-14x14 (Ft.Calhoun)	376	176	0.580	0.3765	0.028	128
W-14x14 (Model C)	397	176	0.580	0.3805	0.026	137
CE-14x14 (Std/Gen.)	386	176	0.580	0.3765	0.028	137
Exx/A-14x14 (CE)	381	176	0.580	0.370	0.031	137

5.b(2)(b)(continued)

Fuel Type Mfr.-Array (Versions)	Design Initial U (kg/assy.)	No. of Fuel Rods	Fuel Rod Pitch (in.)	Pellet Diameter (in.)	Zr Clad Thickness (in.)	Active Fuel Length (in.)
W-14x14 (OFA)	358	179	0.556	0.3444	0.0243	144
W-14x14 (Std/ZCA,/ZCB)	407	179	0.556	0.3674	0.0225	145.5
Exx/A-14x14 (WE)	379	179	0.556	0.3505	0.030	142

5.c. Criticality Safety Index (CSI): 100

6. Fuel assemblies with missing fuel pins shall not be shipped unless dummy fuel pins that displace an equal amount of water have been installed in the fuel assembly.

7. In addition to the requirements of Subpart G of 10 CFR 71:

   a. Each package shall be both prepared for shipment and operated in accordance with detailed written operating procedures. Procedures for both preparation and operation shall be developed using the specifications contained within the application. At a minimum, those procedures shall require the following provisions:

      (1) Identification of the fuel to be loaded and independent verification that the fuel meets the specifications of Condition 5.b of the CoC.

      (2) That before shipment the licensee shall:

         (a) Perform a measured radiation survey to assure compliance with 49 CFR 173.441 and 10 CFR 71.47 and assure that the neutron and gamma measurement instruments are calibrated for the energy spectrums being emitted from the package.
         (b) Verify that measured dose rates meet the following correlation to demonstrate compliance with the design bases calculated hypothetical accident dose rates: 3.4 x (peak neutron dose rate at any point on cask surface at its midlength) + 1.0 x (gamma dose rate at that location) ≤ 1000 mR/hr.
         (c) Verify that the surface removable contamination levels meet the requirements of 49 CFR 173.443 and 10 CFR 71.87.

7.a.(2) (continued)

(d) Inspect all containment seals and closure sealing surfaces for damage. Leak test all containment seals with a gas pressure rise test after final closure of the package. The leak test shall have a test sensitivity of at least 1 x10^{-3} standard cubic centimeters per second of air (std-cm^3/sec) and there shall be no detectable pressure rise. A higher sensitivity acceptance and maintenance test may be required as discussed in Condition 7.b.(5), below.

(3) Before leak testing, the following closure bolt and valve torque specifications:

(a) The cask lid bolts shall be torqued to 235 ± 15 ft-lbs.
(b) The gas sample valve and drain valve shall be torqued to 20 ± 2 ft-lbs.

(4) During wet loading operations and prior to leak testing, the removal of water and residual moisture from the containment vessel in accordance with the following specifications:

(a) Cask evacuation to a pressure of 0.2 psia (10 mm Hg) or less for a minimum of 1 hour.
(b) Verifying that the cask pressure rise is less than 0.1 psi in 10 minutes.

(5) Before shipment, independent verification of the material condition of the neutron shield as described in SAR Section 7.1.1.4 or 7.1.2.4.

b. All fabrication acceptance tests and maintenance shall be performed in accordance with detailed written procedures. Procedures for fabrication, acceptance testing, and maintenance shall be developed using the specifications contained within the application and shall include the following provisions:

(1) All containment boundary welds, except the final fabrication weld joint connecting the cask body wall to the bottom plate, shall be radiographed and liquid-penetrant examined in accordance with ASME Code Section III, Division 1, Subsection NB. Examination of the final fabrication weld joint connecting the cask body wall to the bottom plate may be ultrasonic and progressive liquid penetrant examined in lieu of radiographic and liquid penetrant examination.

(2) The upper lifting trunnions and redundant lifting sockets shall be load tested, in the cask axial direction, to 300 percent of their maximum working load (79,500 lbs. minimum) per trunnion and per lifting socket, in accordance with the requirements of ANSI N14.6. The upper and lower lifting trunnions shall be load tested, in the cask transverse direction, to 150 percent of their maximum working load (20,625 lbs. minimum) per trunnion, in accordance with the requirements of ANSI N14.6.

7.b.(continued)

(3) The cask containment boundary shall be pressure tested to 1.5 times the Maximum Normal Operating Pressure of 80 psig. The minimum test pressure shall be 120 psig.

(4) All containment seals shall be replaced within the 12-month period prior to each shipment.

(5) A fabrication leakage test shall be performed on all containment components including the O-ring seals prior to first use. Additionally, all containment seals shall be leak tested after the third use of each package and within the 12-month period prior to each shipment. Any replaced or repaired containment system component shall be leak tested. The leakage tests shall verify that the containment boundary leakage rate does not exceed the design leakage rate of 1×10^{-7} std-cm^3/sec. The leak tests shall have a test sensitivity of at least 5×10^{-8} std-cm^3/sec.

(6) The depleted uranium shield shall be gamma scanned with 100 percent inspection coverage during fabrication to ensure that there are no shielding discontinuities. The neutron shield supplier shall certify that the shield material meets the minimum specified requirements (proprietary) used in the applicant's shielding analysis.

(7) Qualification and verification tests to demonstrate the crush strength of each aluminum honeycomb type and lot to be utilized in the impact limiters shall be performed.

(8) The boron carbide pellets, fuel support structure and fuel cavity dimensions, and ^{235}U content in the depleted uranium shall be fabricated and verified to be within the specifications of Table 2 to ensure criticality safety.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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Table 2

Specified Parameter	Minimum	Maximum
B_4C boron enrichment	96 wt% ^{10}B	N/A
Diameter of each B_4C pellet	0.426 in	0.430 in
Height of each B_4C pellet stack	7.986 in	8.046 in
Mass of ^{10}B in each B_4C pellet stack	31.5 g	N/A
Mass of each B_4C pellet stack	43.0 g	45.0 g
Diameter of each fuel support structure hole	0.432 in	0.44 in
Fuel support structure nominal hole pitch	N/A	0.55 in
Fuel support structure hole depth minus B_4C pellet stack height (at room temperature)	0.009 in	0.129 in
Thickness of each fuel support structure panel	0.600 in	0.620 in
Fuel cavity width	N/A	9.135 in
^{235}U content in depleted uranium shielding material	N/A	0.2 wt%

8. Transport of fissile material by air is not authorized.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration Date: October 31, 2013.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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REFERENCES

General Atomics Safety Analysis Report for the GA-4 Legal Weight Truck Spent Fuel Shipping Cask, August 31, 1994.

Supplements dated: August 5, 1998, General Atomics Safety Analysis Report for the GA-4 Legal Weight Truck Spent Fuel Shipping Cask, Revision G (Proprietary) and Revision H (Non-Proprietary), June 12, 2003; and September 24, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

James R. Hall
for

Eric J. Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date November 4, 2008

NRC FORM 618 (8-2000) 10 CFR 71	**CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES**			U.S. NUCLEAR REGULATORY COMMISSION
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
9228	24	71-9228	USA/9228/B(U)F-96	1 OF 10

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

GE-Hitachi Nuclear Energy Americas, LLC
3901 Castle Hayne Road
Wilmington, NC 28401

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

General Electric Company* application dated December 12, 2000, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 2000

(2) Description

A steel encased lead shielded shipping cask. The cask is within a double-walled overpack with toroidal shell impact limiters at each end. The overall dimensions are approximately 131.5 inches in height and 72.0 inches in diameter. The cask is transported in the upright or horizontal position. The gross weight of the package is approximately 33,550 lbs.

The cask is constructed of two concentric 1-inch thick 304 stainless steel cylindrical shells (ASTM A 240) joined at the bottom end to a 6-inch thick 304 stainless steel forging (ASTM A 182). The annulus between the two shells is filled with lead approximately 4 inches thick. The cask is approximately 71.0 inches in height and has an outer diameter of 38.5 inches. The cask cavity is approximately 26.5 inches in diameter and 54.0 inches deep.

The cask lid is 304 stainless steel and lead, has a stepped design, and is fully recessed into the cask top flange. The lid is secured to the cask body by 15, 1.25-inch diameter socket head screws. The cask is sealed by elastomeric O-rings bonded to a thin aluminum disc-shaped ring. The cask is equipped with a seal test port on the side of the cask body, a vent port in the cask lid, and a drain port near the bottom of the cask.

The cask is positioned within an overpack constructed from two 0.5-inch thick concentric 304 stainless steel cylindrical shells (ASTM A 240). The shells are separated radially by eight equally spaced tubes and horizontally by two tube sections. A 304 stainless steel toroidal shell impact limiter is attached to each end of the overpack. The overpack opens just above the lower impact limiter for access to the cask. The top of the overpack is joined to the base by 15, 1-3/8-inch diameter shoulder screws.

* This license was transferred from General Electric Company to GE-Hitachi Nuclear Energy Americas, LLC, in 2007.

5(a) (2) Description (Continued)

Gussets on the top and bottom impact limiters provide tie-down points for the package. The cask body is equipped with attachment plates for lifting devices. The cask lifting devices are detached during transport.

(3) Drawings

(i) The packaging is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 10; 105E9520, Rev. 4; and 105E9521, Rev. 5.

(ii) Packaging Serial No. 2001 is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 10; 101E8718, Rev. 12; and 101E8719, Rev. 12.

(iii) The HFIR fuel basket and liner are constructed and assembled in accordance with General Electric Company Drawing No. 105E9523, Rev. 3.

(iv) The multifunctional rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E9555, Rev. 2.

(v) The barrel rack is constructed and assembled in accordance with General Electric Company Drawing No. 166D8066, Rev. 2.

(vi) The material basket is constructed in accordance with General Electric Company Drawing No. 183C8356, Rev. 2. The material basket may be used with the multifunctional rack and the barrel rack.

(vii) The TSR fuel basket is constructed and assembled in accordance with General Electric Company Drawing No. 105E9560, Rev. 2.

