U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

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

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE B(U) RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/9314/B(U), REVISION 11

The Competent Authority of the United States certifies that the radioactive material package design described in this certificate satisfies the regulatory requirements for a Type B(U) package as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] The package design is approved for use within the United States for import and export shipments made in accordance with applicable international and domestic transport regulations.

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 11 (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 Engineering and Research, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

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[1] "Regulations for the Safe Transport of Radioactive Material, 2018 Edition, No. SSR-6, Revision 1" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

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

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 Management System activities required by Paragraph 306 of the IAEA regulations[1] 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. Special Conditions -

a. Aging Management protocols detailed in QSA Global In-Service Bulletin SB-28 dated January 2025 (attached) shall be followed.

5. Marking and Labeling - The package shall bear the marking USA/9314/B(U) in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on July 31, 2028. Previous editions which have not reached their expiration date may continue to be used.

This certificate is issued in accordance with paragraph(s) 810 of the IAEA Regulations and Section 173.471 of Title 49 of the Code of Federal Regulations, in response to the July 30, 2025 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:

September 03, 2025

William Quade
Acting Associate Administrator for
Hazardous Materials Safety

(DATE)

Revision 11 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9314, Revision 11 to the Regulations for the Safe Transport of Radioactive Material, 2018 Edition, No. SSR-6, Rev. 1.

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
9314	11	71-9314	USA/9314/B(U)-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)*

QSA Global, Inc.
40 North Avenue
Burlington, MA 01803

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

QSA Global, Inc., application dated July 11, 2023

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. This drum is a 20-gallon capacity, 16 gauge, stainless steel drum, with approximate external dimensions of 19 ¾” (502 mm) diameter and a height of 21 ¼” (540 mm). The drum lid is secured in place with a closure band, and four 3/8” – 16 x ¾” (19 mm) long 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 stainless steel blocks measuring 1” (25.4 mm) by 1” (25.4 mm) by ¾” (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. Alternatively, the drum lid can be constructed to replace the welded, threaded blocks with floating nuts retained in square tubes that are welded to the lid. 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 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

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

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 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)

(3) Drawings

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

R97600, Rev. E, sheets 1–4	Model No. 976 Transport Package
R97608, Rev. K, sheet 1	20 Gallon Drum Model 976

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

RCLM009, Rev. C, sheet 1	Clamp Band
R85590, Rev. K, sheets 1-6	Model 855 Source Changer
R3056, Rev. H, sheets 1-4	Model 3056 Shield Container Top Level Assy
RCLM011, Rev B	Clamp Band
R1911, Rev. H, sheets 1-6	Model 1911 Shield

The Model Nos. 976A, 976C and 976F drum and cork inserts, and the Model 1911 inner shield container, are authorized for fabrication.

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)	220
		Se-75	1,000 (37 TBq)	
		Yb-169	1,000 (37 TBq)	

[1] For 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).

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

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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.

   (c) No new fabrication of the Model Nos. 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.

   (d) 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. 10 of this certificate may be used until November 30, 2024.

9. Expiration date: July 31, 2029.

REFERENCES

QSA Global, Inc., application dated: July 11, 2023.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Signed by Diaz-Sanabria, Yoira
on 12/06/23

Yoira Diaz Sanabria, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: December 6, 2023

QSA GLOBAL.

SERVICE BULLETIN.

976 Series Extended Inspection & Maintenance for IAEA SSR-6: 2018 Compliance

Purpose

This document provides information applicable to the inspection and maintenance of the Model 976 Series[1] transport packages to comply with IAEA SSR-6 (2018). In addition to ensuring the packages are in accordance with the operating instructions supplied with the transport packages, per 10 CFR 71.87 and 71.89, specifically Sections 7 & 8 of the Model 976 Series Safety Analysis Report, compliance with this bulletin is required for all packages shipped under a USDOT certificate, or other foreign Type B certification, endorsed to IAEA SSR-6 (2018).

Package Inspection & Maintenance Requirements

The Model 976 Series packages must be maintained regularly by trained and qualified personnel to ensure the package complies with applicable Type B(U) or Type A approval requirements and the package maintains its integrity during transport.

