



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/9263/B(U)-96, REVISION 10**

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 - SPEC-150.
2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9263, Revision 8 (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.

CERTIFICATE USA/9263/B(U)-96, REVISION 10

- 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/9263/B(U)-96 in addition to other required markings and labeling.
5. Expiration Date - This certificate expires on June 30, 2015. On February 28, 2012, this certificate supersedes all previous revisions of USA/9263/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 March 01, 2011 petition by Source Production and Equipment Company, St. Rose, LA, and in consideration of other information on file in this Office.

Certified By:



Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

Mar 17 2011

(DATE)

Revision 10 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9263, Revision 8.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

a. CERTIFICATE NUMBER 9263	b. REVISION NUMBER 8	c. DOCKET NUMBER 71-9263	d. PACKAGE IDENTIFICATION NUMBER USA/9263/B(U)-96	PAGE 1	PAGES OF 3
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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>)
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 February 14, 2011, 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.: SPEC-150
- (2) Description

A welded titanium encased, uranium shielded, radiographic exposure device. Primary components consist of an outer titanium shell, internal supports, depleted uranium shield, and a titanium, titanium alloy or zircalloy S-tube. The contents are securely positioned in the S-tube by a source cable lock assembly and source safety plug assembly. The unit resembles a rectangular box approximately 5.4 inches wide, 5.6 inches high and 14.5 inches long. The maximum weight of the package is 53.5 pounds.

- (3) Drawings

The packaging is constructed and assembled in accordance with Source Production and Equipment Company, Inc. Drawing Nos. 15B000, Rev. 10; 15B001-3, Rev. 3; 15B002-A, Rev. 9; 15B008, Rev. 7; 19B005, Rev. 3; 19B006, Rev. 3; and 190909, Rev. 0.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9263	8	71-9263	USA/9263/B(U)-96	2 OF	3

(b) Contents

(1) Type and form of material

Iridium-192, Selenium-75, and Ytterbium-169 as encapsulated sealed sources meeting the requirements of special form radioactive material.

(2) Maximum quantity of material per package

5.55 TBq (150 Ci) (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. The source shall be secured in the shielded position of the packaging by the source assembly lock cap and safety plug assembly. The safety plug assembly, lock cap and source assembly used must be fabricated of materials capable of resisting a 1475 degrees Fahrenheit 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 safety plug assembly 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.

Packagings must be marked with Package Identification Number USA/9263/B(U)-96.

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, as supplemented, and

(b) Each packaging must meet the Acceptance Tests and Maintenance Program in Section 8, of the application, as supplemented.

(c) The packaging will be fabricated and inspected in accordance with the 2007 or later edition of the ASME Code, Section VIII, Division 1. Alternatively, the 2007 or later edition of the AWS D1.9 Welding Code may be used for fabrication and inspection. Regardless of which construction code is used, any single package must be entirely fabricated and inspected in accordance with only a single edition of the referenced construction code. No mixing of codes or editions is permitted for a single package.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9263	8	71-9263	USA/9263/B(U)-96	3 OF	3

9. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
10. Revision No. 7 of the certificate may be used until February 28, 2012.
11. Expiration date: June 30, 2015.

REFERENCES

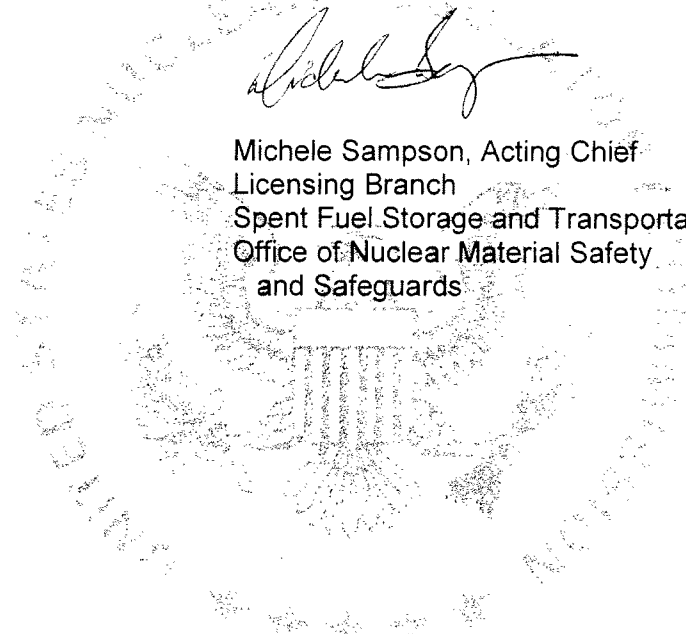
Source Production and Equipment Company, Inc., application dated February 14, 2011.
Supplement dated February 18, 2011.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