(viii) The MTR fuel basket is constructed and assembled in accordance with General Electric Company Drawing No. 105E9557, Rev. 9.

(ix) The optional lead liner is constructed and assembled in accordance with General Electric Company Drawing No. 129D4922, Rev. 2.

5.(b) Contents

(1) Type and form of material

(i) Irradiated fuel rods, which may be cut or segmented.

(ii) Byproduct, source, or special nuclear material in solid form.

(iii) Irradiated High Flux Isotope Reactor (HFIR) fuel assembly, positioned within the HFIR fuel basket and liner as specified in 5(a)(3). The HFIR fuel assembly is fabricated in accordance with Oak Ridge National Laboratory Drawing Nos. M-11524-OH-101-D, Rev. 0, and M-11524-OH-102-D, Rev. 0.

(iv) Irradiated Tower Shielding Reactor (TSR) fuel elements, positioned within the TSR fuel basket specified in 5(a)(3).

5.(b)(1) Type and form of material (continued)

(v) Irradiated MTR-type fuel assemblies, positioned within the MTR fuel basket specified in 5(a)(3). The fuel assemblies may be sectioned only in the non-fuel bearing region of the assembly. The fuel assemblies are composed of aluminum clad plates, and are limited as follows:

Fuel material	U_3O_8	UAl_x	U_{METAL}
Max. uranium enrichment (w/o U-235)	94.0	94.0	95.0
Max. active fuel thickness (in)	0.023	0.020	0.020
Min. clad thickness (in)	0.014	0.015	0.015
Max. U-235 per fuel assembly (g)	355	290	110
Max. U-235 mass per fuel basket cell (g)	710	580	220
Max. burnup (GWd/MTU)	568	568	568
Min. cool time (days)	120	120	120

Fuel material	U_3Si_2	UAl_x
Max. uranium enrichment (w/o U-235)	20.0	20.0
Max. active fuel thickness (in)	0.020	0.100
Min. clad thickness (in)	0.015	0.010
Max. U-235 per fuel assembly (g)	347	150
Max. U-235 mass per fuel basket cell (g)	694	300
Max. burnup (GWd/MTU)	122	122
Min. cool time (days)	120	120

Note: The enrichments, masses, and dimensions shall be based on values prior to irradiation.

5.(b) (1) Type and form of material (Continued)

(vi) Irradiated TRIGA fuel elements, positioned with the MTR fuel basket specified in 5(a)(3). The fuel material consists of $UZrH_x$ in cylindrical elements, with aluminum, stainless steel, or inconel cladding. The H to Zr ratio in the fuel ranges from approximately 1.0 to 1.7. Some fuel elements contain graphite reflectors in each end of the fuel element. The fuel elements are limited as follows:

Approximate rod diameter (in)	1-1/2	½	1-1/2	1-1/2	½
Graphite reflectors	With or without reflectors	With or without reflectors	With reflectors	With reflectors	Without reflectors
Uranium concentration in fuel (w/o U)	8 - 45	10 - 45	8.5 min.	8.5 min.	10 min.
Max. rod length (in)	30	30	30	30	30
Max. active fuel length (in)	15	22	15	15	22
Min. clad thickness (in)	0.02	0.016	0.02	0.02	0.016
Max. uranium enrichment (w/o U-235)	20.0	20.0	70.0	94.0	94.0
Max. active fuel diameter (in)	1.435	0.51	1.435	1.435	0.51
Max. U-235 per rod (g)	165	44 (max. 15 rods per basket cell) 33 (max. 20 rods per basket cell)	140	220	44 (max. 15 rods per basket cell) 33 (max. 20 rods per basket cell)
Max. U-235 mass per fuel basket cell (g)	560	660	560	660	660
Max. burnup (GWd/MTU)	427	427	427	568	568
Min. cool time (days)	120	120	120	120	120

Note: The enrichments, masses, and dimensions shall be based on values prior to irradiation.

5.(b) (2) Maximum quantity of material per package

Not to exceed 5,450 lbs, including fuel baskets, carrier racks, shoring, secondary containers, and shielding liner.

(i) For the contents described in 5(b)(1)(i):

600 watts decay heat; and

Fissile contents not to exceed 1175 grams U-235 equivalent mass with initial enrichment not to exceed 5 weight percent in the fissile isotope; minimum pellet diameter of 0.3 inch, maximum burnup of 45 GWd/MTU, and minimum cooling time of 120 days; or

Fissile contents not to exceed 1750 grams U-235 equivalent mass with initial enrichment not to exceed 5 weight percent in the fissile isotope; minimum pellet diameter of 0.35 inch, maximum burnup of 38 GWd/MTU, and minimum cooling time of 120 days. Fuel rods must be contained in closed, 5-inch schedule 40 pipe, with a maximum of 437.5 grams U-235 equivalent per pipe; or

Fissile contents not to exceed 242 grams U-235 equivalent mass with initial enrichment not to exceed 5 weight percent in the fissile isotope; minimum pellet diameter of 0.3 inch, maximum burnup of 52 GWd/MTU, and minimum cooling time of 180 days.

(ii) For the contents described in 5(b)(1)(ii):

2000 watts decay heat. Fissile contents not to exceed 500 grams U-235 equivalent mass. Carrier racks specified in 5(a)(3)(iv) or 5(a)(3)(v) must be used for contents exceeding 600 watts decay heat per package.

(iii) For the contents described in 5(b)(1)(iii):

One HFIR fuel assembly. The fuel assembly is composed of one inner fuel element, with up to 2628 grams U-235, and one outer fuel element, with up to 6872 grams U-235. The maximum uranium enrichment is 93.2 weight percent U-235. The maximum burnup per assembly is 2300 MWd, the minimum cool time is two years. Decay heat not to exceed 600 watts per package.

5.(b) (2) Maximum quantity of material per package (Continued)

(iv) For the contents described in 5(b)(1)(iv):

A maximum of 4393 grams U-235 per package. The maximum uranium enrichment is 94.0 weight percent U-235. Decay heat not to exceed 35 watts per package. The TSR fuel elements must be positioned and limited within the TSR fuel basket as follows:

Lower fuel basket section -	Up to 4 upper or lower fuel elements, or a combination of upper and lower fuel elements, for a total U-235 mass of 1412 grams.
Middle fuel basket section -	Up to 4 fuel cover (lune) plates, for a total U-235 mass of 304 grams.
Upper fuel basket section -	Up to 6 annular fuel elements plus one cylindrical fuel element, for a total U-235 mass of 2677 grams.

(v) For the contents described in 5(b)(1)(v):

Weight of contents, including fuel elements, spacers, shoring, and hardware, not to exceed 42.8 lbs per fuel basket cell.

Decay heat not to exceed any of the following: 1500 watts per package, 120 watts per cell, 35 watts per cell in the upper half of the fuel basket, 85 watts per cell in the lower half of the fuel basket, 765 watts in the lower half of the fuel basket (i.e., the lower half of all 21 cells combined).

Failed fuel elements are permitted provided the damage is limited to cladding defects due to corrosion, nicks, and scratches. Failed fuel elements must be structurally and geometrically intact.

(vi) For the contents described in 5(b)(1)(vi):

Weight of contents, including fuel elements, spacers, shoring, and hardware, not to exceed 42.8 lbs per fuel basket cell.

For stainless steel and inconel clad fuel, decay heat not to exceed any of the following: 1500 watts per package, 120 watts per cell, 35 watts per cell in the upper half of the fuel basket, 85 watts per cell in the lower half of the fuel basket, 765 watts in the lower half of the fuel basket (i.e., the lower half of all 21 cells combined).

For aluminum clad fuel, decay heat not to exceed either of the following: 630 watts per package; 30 watts per cell.

5.(c) Criticality Safety Index

For the contents described in 5(b)(1)(i), 5(b)(1)(ii) (except byproduct material), and 5(b)(1)(iii); and limited in 5(b)(2)(i), 5(b)(2)(ii), and 5(b)(2)(iii): 100

For the contents described in 5(b)(1)(iv), 5(b)(1)(v), 5(b)(1)(vi), and byproduct material from 5(b)(1)(ii); and limited in 5(b)(2)(iv), 5(b)(2)(v), 5(b)(2)(vi), and 5(b)(2)(ii): 0.0

6. Plutonium in excess of twenty curies per package must be in the form of metal, metal alloy or reactor fuel elements.

7. The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.

8. Bolt torque:

The cask lid bolts must be torqued to 690 ft-lbs (lubricated).

The bolts used to secure the top of the overpack to the overpack base must be torqued to 100 ft-lbs (dry).

9. (a) For any package containing organic or inorganic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F); or

(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with a radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

10. Prior to each shipment (except for contents meeting the requirements of special form radioactive material), the package must be leak tested to 1 x 10^{-3} std cm^3/sec. Prior to first use, after the third use, and at least once within the 12-month period prior to each subsequent use, the package must be leak tested to 1 x 10^{-7} std cm^3/sec.

11. The cask must be vacuum dried prior to shipment if contents are loaded under water, or if water is introduced into the cask cavity. During shipments for which vacuum drying is performed, the cask cavity must be filled with helium.

12. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) Prior to each shipment the cask seal must be inspected. The seal must be replaced with a new seal if inspection shows any defects or every 12 months, whichever occurs first; and

    (b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, except that inspections in Section 8.2 of the application must be performed at least once within the 12-month period prior to each use; and

    (c) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.

13. Appropriate carrier racks or shoring must be provided to minimize movement of contents during accident conditions of transport.

14. Each batch of ethylene propylene seals must be tested in accordance with Section 8.1.4.2 of the application.

15. Fissile mass limits for reactor fuel are based on fissile mass prior to irradiation.

16. For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(v), and 5(b)(1)(vi), the package may be transported horizontally. For horizontal transport, the package must be secured to the truck bed with the top end of the package (closure end) facing the front (cab) of the truck. For horizontal transport of irradiated fuel and byproduct material contents described in 5(b)(1)(i) and 5(b)(1)(ii), the maximum decay heat is limited to 600 watts per package and the lead liner described in 5(a)(3)(ix) must be used.

17. Packagings may be marked with Package Identification Number USA/9228/B(U)F-85 until May 31, 2006, and must be marked with Package Identification Number USA/9228/B(U)F-96 after May 31, 2006.