The recommended inspection and maintenance requirements are based on the system's design, application, materials, anticipated work cycles, environmental factors of use under the normal and abnormal conditions of transport. A program of systematic maintenance will prolong the working life of the package in addition to ensuring safety during transport and use. Routine inspection of the packages are required prior to each shipment. In addition, a complete annual servicing of the 976 Series packages are necessary to ensure the package integrity.

Maintenance program administrators must recognize the need for maintenance intervals that are less than the required annual interval, especially in cases where the packages are used in severe environmental conditions. Maintenance program administrators must ensure the systems are completely serviced immediately after observed damage or after exposure to severe conditions. Extreme or severe conditions may include, but is not limited to, conditions where the package was:

- Immersed in water or mud.
- Subjected to high-concentrations of particulate such as fly ash, sand or foundry green-sand.
- Subjected to salt-water conditions, caustic or acidic materials.
- Subjected to accidental drops or falling objects.
- Whenever subjected to extreme environmental conditions.

The complete, annual inspection and maintenance (also required after removal from long term storage – see Section 4) involves an enhanced inspection and service for package components and major assemblies.

Personnel performing the inspections and maintenance in this bulletin must be adequately trained and approved to perform these duties. Personnel approved and qualified under either a USNRC approved QA program or an ISO 9001 QA program to perform Type B container inspection and maintenance would meet the training requirements in this bulletin.

1. General Requirements

a. The Model 976 Series transport packages must be loaded and closed in accordance with procedures that, at a minimum, include the requirements in Sections 7 & 8 of the SAR and this

[1] The 976 Series includes the Model 976A (inner shield Model 855), the Model 976C (inner shield Model 3056) and the Model 976F (inner shield Model 1911).

bulletin. Shipment of Type B quantities of radioactive material are authorized for sources specified in Section 2. Maintenance and inspection of these packages is in accordance with the additional requirements specified in Section 3 and 4.

NOTE: Package conformance after storage and prior to use for Type B shipments is ensured by proper inspection and maintenance. The materials used in the Model 976 Series packages are not vulnerable to degradation due to irradiation over time, and there will typically be no chemical/galvanic material interactions between package materials during storage so long that the packages are not exposed to hazardous chemicals and is stored under controlled environmental conditions[2].

For packages removed from storage and prior to shipment, the package components are inspected for any degradation due to non-use/storage. Any degradation identified will prevent the package use for shipment until correction by replacement, service and/or repair. (Reference: IAEA SSR-6 §503(e) & 613A).

b. Results of package annual inspections and maintenance covered in this bulletin must be recorded and include, at a minimum,

- The date of inspection and maintenance.
- Name and signature of the qualified individual performing the required inspections.
- Problems found and maintenance or repairs performed.
- Package model number (e.g., 976 Series) and the model number and serial number of the inner shield container.
- Associated equipment that was inspected and maintained.
- Part numbers and associated lot numbers or serial numbers of replacement parts installed.

If any defective/damaged components are identified on the package or source(s) contained in the 976 Series package, they must be removed from transport use and identified with a status indicator (tag, label, or tape) to prevent inadvertent shipment or use. Defective or damaged components must be repaired or replaced before continued use of the Model 976 Series package (or source assembly as applicable) in transport.

NOTE: Service/repair of any 976 Series package component including the inner shield container must be performed by, or under the direction and approval of, QSA Global, Inc. only.

Contact QSA Global, Inc. if additional guidance or assistance is needed to determine actions to deal with defective/damaged equipment.

