



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 4**

East Building, PHH-23
1200 New Jersey Avenue Southeast
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 Agency¹ and the United States of America².

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 4 (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.

¹ "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.

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

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- d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations¹ 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.
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 July 31, 2014. On June 30, 2010, 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 August 17, 2009 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:



Robert A. Richard
Deputy Associate Administrator for Hazardous Materials Safety

Sep 02 2009
(DATE)

Revision 4 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9314, Revision 4.

**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 (<i>Name and Address</i>)
QSA Global, Inc.
40 North Avenue
Burlington, MA 01803 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
QSA Global, Inc., application dated April 20, 2009, 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 transport packages include three versions called the 976A, 976C, and 976F, all designed for Type B quantities of radioactive material in special form. All versions of the Model No. 976 package include an inner shield container and a stainless steel drum with cork liner inserts to position and support the individual shield containers within the package. The drum is a 20 gallon capacity drum, with a 19 3/4" (502 mm) diameter and a height of 21 1/4" (540 mm), with 16 gauge, 0.06" (1.5 mm) thick 304 series stainless steel walls per ASTM 240 specifications. The drum lid is secured in place with a lid closure band, and four 3/8" - 16 x 3/4" (19 mm) long 304 series stainless steel lid closure bolts. The lid bolts are inserted through four 3/8" (9.5 mm) diameter holes spaced equidistantly around the drum diameter. The drum lid has four 304 series stainless steel blocks measuring 1" (25.4 mm) by 1" (25.4 mm) by 3/4" (19 mm) tall; the steel blocks are welded on all four sides to the underside of the drum lid and the block welds are on the full length of the block on each side. The cork liner inserts provide shield stability during transport and act as a thermal insulator in case of fire.

The Model 855 inner shield container for the Model No. 976A package is comprised of a depleted uranium shield, secured within a steel welded housing, capable of loading up to

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5.(a)(2) Description (Continued)

eight individual sources with titanium "J" tubes. Locking assemblies secure the sources at the bottom of the "J" tubes. The Model 855 is approximately 11 1/4" (286 mm) in diameter at the base by 11 3/4" (298 mm) tall, without the eyebolt height. Copper separators are installed around all exposed surfaces of the depleted uranium to prevent any steel-uranium interactions inside the shield container. The shield is further retained in place by polyurethane foam to fill the voids between the shield and the inner surfaces of the Model 855 housing. The cover is bolted to the top of the shield container during shipment. The Model 855 shield weighs a maximum of 225 lbs (102 kg) and contains a maximum of 135 lbs (61 kg) of depleted uranium.

The Model 3056 inner shield container for the Model No. 976C package is a lead shield pot measuring approximately 7.7" (196 mm) in diameter (including the handle bosses) with a height of 10.4" (264 mm). The Model 3056 inner shield container includes a depleted uranium inner core shield to provide additional shielding in close proximity to the source positions during transport. An insert contains the "J" tubes which are closed by tube caps. The Model 3056 container includes a cover to protect the source tubes and caps during shipment, stainless steel strapping, handle bosses, lifting handles and weighs a maximum of 114 lbs (52kg).

The Model 1911 inner shield container for the Model No. 976F package is a lead shield pot with a maximum thickness of 2 1/4" (57 mm), encased by a welded steel cylinder, 8" (203 mm) in diameter, 8 3/4" (222 mm) high and a maximum weight of 184 lbs (84 kg). The shield lid is secured to the shield container body by four stainless steel bolts and washers. The Model 1911 container is designed to be lifted by a steel eyebolt which is threaded onto a recess in the shield lid. The eyebolt is removed after loading the Model 1911 into the Model No. 976 F package cork lined drum and during transportation. There are three inner shield insert configurations to allow for different source loading applications within the Model 1911 shield container: 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.