18. Air transport of fissile material is not authorized.

19. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

20. Revision No. 23 of this certificate may be used until October 31, 2008.

21. Expiration date: May 31, 2011.

REFERENCES

General Electric Company application dated December 12, 2000.

Supplements dated: December 20, 2000; March 16 and 27, 2001; March 22, 2002; and March 25, May 4, 5, and 23, July 28, 2005, January 25, 2006, and January 19, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: 10/22/07

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9233	8	71-9233	USA/9233/B(U)	1	OF	3

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Transnuclear, Inc
   Four Skyline Drive
   Hawthorne, NY 10532-2120

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Transnuclear, Inc. application
   dated March 8, 2005, as supplemented.

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: TN-RAM

(2) Description

The package is a steel encased lead shielded cask with wood impact limiters attached at both ends. The cask is a right circular cylinder. The overall dimensions of the packaging are approximately 178 inches long and 92 inches diameter with the impact limiters installed. The cask body is approximately 129 inches long with an outer diameter of 51 inches. The cask cavity has a length of approximately 111 inches and an inside diameter of 35 inches. The cask body is made of a 0.75-inch stainless steel inner shell, a 5.88-inch thick lead annulus, a 1.5-inch thick stainless steel outer shell, a 0.5-inch thick inner bottom plate and a 2.5-inch thick outside bottom plate. The lead shielding is 6 inches thick in the bottom end of the cask. The outer shell of the cask body is covered with a stainless steel thermal shield. The closure lid consists of a 2.5-inch thick outer stainless steel plate and a 0.5-inch thick inner stainless steel plate separated by 6 inches of lead shielding. The lid is secured by sixteen 1.5-inch diameter closure bolts. Two concentric silicone O-rings are installed in grooves on the underside of the lid. The cask is equipped with a sealed leak test port between the O-rings, a vent port in the closure lid and a sealed drain port in the bottom of the cask.

Each impact limiter is attached to the cask by eight 1.75-inch diameter bolts. The cask is equipped with 6 trunnions, four at the top and two at the bottom.

The gross weight of the package is approximately 80,000 pounds, including maximum contents of 9,500 pounds.

5.(a) Packaging (continued)

(3) Drawings

The packaging is constructed in accordance with Transnuclear, Inc. Drawing Nos. 990-701, Rev. 6; 990-702, Rev. 6; 990-703, Rev. 7; 990-704, Rev. 3; 990-705, Rev. 5; 990-706, Rev. 3; 990-707, Rev. 3; 990-708, Rev. 6; and 990-709, Rev. 1.

(b) Contents

(1) Type and Form of Material

Dry irradiated and contaminated non-fuel-bearing solid materials contained within a secondary container.

(2) Maximum quantity of material per package

Greater than Type A quantities of radioactive material which may include fissile material provided that the fissile material does not exceed the mass limits of 10 CFR 71.15. The contents may not exceed 2,000 times an A_2 quantity. The decay heat of the contents may not exceed 300 watts. The maximum gross weight of the contents, secondary container, and shoring is limited to 9,500 pounds.

6. As appropriate, shoring must be used in the secondary container sufficient to prevent significant movement of the contents under accident conditions.

7. Both the inner cask cavity and the secondary container must be free of water when the package is delivered to a carrier for transport.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Prior to each shipment, the lid seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first;

(b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application; and

(c) The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration date: April 30, 2010.

NRC FORM 618 (8-2000) 1' 'R 71	CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES		U.S. NUCLEAR REGULATORY COMMISSION	
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE PAGES
9233	8	71-9233	USA/9233/B(U)	3 OF 3

REFERENCES

Transnuclear, Inc., application dated March 8, 2005.

Supplement dated: May 4, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Stewart Brown for

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage
and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: 5/7/07

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9234	19	71-9234	USA/9234/B(U)F	1 OF	3

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*
   Columbiana Hi Tech, LLC
   1802 Fairfax Road
   Greensboro, NC 27407

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
   Nuclear Containers, Inc. application dated January 11, 1993, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

Packaging

(1) Model No.: NCI-21PF-1

(2) Description

Overpack for 30-inch enriched uranium hexafluoride (UF_6) cylinders. The valve end of the cylinder may be equipped with a valve protection device. The overpack is a right circular cylinder constructed of two stainless steel shells with the volume between the shells filled with fire resistant, phenolic-foam per USAEC Specification SP-9, Rev. 1, and Supplement K/TL-729. The volume between the 1/4-inch thick end closure plates of the two shells is filled with oak wood blocks which are cross-laminations of 3 layers of boards glued and nailed together. A stepped and gasketed horizontal joint permits the top half of the overpack to be removed from the base. The package "halves" are secured with ten, 1-inch stainless steel toggle closures. The overpack is 43-5/8 inches O.D. by 92 inches long. The maximum gross weight of the package, including the valve protection device, is 8875 pounds.

(3) Drawing

The Model No. NCI-21PF-1 packaging is fabricated in accordance with Nuclear Containers, Inc. Drawing No. DED-206-B, Sheets 1 through 11, Rev. 5. The valve protection device and the valve protection device gauge are fabricated and assembled in accordance with United States Enrichment Corporation Drawing Nos. VPD-0001, Rev. 1, VPD-0002, Rev. 2, and VPD-0003, Rev. 1.

5.(b) Contents

(1) Type and form of material

Uranium hexafluoride contained within a Model 30B cylinder.

(2) Maximum quantity of material per package

5,020 pounds uranium hexafluoride. Uranium enriched to not more than 5 w/o in the U-235 isotope. The total quantity of radioactive material within a package may not exceed a Type A quantity.

(c) Criticality Safety Index

Minimum transport index to be shown on label for nuclear criticality control: 5.0

The Model 30B cylinders must be fabricated, inspected, tested, and maintained in accordance with American National Standard ANSI N14.1-2001, or an earlier version of ANSI N14.1 in effect at the time of fabrication. Cylinders must be fabricated in accordance with Section VIII, Division I, of the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code and be ASME code stamped.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

(b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.

(c) The torque on the overpack closures must be 110 ± 10 foot-pounds. Within the 12-month period prior to shipment, the torque must be checked in accordance with the procedure described in the supplement dated November 19, 1996.

8. Packagings manufactured by Nuclear Containers, Incorporated, during the period November 30, 1991, to October 1, 1994, and having NCI serial Nos. 487 through 619, but excluding 487A and 488A, are authorized for use.

9. Model No. NCI-21PF-1 packages must be equipped with the valve protection device described in 5(a)(3). The valve protection device must be installed in accordance with the procedures specified in the supplement dated November 30, 2000.

Prior to each shipment, the stainless steel components of the packaging must be visually inspected. Packagings in which stainless steel components show pitting, corrosion, cracking, or pinholes are not authorized for transport.

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U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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11. The Model 30B cylinder valve stem and plug may be tinned with ASTM B32, alloy 50A or Sn50 solder material, or a mixture of alloy 50A or Sn50 with alloy 40A or Sn40A material, provided the mixture has a minimum tin content of 45 percent.

12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

13. Expiration date: December 31, 2008

REFERENCES

Nuclear Containers, Inc. application dated January 11, 1993.

Supplements dated: September 10, 1993; July 21, 1994; November 19, 1996; February 26, April 21, May 15, July 9, and August 11, 1997; September 9, 1998; July 13 and November 30, 2000; April 11, 2002; August 27, 2003, January 28 and June 13, 2005.

United States Enrichment Corporation supplement dated: April 14, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Acting Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: July 5, 2005

NRC FORM 618 (8-2000) 10 CFR 71	CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES		U.S. NUCLEAR REGULATORY COMMISSION	
a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE / PAGES
9235	9	71-9235	USA/9235/B(U)F-96	1 OF 12

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

NAC International
3930 East Jones Bridge Road, Suite 200
Norcross, Georgia 30092

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

NAC International, Inc., application dated March 1, 2004, as supplemented

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: NAC-STC

(2) Description: For descriptive purposes, all dimensions are approximate nominal values. Actual dimensions with tolerances are as indicated on the Drawings.

A steel, lead and polymer (NS4FR) shielded shipping cask for (a) directly loaded irradiated PWR fuel assemblies, (b) intact, damaged and/or the fuel debris of Yankee Class or Connecticut Yankee irradiated PWR fuel assemblies in a canister, and (c) non-fissile, solid radioactive materials (referred to hereafter as Greater Than Class C (GTCC) as defined in 10 CFR Part 61) waste in a canister. The cask body is a right circular cylinder with an impact limiter at each end. The package has approximate dimensions as follows:

Cavity diameter	71 inches
Cavity length	165 inches
Cask body outer diameter	87 inches
Neutron shield outer diameter	99 inches
Lead shield thickness	3.7 inches
Neutron shield thickness	5.5 inches
Impact limiter diameter	124 inches
Package length:	
without impact limiters	193 inches
with impact limiters	257 inches

The maximum gross weight of the package is about 260,000 lbs.

The cask body is made of two concentric stainless steel shells. The inner shell is 1.5 inches thick and has an inside diameter of 71 inches. The outer shell is 2.65 inches thick and has

5.(a)(2) Description (Continued)

an outside diameter of 86.7 inches. The annulus between the inner and outer shells is filled with lead.

The inner and outer shells are welded to steel forgings at the top and bottom ends of the cask. The bottom end of the cask consists of two stainless steel circular plates which are welded to the bottom end forging. The inner bottom plate is 6.2 inches thick and the outer bottom plate is 5.45 inches thick. The space between the two bottom plates is filled with a 2-inch thick disk of a synthetic polymer (NS4FR) neutron shielding material.

The cask is closed by two steel lids which are bolted to the upper end forging. The inner lid (containment boundary) is 9 inches thick and is made of Type 304 stainless steel. The outer lid is 5.25 inches thick and is made of SA-705 Type 630, H1150 or 17-4PH stainless steel. The inner lid is fastened by 42, 1-1/2-inch diameter bolts and the outer lid is fastened by 36, 1-inch diameter bolts. The inner lid is sealed by two O-ring seals. The outer lid is equipped with a single O-ring seal. The inner lid is fitted with a vent and drain port which are sealed by O-rings and cover plates. The containment system seals may be metallic or Viton. Viton seals are used only for directly-loaded fuel that is to be shipped without long-term interim storage.