2. Authorized Package Contents

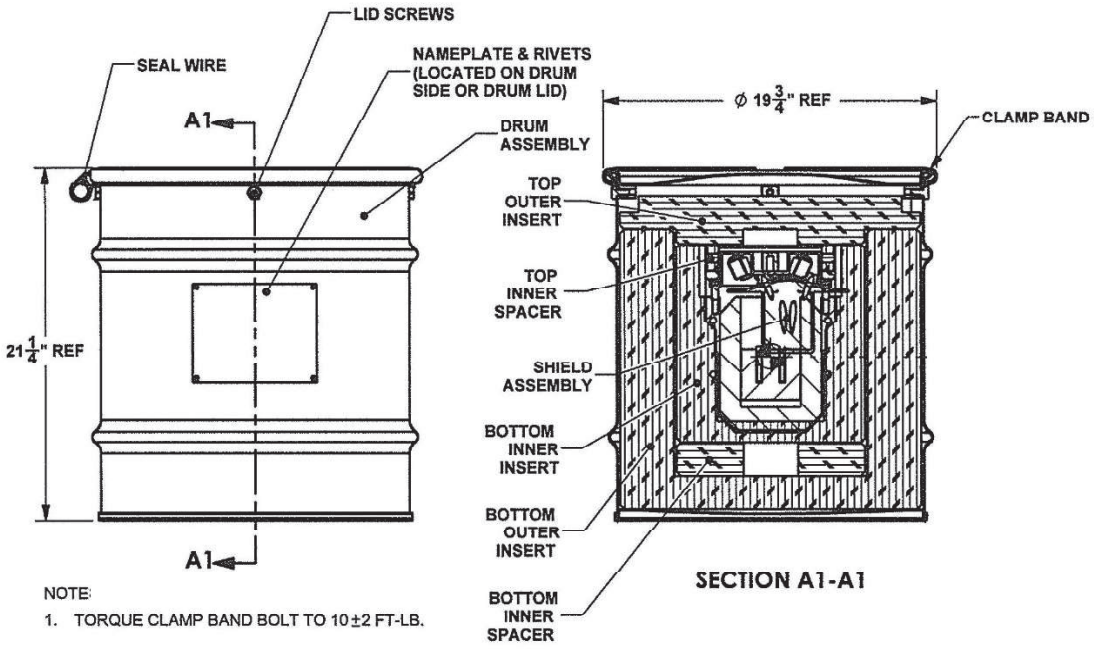
The Model 976 Series transport packages are designed for use with a special form source capsules as approved under a U.S. Department of Transportation special form certification[3]. The approved isotopes and maximum package activity limits are shown in Table A. Details of encapsulation as well as chemical and physical form of the radioactive material will comply with specifications approved under U.S. Department of Transportation or other Competent Authority special form certifications.

[2] Storage of the Model 976 Series packages should be in a temperature and humidity controlled area away from chemicals or other hazardous substances to prevent degradation of the package integrity while in storage.
[3] Special Form is defined in 10 CFR 71, 49 CFR 173, IAEA TS-R-1 and SSR-6.

Table A: Isotopes Permitted in the Model 976 Series

Model	Isotope as Special Form Sources	Maximum Activity	Maximum Depleted Uranium in Shield	Maximum Package Weight
976A	Ir-192[4]	1,000 Ci	135 lbs (22 mCi)	300 lbs (136 kgs)
	Se-75	1,000 Ci		
	Yb-169	865 Ci		
976C	Ir-192[4]	1,250 Ci	26 lbs (4.3 mCi)	190 lbs (86 kgs)
	Se-75	1,250 Ci		
	Yb-169	1,000 Ci		
976F	Ir-192[4]	1,000 Ci	12.3 lbs (2 mCi)[5]	263 lbs (119 kgs)
	Se-75	1,000 Ci		
	Yb-169	1,000 Ci		

3. Packaging Maintenance and Inspection Prior to Shipment



PART NAME	976A QTY	976C QTY	976F QTY
LID SCREWS	4	4	4
CLAMP BAND	1	1	1
SEAL WIRE	AR	AR	AR
RIVETS	4	4	4
NAMEPLATE	1	1	1
BOTTOM INNER SPACER	0	1	0
TOP INNER SPACER	0	4	4
BOTTOM INNER INSERT	0	1	1
TOP OUTER INSERT	1	1	1
BOTTOM OUTER INSERT	1	1	1
SHIELD ASSEMBLY MODEL 1911	0	0	1
SHIELD ASSEMBLY MODEL 3056	0	1	0
SHIELD ASSEMBLY MODEL 855	1	0	0
DRUM ASSEMBLY	1	1	1

976 Series Package General Assembly

a. If the package has been in storage for 1 year or longer, inspection to the requirements in Section 4 must be completed in addition to the maintenance and inspection listed in this section.