The maximum package weights of the Model No. 976 Series Transport Packages are indicated below:

Model No.	Maximum Package Weight
976A	300 lbs (136 kg)
976C	190 lbs (86 kg)
976F	263 lbs (119 kg)

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(3) Drawings

The Model No. 976 Series transport package is constructed in accordance with the following AEA Technology or QSA Global, Inc. drawings:

R97608, Rev. H, Sheet 1 RCLM009, Rev. C, Sheet 1	20 Gallon Drum Model 976 Clamp, Band
R97637, Rev. A, Sheet 1 R97623, Rev. B, Sheet 1 R97623A, Rev. B, Sheet 1	Cork Spacer Top Inner Bottom Inner Cork Insert Bottom Inner Cork Insert
R97615, Rev. C, Sheet 1 R97615-1, Rev. B, Sheet 1	Top Outer Cork Insert Top Outer Cork Insert
R97615-2, Rev. A, Sheet 1 R97616, Rev. B, Sheet 1	Bottom Cork Insert Bottom Outer Cork Insert
R976A, Rev. F, Sheet 1 R85590, Rev. G, Sheets 1-6	976A Type B Package with 855 Shield Container Model 855 Source Changer
R976C, Rev. H, Sheet 1 R3056, Rev. F, Sheets 1-4	976C Type B Package with 3056 Shield Container Model 3056 Shield Container Top Level Assy
R976F, Rev. E, Sheet 1 R1911, Rev. F, Sheets 1-6	976F Type B Package with 1911 Shield Container Model 1911 Shield

The Models No. 976A, 976C and 976F drum and cork inserts, and the Model 1911 inner shield container, are authorized for fabrication.

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5. (b) Contents

(1) Type and form of material

Iridium-192, Selenium-75, and Ytterbium-169 as special form sealed sources.

(2) Maximum quantity of material per package

Model No.	Inner Shield	Nuclide	Maximum Capacity ¹ Ci	Maximum content weight (grams)
976A	855	Ir-192	1,000 (37 TBq)	176
		Se-75	1,000 (37 TBq)	
		Yb-169	865 (32 TBq)	
976C	3056	Ir-192	1,250 (46.25 TBq)	220
		Se-75	1,250 (46.25 TBq)	
		Yb-169	1,000 (37 TBq)	
976F	1911	Ir-192	1,000 (37 TBq)	3.3
		Se-75	1,000 (37 TBq)	
		Yb-169	1,000 (37 TBq)	

¹For Ir-192, the maximum capacity is based on output curies which 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.

For Se-75 and Yb-169, the maximum capacity is based on the content curies contained in the radioactive source(s).

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

- (a) The package shall be prepared for shipment and operated with the sources secured in the shielded positions of the package, in accordance with Chapter 7 of the application, as supplemented.
- (b) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented.
- (b) No new fabrication of the Model No. 855 and 3056 inner shield containers is authorized. Replacement components are provided as part of service and maintenance for existing units. Service operations for the Model No. 3056 shield container are limited to non welded components.

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(c) Minimum values for the tensile and yield strengths of construction materials are indicated in Table 2.2.a 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. Revision No. 3 of this certificate may be used until June 30, 2010.
9. Expiration date: July 31, 2014.

REFERENCES

QSA Global, Inc., application dated April 20, 2009.

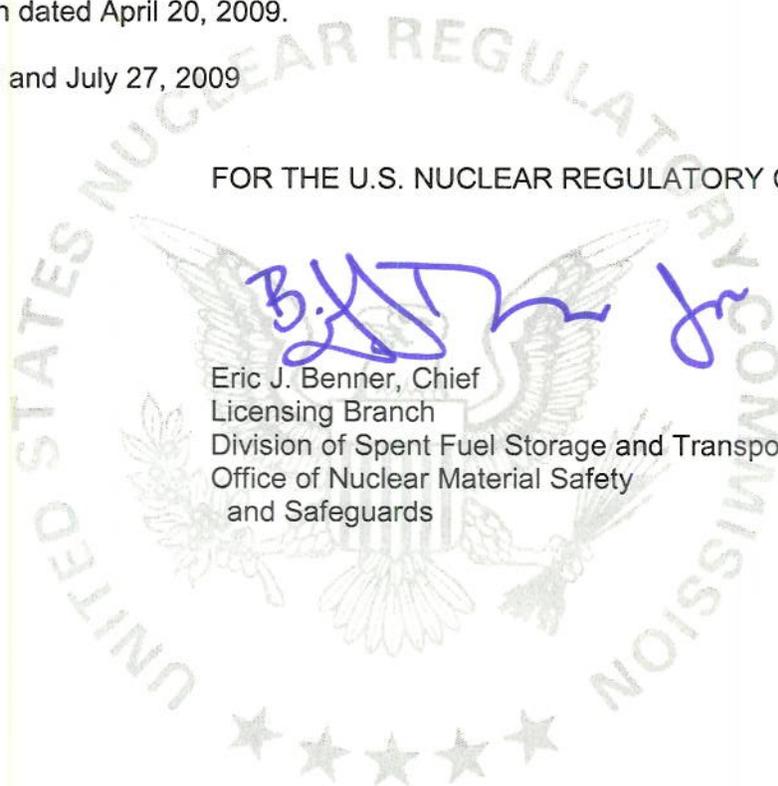
Supplements dated June 30 and July 27, 2009

