



U.S. Department  
of Transportation

Pipeline and  
Hazardous Materials  
Safety Administration

COMPETENT AUTHORITY CERTIFICATION  
FOR A TYPE B(U)  
RADIOACTIVE MATERIALS PACKAGE DESIGN  
CERTIFICATE USA/9314/B(U)-96, REVISION 3

East Building, PHH-23  
1200 New Jersey Avenue SE  
Washington, D.C. 20590

This certifies that the radioactive material package design described has been certified by the Competent Authority of the United States as meeting the regulatory requirements for a Type B(U) packaging for radioactive material as prescribed in the regulations of the International Atomic Energy Agency<sup>1</sup> and the United States of America<sup>2</sup>.

1. Package Identification - Model No. 976 Series.
2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9314, Revision 3 (attached).
3. General Conditions -
  - a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.
  - b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Hazardous Materials Technology, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.
  - c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.
  - d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations<sup>1</sup> shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

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<sup>1</sup> "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

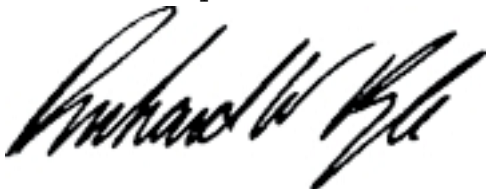
<sup>2</sup> Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

**CERTIFICATE USA/9314/B(U)-96, REVISION 3**

4. Marking and Labeling - The package shall bear the marking USA/9314/B(U)-96 in addition to other required markings and labeling.
5. Expiration Date - This certificate expires on June 30, 2010. On June 30, 2008, this certificate supersedes all previous revisions of USA/9314/B(U)-96.

This certificate is issued in accordance with paragraph 808 of the IAEA Regulations and Section 173.471 of Title 49 of the Code of Federal Regulations, in response to the June 28, 2007 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:



**Aug 21 2007**

(DATE)

Robert A. Richard

Deputy Associate Administrator for Hazardous Materials Safety

Revision 3 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9314, Revision 3, to increase the authorized capacity of Ir-192 and to add Se-75 and Yb-169 as authorized contents.

**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*)  
QSA Global, Inc.  
40 North Avenue  
Burlington, MA 01803
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION  
QSA Global, Inc., consolidated application dated December 6, 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.: 976 Series
- (2) Description

The Model No. 976 Series packages are designed for use as transport packages for Type B quantities of radioactive material in special form. The Model No. 976 has six versions called the 976A, 976B, 976C, 976D, 976E and 976F. The Model 976A package contains a 855 shield container. The Model 976B package contains a 3015 shield container. The Model 976C package contains a 3056 shield container. The Model 976D package contains a 3018 shield container. The Model 976E package contains a 3078 shield container. The Model 976F package contains a 1911 shield container. All versions of the package include a 16 gauge stainless steel 20 gallon drum, four 3/8" - 16 UNC x 3/4" long stainless steel lid closure bolts, a clamp band with M8 stainless steel bolt, and cork inserts to position and support the individual shield containers within the package. All Model No. 976 Series packages measure 19 3/4" in diameter by 21 1/4" tall.

The shield containers are described as follows:

855 - An outer carbon steel shell, rigid polyurethane potting material, uranium shield, eight titanium "J" tubes, source stop, top and bottom support plates, and a gasketed lid which is secured with eight 3/8" - 16 UNC x 5/8" long stainless steel hex head bolts. Approximately 11 1/4" in diameter at the base by 11 3/4" tall (without the eyebolt).

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5(a) (2) (Description continued)

3015 - A lead shield container surrounded on the sides and partially on the top by an outer stainless steel jacket. The steel jacket incorporates two stainless steel lifting handles. The container includes a lower depleted uranium shielding insert encased in stainless steel, a tungsten capsule holder, an upper lead insert, a lead top shield plug with a stainless steel extension, and a gasketed shield lid which secures to the shield container body by two M10 stainless steel screws and washers. Measures approximately 7 ½" in diameter (including the handle bosses) by 10.1" tall.

3056 - A lead shield container which incorporates stainless steel strapping, handle bosses and lifting handles along with a combination lower depleted uranium insert and upper lead insert with ten stainless steel "J" tubes. The lead insert is partially enclosed by stainless steel. The "J" tubes are covered with tube caps and the tube caps are further covered by a stainless steel "top hat" or lid secured to the container by an M12 steel rod and retaining nut. Measures approximately 7.7" in diameter (including the handle bosses) by 10.4" tall.

3018 - A lead shield container surrounded on the sides and partially on the top by an outer stainless steel jacket. The steel jacket incorporates two stainless steel lifting handles. The container includes a lower depleted uranium shielding insert encased in stainless steel and upper lead insert with four stainless steel "J" tubes. The "J" tubes are covered with tube caps. The shield inserts are secured to the shield body by means of a stainless steel bracket and two M10 stainless steel bolts and washers. The metal bracket also incorporates a stainless steel disk above the "J" tubes which further protects the tube caps during shipment. Measures approximately 7 ½" in diameter (including the handle bosses) by 11" tall.