The cask body is surrounded by a 1/4-inch thick jacket shell constructed of 24 stainless steel plates. The jacket shell is 99 inches in diameter and is supported by 24 longitudinal stainless steel fins which are connected to the outer shell of the cask body. Copper plates are bonded to the fins. The space between the fins is filled with NS4FR shielding material.

Four lifting trunnions are welded to the top end forging. The package is shipped in a horizontal orientation and is supported by a cradle under the top forging and by two trunnion sockets located near the bottom end of the cask.

The package is equipped at each end with an impact limiter made of redwood and balsa. Two impact limiter designs consisting of a combination of redwood and balsa wood, encased in Type 304 stainless steel are provided to limit the g-loads acting on the cask during an accident. The predominately balsa wood impact limiter is designed for use with all the proposed contents. The predominately redwood impact limiters may only be used with directly loaded fuel or the Yankee-MPC configuration.

The contents are transported either directly loaded (uncanistered) into a stainless steel fuel basket or within a stainless steel transportable storage canister (TSC).

The directly loaded fuel basket within the cask cavity can accommodate up to 26 PWR fuel assemblies. The fuel assemblies are positioned within square sleeves made of stainless steel. Boral or TalBor sheets are encased outside the walls of the sleeves. The sleeves are laterally supported by 31, ½-inch thick, 71-inch diameter stainless steel disks. The basket also has 20 heat transfer disks made of Type 6061-T651 aluminum alloy. The support disks

5.(a)(2) Description (Continued)

and heat transfer disks are connected by six, 1-5/8-inch diameter by 161-inch long threaded rods made of Type 17-4 PH stainless steel.

The TSC shell, bottom plate, and welded shield and structural lids are fabricated from stainless steel. The bottom is a 1-inch thick steel plate for the Yankee-MPC and 1.75-inch thick steel plate for the CY-MPC. The shell is constructed of 5/8-inch thick rolled steel plate and is 70 inches in diameter. The shield lid is a 5-inch thick steel plate and contains drain and fill penetrations for the canister. The structural lid is a 3-inch thick steel plate. The canister contains a stainless steel fuel basket that can accommodate up to 36 intact Yankee Class fuel assemblies and Reconfigured Fuel Assemblies (RFAs), or up to 26 intact Connecticut Yankee fuel assemblies with RFAs, with a maximum weight limit of 35,100 lbs. Alternatively, a stainless steel GTCC waste basket is used for up to 24 containers of waste.

One TSC fuel basket configuration can store up to 36 intact Yankee Class fuel assemblies or up to 36 RFAs within square sleeves made of stainless steel. Boral sheets are encased outside the walls of the sleeves. The sleeves are laterally supported by 22 ½-inch thick , *69-inch diameter stainless steel disks, which are spaced about 4 inches apart. The support* disks are retained by split spacers on eight 1.125-inch diameter stainless steel tie rods. The basket also has 14 heat transfer disks made of Type 6061-T651 aluminum alloy.

The second fuel basket is designed to store up to 26 Connecticut Yankee Zirc-clad assemblies enriched to 3.93 wt. percent, stainless steel clad assemblies enriched up to 4.03 wt. percent, RFAs, or damaged fuel in CY-MPC damaged fuel cans (DFCs). Zirc-clad fuel enriched to between 3.93 and 4.61 wt. percent, such as Westinghouse Vantage 5H fuel, must be stored in the 24-assembly basket. Assemblies approved for transport in the 26-assembly configuration may also be shipped in the 24-assembly configuration. The construction of the two basket configurations is identical except that two fuel loading positions of the 26-assembly basket are blocked to form the 24-assembly basket.

RFAs can accommodate up to 64 Yankee Class fuel rods or up to 100 Connecticut Yankee *fuel rods, as intact or damaged fuel or fuel debris, in an 8x8 or 10x10 array of stainless steel* tubes, respectively. Intact and damaged Yankee Class or Connecticut Yankee fuel rods, as well as fuel debris, are held in the fuel tubes. The RFAs have the same external dimensions as a standard intact Yankee Class, or Connecticut Yankee fuel assembly.

The TSC GTCC basket positions up to 24 Yankee Class or Connecticut Yankee waste containers within square stainless steel sleeves. The Yankee Class basket is supported laterally by eight 1-inch thick, 69-inch diameter stainless steel disks. The Yankee Class basket sleeves are supported full-length by 2.5-inch thick stainless steel support walls. The support disks are welded into position at the support walls. The Connecticut Yankee GTCC basket is a right-circular cylinder formed by a series of 1.75-inch thick Type 304 stainless steel plates, laterally supported by 12 equally spaced welded 1.25-inch thick Type 304 stainless steel outer ribs. The GTCC waste containers accommodate radiation activated and surface contaminated steel, cutting debris (dross) or filter media, and have the same external dimensions of Yankee Class or Connecticut Yankee fuel assemblies.

5.(a)(2) Description (Continued)

The Yankee Class TSC is axially positioned in the cask cavity by two aluminum honeycomb spacers. The spacers, which are enclosed in a Type 6061-T651 aluminum alloy shell, position the canister within the cask during normal conditions of transport. The bottom spacer is 14-inches high and 70-inches in diameter, and the top spacer is 28-inches high and also 70-inches in diameter.

The Connecticut Yankee TSC is axially positioned in the cask cavity by one stainless steel spacer located in the bottom of the cask cavity.

5.(a)(3) Drawings

(i) The cask is constructed and assembled in accordance with the following Nuclear Assurance Corporation (now NAC International) Drawing Nos.:

423-800, sheets 1-3, Rev. 14
423-802, sheets 1-7, Rev. 20
423-803, sheets 1-2, Rev. 8
423-804, sheets 1-3, Rev. 8
423-805, sheets 1-2, Rev. 6
423-806, Rev. 7
423-807, sheets 1-3, Rev. 3
423-811, sheets 1-2, Rev. 11
423-812, Rev. 6
423-900, Rev. 6
423-209, Rev. 0
423-210, Rev. 0
423-901, Rev. 2

(ii) For the directly loaded configuration, the basket is constructed and assembled in accordance with the following Nuclear Assurance Corporation (now NAC International) Drawing Nos.:

423-870, Rev. 5
423-871, Rev. 5
423-872, Rev. 6
423-873, Rev. 2
423-874, Rev. 2
423-875, sheets 1-2, Rev. 7

(iii) For the Yankee Class TSC configuration, the canister, and the fuel and GTCC waste baskets are constructed and assembled in accordance with the following NAC International Drawing Nos.:

455-800, sheets 1-2, Rev. 2
455-801, sheets 1-2, Rev. 3
455-820, sheets 1-2, Rev. 2
455-870, Rev. 5
455-871, sheets 1-2, Rev. 8
455-871, sheets 1-3, Rev. 7P2[1]
455-872, sheets 1-2, Rev. 12
455-872, sheets 1-2, Rev. 11P1[1]
455-873, Rev. 4
455-881, sheets 1-3, Rev. 8
455-887, sheets 1-3, Rev. 4
455-888, sheets 1-2, Rev. 8
455-891, sheets 1-2, Rev. 1
455-891, sheets 1-3, Rev. 2PO[1]
455-892, sheets 1-2, Rev. 3
455-892, sheets 1-3, Rev. 3P0[1]
455-893, Rev. 3
455-894, Rev. 2
455-895, sheets 1-2, Rev. 5
455-895, sheets 1-2, Rev. 5P0[1]
455-901, Rev. 0P0[1]
455-902, sheets 1-5, Rev. 0P4[1]
455-919, Rev. 2

[1]Drawing defines the alternate configuration that accommodates the Yankee-MPC damaged fuel can.

5.(a)(3) Drawings (Continued)

(iv) For the Yankee Class TSC configuration, RFAs are constructed and assembled in accordance with the following Yankee Atomic Electric Company Drawing Nos.:

YR-00-060, Rev. D3
YR-00-061, Rev. D4
YR-00-062, sheet 1, Rev. D4
YR-00-062, sheet 2, Rev. D2
YR-00-062, sheet 3, Rev. D1
YR-00-063, Rev. D4
YR-00-064, Rev. D4
YR-00-065, Rev. D2
YR-00-066, sheet 1, Rev. D5
YR-00-066, sheet 2, Rev. D3

(v) The Balsa Impact Limiters are constructed and assembled in accordance with the following NAC International Drawing Nos.:

423-257, Rev. 2
423-258, Rev. 2
423-843, Rev. 2
423-859, Rev. 0

(vi) For the Connecticut Yankee TSC configuration, the canister and the fuel and GTCC waste baskets are constructed and assembled in accordance with the following NAC International Drawing Nos.:

414-801, sheets, 1-2, Rev. 1
414-820, Rev. 0
414-870, Rev. 3
414-871, sheets 1-2, Rev. 6
414-872, sheets 1-3, Rev. 6
414-873, Rev. 2
414-874, Rev. 0
414-875, Rev. 0
414-881, sheets 1-2, Rev. 4
414-882, sheets 1-2, Rev. 4
414-887, sheets 1-4, Rev. 4
414-888, sheets 1-2, Rev. 4
414-889, sheets 1-3, Rev. 7
414-891, Rev. 3
414-892, sheets 1-3, Rev. 3
414-893, sheets, 1-2, Rev. 2
414-894, Rev. 0
414-895, sheets 1-2, Rev. 4

(vii) For the Connecticut Yankee TSC configuration, DFCs and RFAs are constructed and assembled in accordance with the following NAC International Drawing Nos.:

414-901, Rev. 1
414-902, sheets 1-3, Rev. 3
414-903, sheets 1-2, Rev. 1
414-904, sheets 1-3, Rev. 0

5.(b) Contents

(1) Type and form of material

(i) Irradiated PWR fuel assemblies with uranium oxide pellets. Each fuel assembly may have a maximum burnup of 45 GWD/MTU. The minimum fuel cool time is defined in the Fuel Cool Time Table, below. The maximum heat load per assembly is 850 watts. Prior to irradiation, the fuel assemblies must be within the following dimensions and specifications:

Assembly Type	14x14	15x15	16x16	17x17	17x17 (OFA)	Framatome-Cogema 17x17
Cladding Material	Zirc-4	Zirc-4	Zirc-4	Zirc-4	Zirc-4	Zirconium Alloy
Maximum Initial Uranium Content (kg/assembly)	407	469	402.5	464	426	464
Maximum Initial Enrichment (wt% ^{235}U)	4.2	4.2	4.2	4.2	4.2	4.5
Minimum Initial Enrichment (wt% ^{235}U)	1.7	1.7	1.7	1.7	1.7	1.7
Assembly Cross-Section (inches)	7.76 to 8.11	8.20 to 8.54	8.10 to 8.14	8.43 to 8.54	8.43	8.425 to 8.518
Number of Fuel Rods per Assembly	176 to 179	204 to 216	236	264	264	264[1]
Fuel Rod OD (inch)	0.422 to 0.440	0.418 to 0.430	0.382	0.374 to 0.379	0.360	0.3714 to 0.3740
Minimum Cladding Thickness (inch)	0.023	0.024	0.025	0.023	0.023	0.0204
Pellet Diameter (inch)	0.344 to 0.377	0.358 to 0.390	0.325	0.3225 to 0.3232	0.3088	0.3224 to 0.3230
Maximum Active Fuel Length (inches)	146	144	137	144	144	144.25

Notes:
[1] - Fuel rod positions may also be occupied by solid poison shim rods or solid zirconium alloy or stainless steel fill rods.

5.(b)(1)(i) Contents - Type and Form of Material - Irradiated PWR fuel assemblies (Continued)

FUEL COOL TIME TABLE
Minimum Fuel Cool Time in Years

	Fuel Assembly Burnup (BU)															
Uranium Enrichment (wt% U-235)	BU ≤ 30 GWD/MTU				30 < BU ≤ 35 GWD/MTU				35 < BU ≤ 40 GWD/MTU				40 < BU ≤ 45 GWD/MTU			
Fuel Type	14x14	15x15	16x16	17x17	14x14	15x15	16x16	17x17	14x14	15x15	16x16	17x17	14x14	15x15	16x16	17x17
1.7≤E<1.9	8	7	6	7	10	10	7	9	--	--	--	--	--	--	--	--
1.9≤E<2.1	7	7	5	7	9	9	7	8	12	13	9	11	--	--	--	--
2.1≤E<2.3	7	7	5	6	9	8	6	8	11	11	8	10	--	--	--	--
2.3≤E<2.5	6	6	5	6	8	8	6	7	10	10	8	9	14	15	12	14
2.5≤E<2.7	6	6	5	6	8	7	6	7	10	9	7	9	13	14	10	12
2.7≤E<2.9	6	6	5	5	7	7	5	6	9	9	7	8	12	12	9	11
2.9≤E<3.1	6	5	5	5	7	7	5	6	9	8	6	8	11	11	8	10
3.1≤E<3.3	5	5	5	5	7	6	5	6	8	8	6	7	10	10	8	9
3.3≤E<3.5	5	5	5	5	6	6	5	6	8	7	6	7	10	10	7	9
3.5≤E<3.7	5	5	5	5	6	6	5	6	7	7	6	7	9	9	7	9
3.7≤E<3.9	5	5	5	5	6	6	5	6	7	7	6	7	9	9	7	9
3.9≤E<4.1	5	5	5	5	6	6	5	6	7	7	6	7	8	9	7	9
4.1≤E≤4.2	5	5	5	5	5	6	5	6	6	7	6	7	8	8	7	9
4.2<E<4.3	--	--	--	5(1)	--	--	--	6(1)	--	--	--	7(1)	--	--	--	9(1)
4.3≤E≤4.5	--	--	--	5(1)	--	--	--	6(1)	--	--	--	7(1)	--	--	--	8(1)

Notes:
(1) - Framatome-Cogema 17x17 fuel only.

5.(b)(1) Contents - Type and Form of Material (Continued)

(ii) Irradiated intact Yankee Class PWR fuel assemblies or RFAs within the TSC. The maximum initial fuel pin pressure is 315 psig. The fuel assemblies consist of uranium oxide pellets with the specifications, based on design nominal or operating history record values, listed below:

Assembly Manufacturer/Type	UN 16x16	CE [1] 16x16	West. 18x18	Exxon [2] 16x16	Yankee RFA	Yankee DFC
Cladding Material	Zircaloy	Zircaloy	SS	Zircaloy	Zirc/SS	Zirc/SS
Maximum Number of Rods per Assembly	237	231	305	231	64	305
Maximum Initial Uranium Content (kg/assembly)	246	240	287	240	70	287
Maximum Initial Enrichment (wt% ^{235}U)	4.0	3.9	4.94	4.0	4.94	4.97 [3]
Minimum Initial Enrichment (wt% ^{235}U)	4.0	3.7	4.94	3.5	3.5	3.5 [3]
Maximum Assembly Weight (lbs)	≤950	≤950	≤950	≤950	≤950	≤950
Maximum Burnup (Mwd/MTU)	32,000	36,000	32,000	36,000	36,000	36,000
Maximum Decay Heat per Assembly (kW)	0.28	0.347	0.28	0.34	0.11	0.347
Minimum Cool Time (yrs)	11.0	8.1	22.0	10.0	8.0	8.0
Maximum Active Fuel Length (in)	91	91	92	91	92	N/A

Notes:

1. Combustion Engineering (CE) fuel with a maximum burnup of 32,000 Mwd/MTU, a minimum enrichment of 3.5 wt. percent ^{235}U, a minimum cool time of 8.0 years, and a maximum decay heat per assembly of 0.304 kW is authorized.
2. Exxon assemblies with stainless steel in-core hardware shall be cooled a minimum of 16.0 years with a maximum decay heat per assembly of 0.269 kW.
3. Stated enrichments are nominal values (fabrication tolerances are not included).

5.(b)(1) Contents - Type and Form of Material (Continued)

(iii) Solid, irradiated, and contaminated hardware and solid, particulate debris (dross) or filter media placed in a GTCC waste container, provided the quantity of fissile material does not exceed a Type A quantity, and does not exceed the mass limits of 10 CFR 71.15.

(iv) Irradiated intact and damaged Connecticut Yankee (CY) Class PWR fuel assemblies (including optional stainless steel rods inserted into the CY intact and damaged fuel assembly reactor control cluster assembly (RCCA) guide tubes that do not contain RCCAs), RFAs, or DFCs within the TSC. The maximum initial fuel pin pressure is 475 psig. The fuel assemblies consist of uranium oxide pellets with the specifications, based on design nominal or operating history record values, listed below:

Assembly Manufacturer/Type	PWR [1] 15x15	PWR [2] 15x15	PWR [3]	CY-MPC RFA[4]	CY-MPC DFC[5]
Cladding Material	SS	Zircaloy	Zircaloy	Zirc/SS	Zirc/SS
Maximum Number of Assemblies	26	26	24	4	4
Maximum Initial Uranium Content (kg/assembly)	433.7	397.1	390	212	433.7
Maximum Initial Enrichment (wt% ^{235}U)	4.03	3.93	4.61	4.61[6]	4.61[6]
Minimum Initial Enrichment (wt% ^{235}U)	3.0	2.95	2.95	2.95	2.95
Maximum Assembly Weight (lbs)	≤1,500	≤1,500	≤1,500	≤1,600	≤1,600
Maximum Burnup (Mwd/MTU)	38,000	43,000	43,000	43,000	43,000
Maximum Decay Heat per Assembly (kW)	0.654	0.654	0.654	0.321	0.654
Minimum Cool Time (yrs)	10.0	10.0	10.0	10.0	10.0
Maximum Active Fuel Length (in)	121.8	121.35	120.6	121.8	121.8

Notes:
1. Stainless steel assemblies manufactured by Westinghouse Electric Co., Babcock & Wilcox Fuel Co., Gulf Gen. Atomics, Gulf Nuclear Fuel, & Nuclear Materials & Man. Co.
2. Zircaloy spent fuel assemblies manufactured by Gulf Gen. Atomics, Gulf Nuclear Fuel, & Nuclear Materials & Man. Co., and Babcock & Wilcox Fuel Co.
3. Westinghouse Vantage 5H zircaloy clad spent fuel assemblies have an initial uranium enrichment > 3.93 % wt. U^{235}.
4. Reconfigured Fuel Assemblies (RFA) must be loaded in one of the 4 oversize fuel loading positions.
5. Damaged Fuel Cans (DFC) must be loaded in one of the 4 oversize fuel loading positions.
6. Enrichment of the fuel within each DFC or RFA is limited to that of the basked configuration in which it is loaded.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package

(i) For the contents described in Item 5.(b)(1)(i): 26 PWR fuel assemblies with a maximum total weight of 39,650 lbs. and a maximum decay heat not to exceed 22.1 kW per package.

(ii) For the contents described in Item 5.(b)(1)(ii): Up to 36 intact fuel assemblies to the maximum content weight limit of 30,600 lbs. with a maximum decay heat of 12.5 kW per package. Intact fuel assemblies shall not contain empty fuel rod positions and any missing rods shall be replaced by a solid Zircaloy or stainless steel rod that displaces an equal amount of water as the original fuel rod. Mixing of intact fuel assembly types is authorized.

(iii) For intact fuel rods, damaged fuel rods and fuel debris of the type described in Item 5.(b)(1)(ii): up to 36 RFAs, each with a maximum equivalent of 64 full length Yankee Class fuel rods and within fuel tubes. Mixing of directly loaded intact assemblies and damaged fuel (within RFAs) is authorized. The total weight of damaged fuel within RFAs or mixed damaged RFA and intact assemblies shall not exceed 30,600 lbs. with a maximum decay heat of 12.5 kW per package.

(iv) For the contents described in Item 5.(b)(1)(iii): for Connecticut Yankee GTCC waste up to 24 containers of GTCC waste. The total cobalt-60 activity shall not exceed 196,000 curies. The total weight of the waste containers shall not exceed 18,743 lbs. with a maximum decay heat of 5.0 kW. For all others, up to 24 containers of GTCC waste. The total cobalt-60 activity shall not exceed 125,000 curies. The total weight of the waste and containers shall not exceed 12,340 lbs. with a maximum decay heat of 2.9 kW.