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

Date: February 28, 2011





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

SAFETY EVALUATION REPORT

Docket No. 71-9263
Model No. SPEC-150 Package
Certificate of Compliance No. 9263
Revision No. 8

SUMMARY

By application dated October 19, 2009, as supplemented November 13, 2009, January 13, February 14 and 18, 2011, Source Production & Equipment Co., Inc. (SPEC or the applicant), requested a revision to Certificate of Compliance (CoC) No. 9263 for the Model No. SPEC-150 package.

The applicant requested that the safety classification of the depleted uranium shield be downgraded from "A" to "B" and be removed from the licensing drawings. The applicant also requested that the package be certified for transport of special form sources of Se-75 and Yb-169. Licensing drawings were revised and updated as part of this request.

Accordingly, CoC No. 9263 has been revised, based on the statements and representations in the application, and staff agrees that the changes do not affect the ability of the package to meet the requirements of Title 10 of the Code of Federal Regulations (10 CFR) Part 71.

EVALUATION

By application dated October 19, 2009, as supplemented on November 13, 2009, January 13, February 14 and 18, 2011, Source Production & Equipment Co., Inc. (SPEC or the applicant), requested a revision to Certificate of Compliance (CoC) No. 9263 for the Model No. SPEC-150 package. SPEC requested changes in the packaging drawings and additional authorized contents. SPEC submitted a consolidated application, dated February 14, 2011, that supersedes all previous revisions of the application. SPEC also submitted a first supplement dated February 18, 2011, to revise drawings and include the Bill of Materials at staff's request. The staff determined that the documentation was available and complete.

The application was evaluated against the regulatory standards in 10 CFR Part 71, including the general standards for all packages and performance standards under normal conditions of transport (NCT) and hypothetical accident conditions (HAC). Staff reviewed the application using the guidance in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

Based on the statements and representations in the application, and the conditions listed in the CoC, the staff has reasonable assurance that the design has been adequately described and evaluated and meets the requirements of 10 CFR Part 71.

1.0 GENERAL INFORMATION

1.1 Package Description

The package description is unchanged from previous revisions of the certificate.

1.2 Package drawings

The drawings were revised to incorporate, in particular, changes to the quality class of the shielding material. The change of the depleted uranium shield's safety classification from "A" to "B" and its removal from the licensing drawings is acceptable, and is in accordance with the guidance in NUREG/CR 6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," and NUREG/CR 5502, "Engineering Drawings for 10 CFR Part 71 Package Approvals." Furthermore, this change to the licensing drawings is consistent with other applications of similar designs.

A number of corrections were also made on drawings 19B005, 19B006 and 190909 to clarify that the device lock is the primary mechanism for holding the source assembly lock in the closed position. Drawing 15B002A was also revised to clarify that all welds shown on licensing drawings are performed in accordance with either the requirements of ASME Section VIII, Division I, requirements or of AWS D1.9.

A summary of the changes made to the licensing drawings is presented below:

Drawing	Rev.	Summary of Changes
15B000	10	Removed fabrication and inspection notes which are now shown on drawing 15B002A. Added supplemental shielding note from 15B008 Rev 5; added maximum weight and materials from 15B002A Rev 6. Added note to refer to the application for material specifications for serial number 1475 and newer.
15B002A	9	Added fabrication and inspection notes for ITS and non-ITS welds, added material specifications for safety-related components for serial number 1475 and newer.
15B008	7	Removed notes that did not specifically describe the depleted uranium shield. Added minimum weight and density for serial number 1475 and newer.
19B005	3	Added material specifications for safety-related components for serial number 1475 and newer, the source assembly lock, device lock, lock module housing and lock module faceplate.
19B006	3	Added material specifications for safety-related components for serial number 1475 and newer, the source assembly lock and device lock.
190909	0	No change

Drawing 15B001-3, Rev. 3, was added to the licensing drawings referenced in the certificate. This drawing contains the Bill of Materials and is also referenced in drawings 15B000, 15B002A, 19B005 and 19B006.