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: July 31, 2009





UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION REPORT
Docket No. 71-9314
Model No. 976 Series Packages
Certificate of Compliance No. 9314
Revision No. 4

SUMMARY

By application dated May 1, 2008, as supplemented April 21, June 30 and July 27, 2009, QSA Global, Inc. (QSA), requested an amendment to Certificate of Compliance No. 9314, for the Model No. 976 Series packages. QSA corrected block welds described on engineering drawing R97608 to accurately match current fabrication practice. QSA also clarified the material of construction for the overpack and made several changes to the welding codes, fastener specifications, as well as to the maintenance and acceptance testing programs of the packages.

Based on the statements and representations in the application, as supplemented, the staff agrees that these changes do not affect the ability of the Model No. 976 Series packages to meet the requirements of 10 CFR Part 71.

GENERAL INFORMATION

By application dated May 1, 2008, QSA submitted an amendment request for the Model No. 976 Series packages to correct weld specifications on Drawing No. R97608 and add notes to that drawing documenting the specifications applicable to this drawing.

On April 21, 2009, QSA identified other discrepancies in the Model No. 976 Series package drawings, provided revisions to such drawings, decided to remove approval for the Model Nos. 976B, 976D, and 976E from the Certificate of Compliance and submitted Revision No. 8 to the Model No. 976 Series application to reflect such changes.

On June 30, 2009, QSA provided additional information and new revisions to Drawing Nos. R976A, 976C, 976F, R85590, R3056, and R1911 to add hardware specification details for materials important to safety.

On July 27, 2009, QSA provided additional details regarding the material specification of the Model No. 976 drum assembly and revised again Drawing No. R97608.

The Model No. 976 Series packages have now only three configurations, called the 976A, 976C, and 976F authorized for the transportation of Type B quantities of special form sources.

EVALUATION

The QSA application "Model No. 976 Series Type B(U) – 96 Transport Package," Revision 8, now references the appropriate specification standards for materials considered as safety related components. For the Models 855 and 3056 inner shield containers that continue to be serviced and maintained but are no longer fabricated, the replaceable fasteners which are

important to safety are now specified in the revisions of the drawings. The drawings were also revised to update the welding qualifications and examination procedures in effect at the time of the fabrication. Service and repair operations for the Model 3056 inner shield container are now limited to non-welded components. In particular:

- QSA clarified that American Welding Society (AWS) codes D1.1, D1.3, and D1.6 will be used for the construction of the new Model No. 976 Series packages. These changes are acceptable to the staff.
- QSA specified that bolting and sheet metal used for safety related components in the construction of new Model No. 976 Series packages will meet the American Society for Testing and Materials (ASTM) standards. Replacement bolting material for packages currently in service will also meet ASTM criteria. The staff finds these changes acceptable.

Due to the safe operating history of the Model No. 976 Series packages, e.g., the shield container Models 3056 and 855 have been used in the field for over twenty years without incident as part of US NRC Type B approval and US DOT Type B revalidations of Great Britain Type B(U) approved packages, the staff finds it reasonable that fasteners currently in service on the previously approved packages will be adequate to maintain the safe operation of the packages until ASTM certified bolting materials are installed.