(v) For the contents described in Item 5.(b)(1)(iv): up to 26 Connecticut Yankee fuel assemblies, RFAs or damaged fuel in CY-MPC DFCs for stainless steel clad assemblies enriched up to 4.03 wt. percent and Zirc-clad assemblies enriched up to 3.93 wt. percent. Westinghouse Vantage 5H fuel and other Zirc-clad assemblies enriched up to 4.61 wt. percent must be installed in the 24-assembly basket, which may also hold other Connecticut Yankee fuel types. The construction of the two basket configurations is identical except that two fuel loading positions of the 26 assembly basket are blocked to form the 24 assembly basket. The total weight of damaged fuel within RFAs or mixed damaged RFAs and intact assemblies shall not exceed 35,100 lbs. with a maximum decay heat of 0.654 kW per assembly for a canister of 26 assemblies. A maximum decay heat of 0.321 kW per assembly for Connecticut Yankee RFAs and of 0.654 kW per canister for the Connecticut Yankee DFCs is authorized.

5.(c) Criticality Safety Index: 0.0

6. Known or suspected damaged fuel assemblies or rods (fuel with cladding defects greater than pin holes and hairline cracks) are not authorized, except as described in Item 5.(b)(2)(iii).

7. For contents placed in a GTCC waste container and described in Item 5.(b)(1)(iii): and which contain organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis that the following criteria are met over a period of time that is twice the expected shipment time:

   The hydrogen generated must be limited to a molar quantity that would be no more than 4% by volume (or equivalent limits for other inflammable gases) of the TSC gas void if present at STP (i.e., no more than 0.063 g-moles/ft^3 at 14.7 psia and 70°F). For determinations performed by analysis, the amount of hydrogen generated since the time that the TSC was sealed shall be considered.

8. For damaged fuel rods and fuel debris of the quantity described in Item 5.(b)(2)(iii) and 5.(b)(2)(v): if the total damaged fuel plutonium content of a package is greater than 20 Ci, all damaged fuel shall be enclosed in a TSC which has been leak tested at the time of closure. For the Yankee Class TSC the leak test shall have a test sensitivity of at least 4.0 X 10^{-8} cm^3/sec (helium) and shown to have a leak rate no greater than 8.0 X 10^{-8} cm^3/sec (helium). For the Connecticut Class TSC the leak test shall have a test sensitivity of at least 1.0 X 10^{-7} cm^3/sec (helium) and shown to have a leak rate no greater than 2.0 X 10^{-7} cm^3/sec (helium).

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application, as supplemented.

   (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application, as supplemented, except that the thermal testing of the package (including the thermal acceptance test and periodic thermal tests) must be performed as described in NAC-STC Safety Analysis Report.

   (c) For packaging Serial Numbers STC-1 and STC-2, only one of these two packagings must be subjected to the thermal acceptance test as described in Section 8.1.6 of the NAC-STC Safety Analysis Report.

10. Prior to transport by rail, the Association of American Railroads must have evaluated and approved the railcar and the system used to support and secure the package during transport.

11. Prior to marine or barge transport, the National Cargo Bureau, Inc., must have evaluated and approved the system used to support and secure the package to the barge or vessel, and must have certified that package stowage is in accordance with the regulations of the Commandant, United States Coast Guard.

12. Transport by air is not authorized.

13. Packagings may be marked with Package Identification Number USA/9235/B(U)F-85 until April 30, 2007, and must be marked with Package Identification Number USA/9235/B(U)F-96 after April 30, 2007.

14. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

15. Revision No. 8 of this certificate may be used until April 30, 2007.

16. Expiration date: March 31, 2009.

REFERENCES

NAC International, Inc., application dated: March 1, 2004.

NAC International, Inc., supplements dated: August 4, and November 1, 2005; and March 1, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: Apr. 25, 2006

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9239	15	71-9239	USA/9239/AF	1 OF	4

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Westinghouse Electric Company
   LLC (WELCO)
   P.O. Box 355
   Pittsburgh, PA 15230

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Westinghouse Electric Corporation application dated August 29, 2006, as supplemented.

4. CONDITIONS

   This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model Nos.: MCC-3, MCC-4, and MCC-5

(2) Description

The MCC packages are shipping containers for unirradiated uranium oxide fuel assemblies. The packagings consist of a steel fuel element cradle assembly equipped with a strongback and an adjustable fuel element clamping assembly. The cradle assembly is shock mounted to a 13-gauge carbon steel outer container by shear mounts. The MCC-3 container is closed with thirty ½-inch T-bolts. The MCC-4 and MCC-5 containers are closed with fifty ½-inch T-bolts.

The MCC-3 and MCC-4 containers are permanently equipped with vertical Gd_2O_3 neutron absorber plates that are mounted on the center wall of the strongback. Additional horizontal Gd_2O_3 neutron absorber plates, mounted on the underside of the strongback, are required for the contents as specified.

The MCC-5 container is permanently equipped with both the vertical and horizontal Gd_2O_3 neutron absorber plates. Additional vee-shaped, guided Gd_2O_3 neutron absorber plates are required for the contents as specified.

Approximate dimensions of the MCC-3 packaging are 44½ inches O.D. by 194½ inches long. The gross weight of the packaging and contents is 7,544 pounds. The maximum weight of the contents is 3,300 pounds.

Approximate dimensions of the MCC-4 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,870 pounds.

5. (a) (2) Packaging (continued)

Approximate dimensions of the MCC-5 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,700 pounds.

(3) Drawings

The MCC-3 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL301, Sheets 1, 2, 3, and 4, Rev. 6.

The MCC-4 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL401, Sheets 1, 2, 3, 4, and 5, Rev. 9.

The MCC-5 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL501, Sheets 1 through 10, Rev. 6.

(b) Contents

(1) Type and form of material

Unirradiated PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent with the following exceptions: 15x15 BW fuel assemblies have a maximum enrichment of 4.65 wt%, and VVER-1000 fuel assemblies have a maximum enrichment of 4.80 wt%.

The fuel assemblies shall meet the specifications given in Westinghouse Drawing No. 6481E15, Rev. 4, and in the following tables of Appendix 1-5 of the application, as supplemented:

Table 1-5.1, Rev. 12*	Fuel Assembly Parameters 14x14 Type Fuel Assemblies
Table 1-5.2, Rev. 12*	Fuel Assembly Parameters 15x15 Type Fuel Assemblies
Table 1-5.3, Rev. 12*	Fuel Assembly Parameters 16x16 Type Fuel Assemblies**
Table 1-5.4, Rev. 12*	Fuel Assembly Parameters 17x17 Type Fuel Assemblies**
Table 1-5.5, Rev. 12*	Fuel Assembly Parameters VVER-1000 Type Fuel Assembly***

* As submitted by letter dated January 24, 2007.

** 16x16 CE fuel assemblies and the 17x17 W-STD/XL fuel assemblies shall be shipped only in the Model No. MCC-4 package.

5. (b) (1) Contents (continued)

*** VVER-1000 fuel assemblies shall be shipped only in the Model No. MCC-5 package.

(2) Maximum quantity of material per package

Two (2) fuel assemblies

(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on label for nuclear criticality control: 0.4

6. (a) For shipments of 14x14, 15x15, 16x16, and 17x17 OFA fuel assemblies with U-235 enrichments of over 4.65 wt% and up to 5.0 wt%, horizontal Gd_20_3 neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.

(b) For shipments of 17x17 STANDARD lattice fuel assemblies (17x17 STD and 17x17 XL) with U-235 enrichments of over 4.85 wt% and up to 5.0 wt%, horizontal Gd_20_3 neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.

7. Shipments of VVER-1000 fuel assemblies are authorized with U-235 enrichments up to 4.80 wt%.

8. Each fuel assembly must be unsheathed or must be enclosed in an unsealed plastic sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent flow of liquids into or out of the sheathed fuel assembly.

9. The dimensions, minimum Gd_20_3 loading and coating specifications, and acceptance testing of the neutron absorber plates shall be in accordance with the "Gd_20_3 Neutron Absorber Plates Specifications," Appendix 1-7, Rev. 12, of the application, as supplemented. The minimum Gd_20_3 coating areal density on the vertical and horizontal neutron absorber plates shall be 0.054 g-Gd_20_3/cm^2. The minimum Gd_20_3 coating areal density on guided neutron absorber plates shall be 0.027 g-Gd_20_3/cm^2.

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each package shall be prepared for shipment and operated in accordance with the "Routine Shipping Container Utilization Summary Operating Procedures," in Chapter 7 of the application, as supplemented; and

(b) Each package shall be tested and maintained in accordance with the "Acceptance Tests, Maintenance Program, and Recertification Program," in Chapter 8 of the application, as supplemented, and as specified in the respective drawings in Condition 5(a)(3) for the MCC-3, MCC-4, and MCC-5 models.

CERTIFICATE OF COMPLIANCE
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11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.

12. Revisions No. 14 of this certificate may be used until January 31, 2008.

13. Expiration date: March 31, 2012.

REFERENCES
Westinghouse Electric Corporation application dated August 29, 2006.

Supplement dated: September 25, November 9, 2006, and January 24, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Meraj Rahimi, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: February 2, 2007

NRC FORM 618 (8-2000) 10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

National Institute of Standards and Technology
Gaithersburg, MD 20899

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

National Institute of Standards and Technology application dated February 7, 1992, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: ST

(2) Description

A closed steel pipe for the transport of an unirradiated research reactor fuel element. The pipe is a 5-1/2-inch OD carbon steel pipe, approximately 71 inches in length, with a closed bottom end and flanged top end. The top end is closed by a cover plate, which is 1/4-inch thick, and 6-1/2 inches in diameter, and a gasket. The cover plate is secured to the pipe flange by 8 cap screws. A wooden nozzle support and top support position the fuel assembly within the pipe. The package weighs approximately 75 pounds, including the fuel element.

(3) Drawing

The packaging is constructed and assembled in accordance with National Institute of Standards and Technology Drawing No. D-04-048, Sheet 1, Rev. 4, and Sheet 2, Rev. 4.