[4] For 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.
[5] Depleted uranium in the 1911 shield container only applies when using the P1992 & P1991 inserts.

b. Ensure all markings are legible including component serial numbers and the labels are securely attached to the package. Labels should be easily legible at a distance of roughly 3 ft (1 m) and contain all necessary information.

c. Inspect the container sub-assemblies/components for signs of damage or significant degradation. Ensure all welds on the drum, clamp band, and inner shield containers are intact and the components are free of heavy rust and damage. Ensure the cork inserts are intact and able to perform their function of positioning the inner shield within the drum. If there is any evidence of damage which could adversely impact the component's ability to perform its function on the package, contact QSA Global, Inc. prior to shipping.

d. Inspect the Model 855 lid gasket to ensure it is intact, undegraded and adhered to the top surface of the cask base.

e. Assure all bolts, washers, nuts and fasteners (hardware), inserts and hold down components (e.g. source tube caps) required for assembly of the package, and as specified on the drawings referenced on the Type B transport certificate, are fit for use. Examine the visible external surfaces for any signs of damage including fatigue cracking, worn/damaged threads, etc.

   Note: The hardware must be replaced if they are no longer fit for use (e.g., threads stripped, unable to fully thread, signs of cracking, etc.). If replacement hardware is required, contact QSA Global, Inc. to obtain parts. This is necessary to ensure replacement hardware meets all applicable specifications listed on the drawings referenced on the Type B transport certificate.

f. Ensure the inner shield containers can be fully assembled per the drawings and can be loaded into the package drum and cork inserts. For the Model 855 inner shield assembly, check each lock assembly to ensure the lock functions and engages an inactive, demo A424-9 source assembly prior to loading an active source in the lock assembly for transport.

g. Ensure the package can be assembled, including application of hardware torque requirements and attachment of a seal wire as identified on drawing R97600 Revision E.

h. If the container fails any of the inspections in steps 3.a-g, remove the container from use until it can be brought into compliance with the Type B certificate.

4. Packaging Annual Maintenance and Inspection

Model 976 Series packages must receive inspection and maintenance at least once a year. Annual maintenance and inspection is performed by QSA Global, Inc. (or its approved service centers). The annual inspection and maintenance must be performed by individuals specifically trained, qualified and authorized for this work. If a package has not been inspected and maintained within the last year based on an inspection sticker on the package, contact QSA Global, Inc. to arrange for inspection prior to further Type B transport of the package.

To perform the annual maintenance/inspection, the package must be disassembled and the major package sub-assemblies thoroughly cleaned and inspected to ensure the integrity of components that are critical to safety. These procedures can only be performed on an empty inner shield, which requires transfer of any radioactive source assembly(ies) into an alternate, approved storage container.

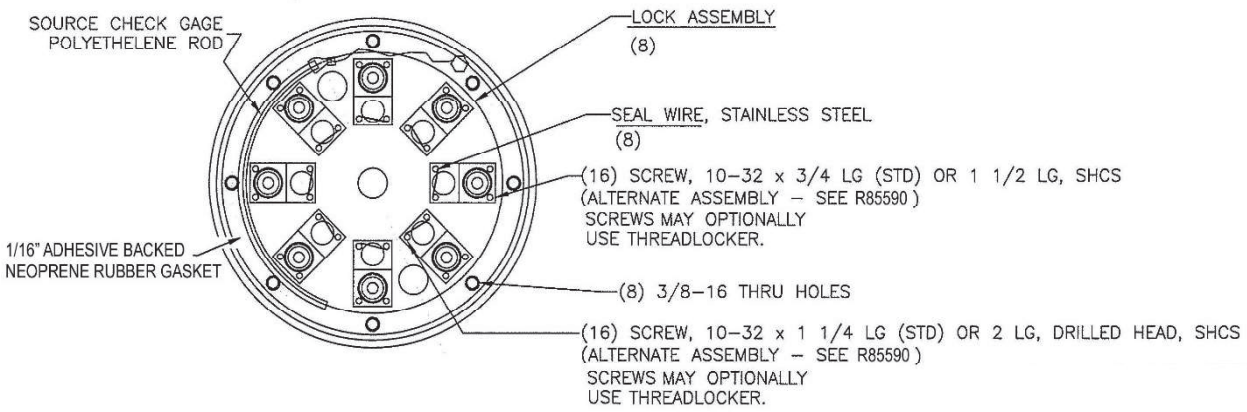
A leak test of a sealed source must be performed every 6 months or prior to its first use after removal from storage. Acceptable results of a radio-assay must indicate removable contamination is less than <185 Bq (0.005 µCi). If any removed source requires a leak test, perform the test and obtain the results prior to transferring the source from the package into an alternate, approved storage container.