The outer 55-gallon drum of the package serves as the primary safety feature of the Model No. 976 Series package. The applicant clarified that the 55-gallon drum will be constructed from ASTM 240 -- 304 stainless steel. The minimum mechanical properties of this steel meet the requirements for the material properties listed in Table 2.2a of the application. The staff finds this clarification acceptable.

The staff does not typically accept materials which meet foreign or industry standards not endorsed for use by the NRC for safety related components without significant technical justification; however, drop testing of the Model No. 976 Series packages was performed using DIN (German Institute for Standardization) certified head screws and a DIN/ISO (International Standards Organization) certified clamp band. After reexamining drop test results, the staff finds the DIN certified head screws acceptable, as no damage was done to the shield container during drop testing, and reapproves the use of these components. The clamp band on licensing drawing RCLM009 meets ISO standard 4017, and is procured from a dedicated commercial supplier. Drop test results showed that no damage was done to the source changer during drop testing, and the staff reapproves the use of the clamp band.

Likewise, the staff does not usually consider the Society of Automotive Engineers (SAE) specification as an acceptable industry standard for use for a safety related component, as the SAE specification only provides the composition of the material and does not mandate minimum yield strengths, tensile strengths, etc. The staff recognizes, however, that during drop testing of the package, no damage was done to the Model 855 source changer or the Model 3056 shield container. In addition, no material was specified for the cap nuts in previously approved applications. Therefore the staff finds the use of 321 SAE steel for construction of the cap nuts sufficient to meet the regulatory requirements under Part 71.

As part of the amendment application, the applicant proposed changes to Section 7 of the application. Acceptance testing of the packages includes radiation surveys of the packages which confirm the integrity of the shielding material. The radiation surveys were already being performed by the package fabricator, but have now been explicitly stated in the application and incorporated into the certificate by reference. Maintenance and handling of the packages include examination of the packages for significant signs of degradation, including deterioration of the bolting material and welds. Other changes include modifications to operations and other minor changes determined by the applicant to be necessary for clarity and consistency. The staff reviewed the proposed changes and finds that the package operations, as modified in the amendment, continue to meet the requirements of 10 CFR Part 71 and remain adequate to assure the package will be operated in a manner consistent with its evaluation for approval.

As a result of this amendment request, Drawing No. R97608, Revision H, provides material specifications for the 20 gallon drum of the Model No. 976 Series and mentions that the barrel will be manufactured with 304 stainless steel per ASTM 240 after September 1, 2009. A note was included in Drawing Nos. R976A, Revision F; R976C, Revision H; and R976F, Revision E; to add details for drum screw materials specifications and revise descriptive reference notes. Several modifications were made to Drawing No. R1911, Revision F, including the mention of a 1/16" fillet weld for threaded boss to the top plate, a reference to the Bill of Materials specifications for stainless steel material fabrication, the classification of items as either important or not important to safety, and the specifications of the cap nut material as well as the correction of previous typographical errors.

A note was also added to Drawing No. R3056, Revision F, to cover material specifications for the lower insert tube (Item 8 from the Bill Of Materials) but this note does not apply to the socket head screws which utilize a 316 stainless steel material per DIN 912-A4. The cap nut material specification is now included on page 4 of the Drawing as AISA/SAE 321 SS.

A summary of authorizations for either manufacturing or service/maintenance configurations for the Model No. 976 Series packages is provided in the table below.

Table 1 – Model No. 976 Series Package Information

<u>Model No.</u>	<u>Configuration</u>
976A (drum and cork inserts)	Manufacturing
855 Inner Shield	Service/Maintenance only
976C (drum and cork inserts)	Manufacturing
3056 Inner Shield	Service/Maintenance only
976F	Manufacturing
1911 Inner Shield	Manufacturing

CONCLUSION

Based on the statements and representation contained in the application, as supplemented, the staff concludes the changes indicated in the application do not negatively affect the package and that the Model No. 976 Series packages meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9314, Revision No. 4,
on July 31, 2009.



U.S. Department
of Transportation

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

**Pipeline and
Hazardous Materials
Safety Administration**

CERTIFICATE NUMBER: USA/9314/B(U)-96, Revision 4

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