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5. (b) Contents

(1) Type and form of material

Unirradiated NBSR fuel element composed of enriched uranium and aluminum.

(2) Maximum quantity of material per package

One fuel element containing not more than 360 grams U-235. The total quantity of radioactive material within a package may not exceed a Type A quantity.

(c) Criticality Safety Index 50.0

6. In addition to the requirements of Subpart G of 10 CFR Part 71, the package shall be prepared for shipment, operated, and maintained in accordance with the loading, unloading, and quality assurance procedures in the application. Prior to each shipment, the shipper shall make the determinations specified in the NIST "ST" Series Shipping Container Shipper's Checklist in the application.

7. Transport by air is not authorized.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Revision No. 5 of this certificate may be used until January 31, 2009.

10. Expiration date: November 30, 2011.

REFERENCES

National Institute of Standards and Technology application dated February 7, 1992.

Supplements dated: February 14, 1992; August 7, 1996; August 17, 2001; September 5, 2006; September 28, 2007; and January 9, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: January 30, 2008

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Framatome ANP, Inc.
2101 Horn Rapids Road
Richland, WA 99352-0130

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Framatome ANP, Inc. application dated September 5, 2003, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model Nos.: SP-1, SP-2, and SP-3

(2) Description

Fuel assembly and fuel rod shipping containers. The packages consist of a right rectangular metal inner container and a wooden outer container, with cushioning material between the inner and outer containers.

The metal inner container is approximately 11-1/2 inches by 18 inches by 179-1/2 inches long and is positioned within a wooden outer container approximately 30 inches by 31 inches by 207 inches long. The SP-1 and SP-2 packagings differ in the length of the metal inner container and end piece. The SP-3 packagings have a reduced spacing between the fuel assembly channels and the outer surface of the metal inner container. Cushioning is provided between the inner and outer containers by phenolic impregnated honeycomb and ethafoam, or equivalent. Closure of the metal inner container and the wooden outer container is accomplished by bolts. A pressure relief (breather) valve is provided on the inner container, and is set for 0.5 psi differential. The maximum weight of the packaging and contents is 2,800 pounds.

(3) Drawings

The packagings are fabricated and assembled in accordance with the following Framatome ANP, Inc., and Siemens Nuclear Power Corporation/Advanced Nuclear Fuels Corporation Drawing Nos.:

EMF-304,416, Rev. 14.
EMF-306,272, Rev. 10.
EMF-309,141, Rev. 1.

5.(a) (4) Product Containers

(i) Five-inch, Schedule 40, stainless steel pipe fitted with screw type or flange closure. The product container shall be vented if it contains materials which decompose at less than 1475 °F.

(ii) Rod shipping container as shown on Siemens Power Corporation Drawing No. EMF-309,141, Rev. 1.

(b) Contents

(1) Type and form of material

(i) UO_2 fuel assemblies in a 7 x 7, an 8 x 8, or a 9 x 9 square array with a maximum fuel cross-section area of 25 square inches, maximum fuel length of 174 inches and maximum average enrichment of 3.3 w/o U-235. Minimum zircaloy clad thickness is 0.025 inches; maximum pellet diameter is 0.555 inches. Any number of water rods in any arrangement is permitted.

(ii) UO_2 fuel assemblies in a 7 x 7, an 8 x 8, or a 9 x 9 square array with a maximum fuel length of 174 inches, and a maximum average enrichment between 3.3 to 4.0 w/o U-235. The maximum pellet diameter is 0.555 inch, and the minimum clad thickness is 0.025 inch. Any number of water rods in any arrangement is permitted, including part length rods. Each assembly contains at least 4 rods with nominal 2 weight percent Gd_2O_3, which are in non-perimeter locations and are symmetric about the diagonal.

(iii) UO_2 fuel assemblies with a maximum U-235 enrichment of 5.0 percent by weight, and a maximum average U-235 enrichment of 4.0 percent by weight. Each fuel assembly is made up of fuel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.022 inches square, a nominal pitch of 0.511 inch, and a maximum fuel length of 174 inches. The maximum pellet diameter is 0.3356 inch, the minimum clad thickness is 0.0225 inch, and the maximum U-235 enrichment in any edge rod is 4.0 percent by weight. Each assembly contains at least 6 rods with nominal 2 weight percent Gd_20_3, which are symmetric about the diagonal, and each assembly contains at least 4 water rods in the 4 central rod positions.

(iv) UO_2 fuel rods with a maximum U-235 enrichment of 5.0 percent by weight, and a minimum Gd_2O_3 content of 1.0 percent by weight. The rods may be clad with zircaloy, steel or aluminum. The rods have a maximum fuel pellet diameter of 0.5 inch, and a maximum fuel length of 169 inches.

5.(b) (1) Type and form of material (Continued)

(v) UO_2 fuel assemblies composed of fuel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.0 inches square, and a maximum fuel length of 174 inches. The maximum U-235 enrichment is 5.0 weight percent, the maximum U-235 enrichment for all edge rods is 4.0 weight percent, and the maximum average enrichment, excluding perimeter rods and rods containing gadolinia (Gd_2O_3), is 4.0 weight percent U-235. The maximum pellet diameter is 0.35 inch, and the minimum clad thickness is 0.018 inch. Each assembly must have a water channel in the central 3 x 3 rod positions. Any number of additional water rods in any arrangement is permitted, including part length rods. Each assembly must include at least twelve rods with a minimum nominal content of 2.0 weight percent gadolinia (Gd_2O_3), in a pattern symmetric about one of the assembly diagonals. At least eight of the twelve gadolinia rods must be located in rows 2 and 9, and in columns 2 and 9 of the assembly.

(vi) UO_2 fuel assemblies composed of fuel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.0 inches square, and a maximum fuel length of 174 inches. The maximum U-235 enrichment is 5.0 weight percent. The maximum pellet diameter is 0.35 inch, and the minimum clad thickness is 0.018 inch. Each assembly must have a water channel in the central 3 x 3 rod positions. Any number of additional water rods in any arrangement is permitted, including part length rods. Each assembly must include at least eight rods with a minimum nominal gadolinia (Gd_2O_3) content of 2.0 weight percent in all axial regions with enriched pellets. Additional gadolinia rod specifications are included in supplement dated April 30, 1996.

(vii) UO_2 fuel assemblies composed of fuel rods in a 9 x 9 square array, with a maximum fuel cross section of 5.0 inches square, and a maximum fuel length of 174 inches. The maximum U-235 enrichment is 5.0 weight percent. The maximum pellet diameter is 0.40 inch, and the minimum clad thickness is 0.015 inch. Each assembly must have a water channel in the central 3 x 3 rod positions. Any number of additional water rods in any arrangement is permitted, including part length rods. Each assembly must include at least eight rods with a minimum nominal gadolinia (Gd_2O_3) content of 2.0 weight percent in all axial regions with enriched pellets. Additional gadolinia rod specifications are included in supplement dated April 30, 1996.

(viii) UO_2 fuel assemblies composed of fuel rods in a 9 x 9 square array, with a maximum fuel cross-section of 25 square inches, a maximum fuel length of 174 inches, and a maximum average uranium enrichment of 4.0 weight percent U-235. The nominal pellet diameter is 0.370 inch. At least the center 3 x 3 rod locations must be a water channel. Each assembly must include at least eight rods with a minimum nominal gadolinia (Gd_2O_3) content of 2.0 weight percent in all axial regions with enriched pellets. The eight gadolinia rod locations are shown in Figure 1 of the supplement dated July 27, 1999.

5.(b) (1) Type and form of material (Continued)

(ix) UO_2 fuel assemblies composed of fuel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.0 inches square, and a maximum fuel length of 174 inches. The maximum U-235 enrichment is 5.0 weight percent, the maximum U-235 enrichment for all edge rods is 4.75 weight percent, the maximum U-235 enrichment for the four (4) corner edge rods is 3.05 weight percent, and the maximum U-235 enrichment for the eight (8) edge rods immediately adjacent to the four corner edge rods is 3.55 weight percent. The pellet diameter is between 0.30 and 0.3957 inch. Each assembly must have a water channel in a central 3 x 3 position. Any number of additional water rods in any arrangement is permitted, including part length rods. Each assembly must include at least ten rods with a minimum nominal content of 2.0 weight percent gadolinia (Gd_2O_3) in all axial regions with the enriched pellets, and in a pattern symmetric about one of the assembly diagonals. At least ten gadolinia rods must be located in rows 2 and 9, and in columns 2 and 9 of the assembly and cannot be immediately adjacent to another one of the ten gadolinia rods; however, diagonally adjacent is permitted. An additional upper tie plate (UTP) shipping shim may be added between the UTP and the fueled region. This UTP shim may consist of a maximum of 345 g plastic or plastic composite.

(x) UO_2 fuel assemblies composed of fuel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.0 inches square and a maximum fuel length of 174 inches. The maximum uranium enrichment is 2.3 weight percent U-235. The pellet diameter is between 0.30 and 0.3957 inch. Each assembly must have a water channel in a central 3 x 3 position. Any number of additional water rods in any arrangement is permitted, including part length rods. An additional upper tie plate (UTP) shipping shim may be added between the UTP and the fueled region. This UTP shim may consist of a maximum of 345 grams plastic or plastic composite.

(2) Maximum quantity of material per package

Total weight of contents (fuel assemblies, or fuel rods and rod shipping containers) not to exceed 1265 pounds. Total quantity of radioactive material within a package may not exceed a Type A quantity.

(i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), 5(b)(1)(v), 5(b)(1)(vi), 5(b)(1)(vii), 5(b)(1)(viii), 5(b)(1)(ix), and 5(b)(1)(x):

Two full length fuel assemblies. Two short fuel assemblies may be substituted for each full length fuel assembly provided the two short assemblies are shipped end-to-end and the total fuel length does not exceed 174 inches.

(ii) For the contents described in 5(b)(1)(iv):

Two product containers specified in 5.(a)(4). Each product container may contain any number of loose fuel rods.