a. If the package has not received an annual inspection per this section within the last year or the package has been in storage for 1 year or longer, inspection to the requirements in this Section must be completed.

b. Complete the inspections in Section 3.b through 3.h.

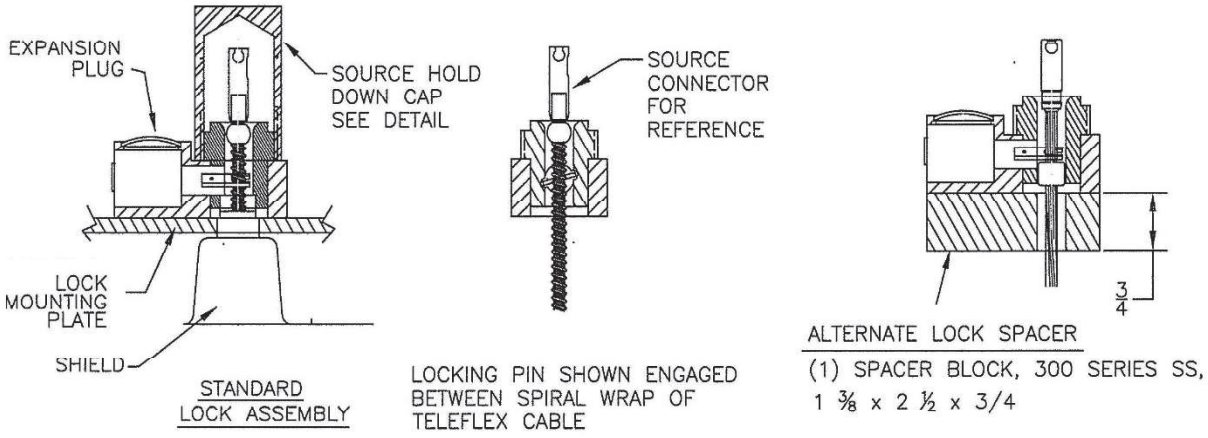
c. Clean the exterior of the package drum and inner shield container using a mild detergent solution to remove any dirt and grime.

d. **Additional Model 855 Inner Shield Maintenance**



1) Replace the neoprene gasket located on the top of the shield body.

2) Replace the lock assembly attachment screws and re-apply the stainless steel seal wire on the two inner screws on each lock assembly. Check each reattached lock assembly to ensure the lock functions and engages an inactive, demo A424-9 source assembly prior to loading an active source in the lock assembly for transport. If the lock fails to secure the inactive source assembly, further service/maintenance of the assembly components may be required or the assembly may require replacement. Remove the 855 container from use until repaired.



e. If the package meets the requirements of 4 b. through d., complete an annual inspection sticker and apply one to the drum above the nameplate and one to the inner shield container above the shield container identification nameplate or on the outer cylinder of the shield container body.

f. Maintain records of this inspection and maintenance (see 1.b in this bulletin).

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

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

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

ORIGINAL REGISTRANT(S):

QSA Global, Inc.
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Burlington, MA, 01803
USA

Source Production and Equipment Company, Inc.
113 Teal Street
St. Rose, LA, 70087
USA