3078 - A stainless steel encased, depleted uranium shield container which includes two stainless steel lifting handles. The shield container incorporates a stainless steel encased depleted uranium upper shield plug that is inserted into the shield body over an optional stainless steel or aluminum source holder can. The upper shield insert is secured to the shield body by a stainless steel cover bolted above the shield insert by four M8 stainless steel screws. Measures approximately 6.1" in diameter by 8.4" tall.

1911 - A stainless steel encased, lead shield container which includes a bolted shield lid and an M10 stainless steel lifting eyebolt. The shield lid is secured to the shield container body by four stainless steel M8 bolts and washers. The inner shield cavity incorporates either a depleted uranium upper and lower shield insert, a tungsten upper and lower shield insert or a lead upper and lower shield insert. Additional handling source stainless steel, aluminum or tungsten capsule holders or cans may be used in the shield insert cavities. Measures approximately 8" in diameter by 8 ¾" tall (without the eyebolt).

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5(a) (2) (Description continued)

The following table gives the maximum package weight.

Model No.	Maximum Package Weight (lbs)
976A	300
976B	190
976C	190
976D	190
976E	226
976F	263

(3) Drawings

This packaging is constructed in accordance with the following AEA Technology or QSA Global Drawings.:

R97608, Rev. E, Sheet 1	20 Gallon Drum Model 976
RCLM009, Rev. B, Sheets 1-2	Clamp, Band
R97637, Rev. A, Sheet 1	Cork Spacer Top Inner
R97623, Rev. B, Sheet 1	Bottom Inner Cork Insert
R97623A, Rev. B, Sheet 1	Bottom Inner Cork Insert
R97615, Rev. C, Sheet 1	Top Outer Cork Insert
R97615-1, Rev. B, Sheet 1	Top Outer Cork Insert
R97615-2, Rev. A, Sheet 1	Bottom Cork Insert
R97616, Rev. B, Sheet 1	Bottom Outer Cork Insert
R976A, Rev. D, Sheet 1	976A Type B Package with 855 Shield Container
R85590, Rev. E, Sheets 1-6	Model 855 Source Changer
R976B, Rev. E, Sheet 1	976B Type B Package with 3015 Shield Container
R3015, Rev. C, Sheets 1-3	3015 Shield Container
R976C, Rev. F, Sheet 1	976C Type B Package with 3056 Shield Container
R3056, Rev. D, Sheets 1-4	Model 3056 Shield Container Top Level Assy
R976D, Rev. E, Sheet 1	976D Type B Package with 3018 Shield Container
R3018, Rev. D, Sheets 1-4	3018 Shield Container
R976E, Rev. E, Sheet 1	976E Type B Package with 3078 Shield Container
R3078, Rev. D, Sheets 1-4	Model 3078 Shield Container Top Level Assembly
R976F, Rev. C, Sheet 1	976F Type B Package with 1911 Shield Container
R1911, Rev. D, Sheets 1-8	Model 1911 Shield

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(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.

(2) Maximum quantity of material per package

Model No.	Inner Shield	Nuclide	Maximum Capacity <sup>1</sup> (Ci)	Maximum Capacity (TBq)
976A	855	Ir-192	1,000	37
		Se-75	1,000	37
		Yb-169	865	32
976B	3015	Ir-192	350	12.95
		Se-75	350	12.95
		Yb-169	350	12.95
976C	3056	Ir-192	1,250	46.25
		Se-75	1,250	46.25
		Yb-169	1,000	37
976D	3018	Ir-192	500	18.5
		Se-75	500	18.5
		Yb-169	500	18.5
976E	3078	Ir-192	1,000	37
		Se-75	1,000	37
		Yb-169	1,000	37
976F	1911	Ir-192	1,000	37
		Se-75	1,000	37
		Yb-169	1,000	37

<sup>1</sup> Output curies are determined by measuring the source output at 1 meter and expressing its activity in curies derived from the following: 0.48 R/h-Ci Iridium-192 at 1 meter. (Ref: American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography.")

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6. Tensile and yield strength for the materials of construction must comply with the following values:

Material	Tensile Strength	Yield Strength
Depleted Uranium	65 ksi	30 ksi
Copper	25 ksi	9 ksi
Steel (nominal)	53 ksi	36 ksi
Stainless Steel	75 ksi	30 ksi
Tungsten	142 ksi	109 ksi
Cork (minimum)	80 psi	NA
Lead ( <sup>96</sup> Pb/ <sup>4</sup> Sb)	3,990 psi	NA

7. The sources shall be secured in the shielded positions of the packaging in accordance with the Package Loading requirements contained in Section 7 of the application, as supplemented. For "J" tube style shield containers, the flexible cable of the source assembly and source cap must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.
8. The name plate must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.
9. 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 Package Operations in Section 7 of the application, as supplemented, and,
  - (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Section 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 71.17.
11. Revision No. 2 of this certificate may be used until June 30, 2008.
12. Expiration date: June 30, 2010.

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REFERENCES

QSA Global, Inc., consolidated application dated December 6, 2005.

Supplements dated December 13 and December 15, 2005; October 31, 2006; February 27, and May 31, 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: June 21, 2007