5.(c) Transport Index for Criticality Control (Criticality Safety Index)

Minimum transport index to be shown on label for nuclear criticality control:

(1) For contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), 5(b)(1)(iv), and 5(b)(1)(viii), and limited in 5(b)(2)(i) and 5(b)(2)(ii): 0.4

(2) For contents described in 5(b)(1)(v), 5(b)(1)(vi), 5(b)(1)(vii), 5(b)(1)(ix), 5(b)(1)(x), and limited in 5(b)(2)(i): 1.0

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly.

Polyethylene shipping shims may be inserted between rods within fuel assemblies as follows:

(a) For contents described in 5(b)(1)(i) and 5(b)(1)(ii), up to a maximum of 0.20 gram H_2O hydrogen equivalent per cubic centimeter averaged over the assembly.

(b) For contents described in 5(b)(1)(v), up to a maximum of 0.25 gram H_2O hydrogen equivalent per cubic centimeter averaged over the assembly.

(c) For contents described in 5(b)(1)(viii), up to a maximum volume fraction of 0.13 averaged over the void volume of the assembly.

(d) For contents described in 5(b)(1)(iii), 5(b)(1)(vi), and 5(b)(1)(vii), polyethylene shipping shims are not permitted.

(e) For contents described in 5(b)(1)(ix) and 5(b)(1)(x), up to a maximum volume fraction of 0.14 averaged over the void volume of the assembly.

8. Only contents described in 5(b)(1)(viii) and 5(b)(1)(ix) are authorized for transport in Model No. SP-3 packages.

9. Maximum average enrichment means the highest average enrichment through any cross sectional plane of the assembly.

10. In addition to the requirements of Subpart G of 10 CFR Part 71:

    (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application dated September 5, 2003.

    (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application dated September 5, 2003.

11. The package authorized by this certificate is hereby authorized for use under the general license provisions of 10 CFR §71.12.

12. Expiration date: February 28, 2009.

REFERENCES

Framatome ANP, Inc., application dated September 5, 2003.

pplements dated: September 24 and November 6, 2003.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

W L Good for

John D. Monninger, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date December 19 2003

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

BWX Technologies
Nuclear Products Division
P.O. Box 785
Lynchburg, VA 24505

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

BWX Technologies, Nuclear Products Division application dated June 13, 2005.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: 5X22

(2) Description

A shipping container for unirradiated uranium of any enrichment. The outer packaging is a 16-gauge steel drum, approximately 22-1/2 inches in diameter and 34-3/4 inches high, with a heavy-duty clamp ring and forged lugs. The inner vessel (containment vessel) is a Schedule 40S stainless steel pipe with a welded bottom cap and a top weldneck flange. The inner vessel lid is a blind flange which is bolted to the weldneck flange with eight hex-head bolts. The closure includes double silicone O-ring seals and a leak-test port. The dimensions of the inner vessel are approximately 5 inches ID by 22 inches high. The inner vessel is centered within the outer drum by fiberboard and supported by plywood disks. The maximum weight of the package, including contents, is 300 pounds.

(3) Drawings

The packaging is constructed in accordance with BWX Technologies, Inc., Drawing Nos. 1220276 E, Rev. 4, and 1220277 E, Rev. 8.

5.(b) Contents

Type and form of material, maximum quantity of material per package, and Criticality Safety Index.

The weight of the contents, including secondary containers, inserts, and other materials in the inner vessel, shall not exceed 50 pounds.

(1) Unirradiated uranium as solid compounds or alloys which do not decompose at temperatures up to 250 °F, and uranium oxides as powder or pellets. The uranium may be of any enrichment. Carbide compounds are not authorized. The maximum H/U must consider all sources of moderation in the inner vessel.

Fissile Material	Maximum H/U	Maximum Fissile Mass per Package (kg)	Criticality Safety Index
U-235	3	9.0	2.0
U-235	3	1.6	0.5
U-235	20	4.0	2.0
U-233	20	0.5	1.8

(2) Unirradiated solid uranyl nitrate in the form of uranyl nitrate dihydrate crystals, which may have small amounts of uranyl trihydrate crystals interspersed. The uranyl nitrate crystals shall have a uranium content that is from 52.5 to 56.0 percent by weight. The uranyl nitrate shall be packaged in Teflon primary containers that will not melt at temperatures up to 94 °C. The uranium may be of any enrichment. The maximum H/U must consider all sources of moderation in the inner vessel.

Fissile Material	Maximum H/U	Maximum Fissile Mass per Package (kg)	Criticality Safety Index
U-235	3	9.0	2.0
U-235	3	1.6	0.5
U-235	20	4.0	2.0
U-233	20	0.5	1.8

5.(b) Contents (continued)

(3) Unirradiated uranium as solid metal. The uranium may be of any enrichment. The maximum H/U must consider all sources of moderation in the inner vessel.

Fissile Material	Maximum H/U	Maximum Fissile Mass per Package (kg)	Criticality Safety Index
U-235	3	9.0	2.5
U-235	3	1.6	0.5
U-235	20	4.0	2.0
U-233	20	0.5	1.8

(4) Unirradiated uranium as solid metal. The uranium may be of any enrichment. The packaging must include a solid aluminum disk insert positioned in the inner vessel, as shown on BWX Technologies, Inc., Drawing No. 1220277 E, Rev. 8 (Part No. 6). The maximum H/U must consider all sources of moderation in the inner vessel.

Fissile Material	Maximum H/U	Maximum Fissile Mass per Package (kg)	Criticality Safety Index
U-235	3	9.0	2.0

(5) Unirradiated liquid uranyl nitrate solution in sealed glass containers or screw top plastic vials, each within one or more additional plastic vials with taped lids, and within a sealed product can or polyethylene bottle containing a sufficient amount of vermiculite to absorb twice the liquid contents present. The uranium may be of any enrichment. The quantity of uranyl nitrate shall not exceed 1000 mL of solution.

Fissile Material	Maximum H/U	Maximum Fissile Mass per Package (kg)	Criticality Safety Index
U-235	N/A	0.4	0.4

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6. The vent holes on the outer steel drum shall be capped or taped closed during transport and storage to preclude entry of rain water into the packaging.

7. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Each package shall be operated and prepared for shipment in accordance with Chapter 7 of the application, as supplemented.

   (b) Each package shall be acceptance tested and maintained in accordance with Chapter 8 of the application.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Expiration date: March 31, 2008.

REFERENCES

BWX Technologies, Inc., application dated June 13, 2005.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

G. Raymond Wharton

for Robert J. Lewis, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: September 22, 2005

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*
AREVA NP, Inc.
P.O. Box 10935
Lynchburg, VA 24506-0935

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
AREVA NP, Inc., application dated September 13, 2007.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: BW-2901

(2) Description

A shipping container for low-enriched uranium oxide powder and pellets, composed of an inner container, surrounded by insulating material, and an outer drum. The inner cross sectional dimensions of the inner container are a maximum 11.15-inch square by 29.5-inch long. The inner container is constructed of minimum 14-gauge steel, with bolted and gasketed top flange closure and welded bottom sheet. The inner container is centered and supported in an 18-gauge steel drum with 16-gauge head and DOT Specification 17H or an equivalent DOT UN1A2/Y1.5/100 closure by asbestos or ceramic sheet, plywood, hardboard, and insulating material. The drum is approximately 22-1/2 inches in diameter and either 34-1/4 inches or 35-1/2 inches in overall height. The drum lid is closed with a 12-gauge locking ring with drop forged lugs and a 5/8-inch diameter bolt. In addition to the locking ring, three lid clamps are installed to secure the drum lid. The uranium oxide is packaged in boxes, and wood boards position the boxes within the inner container. Three borated aluminum plates (approximately 25 inches by 9.25 inches by 0.375 inch) are positioned within the inner container. The maximum gross weight of the package is 660 pounds.

(3) Drawings

The packaging is constructed in accordance with B&W Fuel Company Drawing Nos. 1215597D, Rev. 5; 1215598B, Rev. 1; 1215599E, Rev. 5; and AREVA NP, Inc., Drawing No. 12155600, Rev. 7.

CERTIFICATE OF COMPLIANCE
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5. (b) Contents

(1) Type and form of material

(i) Sintered uranium oxide pellets enriched to a maximum 5.05 weight percent U-235. The minimum pellet diameter is 0.315 inch, and the maximum pellet diameter is 0.400 inch.

(ii) Uranium dioxide as powder, pellets, or any combination thereof, enriched to a maximum 5.05 weight percent U-235.

(2) Maximum quantity of material per package

370 pounds, with the U-235 content not to exceed 7.47 kg. The maximum weight of the uranium oxide, pellet boxes, and all packaging materials within the inner container is 427 pounds. Uranium oxide must be packaged in accordance with B&W Fuel Company Drawing Nos. 1215597D, Rev. 5, and AREVA NP, Inc., Drawing No. 1215600, Rev. 7. The maximum mass of polyethylene within the inner container shall not exceed 1000 grams per package. Maximum quantity of radioactive material within a package may not exceed a Type A quantity.

5. (c) Criticality Safety Index (CSI) 0.7

6. Each package must be shipped with borated aluminum plates positioned within the inner container, on the top of, between, and on the bottom of the rows of pellet boxes. The three borated plates must have dimensions and boron concentration, and must be positioned in accordance with B&W Fuel Company Drawing No. 1215597D, Rev. 5.

7. For packages with fewer than six pellet boxes, solid aluminum or wood pellet box spacers must be substituted for pellet boxes. The pellet boxes, pellet box spacers, borated plates, and wood boards must provide a snug axial and cross sectional fit in the inner container.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each packaging must be maintained and acceptance tested in accordance with Chapter 8 of the application;

(b) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application; and

(c) Prior to each shipment the insert (containment vessel) gasket shall be inspected. The gasket shall be replaced if it is damaged, defective, or degraded.

9. Transport of fissile material by air is not authorized.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9251	13	71-9251	USA/9251/AF	3	OF	3

10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17, provided that fabrication of the package was satisfactorily completed by April 1, 1999.

11. Revision No. 12 of this certificate may be used until January 31, 2009.

12. Expiration date: January 31, 2013.

REFERENCES

AREVA NP, Inc., application dated September 13, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material
Safety and Safeguards

Date: January 24, 2008