1.3 Contents

The applicant requested the addition of Selenium-75 and Ytterbium -169 as authorized contents of the package and provided a shielding analysis to demonstrate compliance with regulatory requirements, up to 150 Ci of either Se-75 or Yb-169.

These radionuclides are contained, secured, and locked within the package in exactly the same manner as the previously authorized contents, i.e., the Iridium-192 sealed sources as special form materials. Since the encapsulated Se-75 and Yb-169 sources are not fissionable, weigh less, have a lower decay heat rate and lower exposure rates than Ir-192, the addition of these two isotopes has no adverse effect on the containment, shielding, and thermal capabilities of the package.

1.4 Evaluation Findings

The staff has reviewed the proposed changes for the Model No. SPEC-150 package. Based on the statements and representations in the application, the staff finds that the proposed changes are acceptable. The proposed changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71, and will be incorporated into the Certificate of Compliance.

2.0 STRUCTURAL AND MATERIALS REVIEW

The staff reviewed the application to revise the Model No. SPEC-150 package materials design and evaluation to assess whether the package will remain within the allowable values or criteria for normal conditions of transport (NCT) and hypothetical accident conditions (HAC) as required in 10 CFR Part 71. This application was also reviewed to determine whether the package fulfills the acceptance criteria listed in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

2.1 Structural Evaluation

The structural design of the package has not been modified. However, on February 3, 2011, the applicant tested a package, serial number 331, as prepared for transport, to confirm that the Model No. SPEC-150 package meets NCT requirements.

The package was loaded with a 131.29 Ci Ir-192 source and subject to a penetration test followed by the drop tests. The target for the penetration test was the safety plug of the package while the drop test impact points were flat on the bottom plate, bottom right corner on the outlet end, bottom left corner on the lock end, top left corner on the outlet end and flat on the lock cap.

The test results show there was no loss of radioactive contents, no adverse effect on the integrity of the shielding of the package and no significant increase of radiation levels at one meter from the surface (See also Chapter No. 5 of this SER). The test results show that there is no reduction of the effectiveness of the package.

2.2 Materials Evaluation

No materials changes were made to the Model No. SPEC-150 package for this amendment request. However, as indicated above, the application and the licensing drawings were updated to provide more specific information about welds and the materials used to fabricate the package.

2.2.1 Welds

Welds that are important to safety (ITS) are now identified as such on the licensing drawings. This clarification eliminates confusion about which welds are structural in nature (thereby being ITS) and those welds which are merely fabrication aids and thus not ITS.

The governing construction code for welding (and an alternative) is now specified on the drawing along with the associated code inspection requirements. All ITS welds are examined by means of liquid penetrant test (PT). It is noted that the non-ITS welds are also subject to a code PT surface exam. This ensures that these fabrication aids have not caused any defects in the base material of the associated ITS structural component.

At the time of this license amendment request, the construction code is the American Society of Mechanical Engineers (ASME) Section VIII, Division 1. The licensee indicated that future packages may be fabricated and examined in accordance with the American Welding Society (AWS) D1.9 Code. This future change from ASME to AWS is intended as a permanent change. Regardless of which construction code is employed, any one package would be entirely fabricated under a single Code, either ASME or AWS. In accordance with a long-standing staff position, no mixing of construction codes would occur during the fabrication of any package. This position is reflected into a new condition of the CoC. The most recent edition and addenda of the governing construction code is and will be employed.

The staff finds that the identification of ITS welds on the licensing drawings, along with more specific information regarding the code of construction, provision for a future alternative construction code, and identification of more specific inspection requirements is appropriate and acceptable.

2.2.2 Materials

The materials of fabrication are now better identified and specified in the consolidated application dated February 14, 2011.

Major changes were made to the Bill of Materials to allow for alternative ASME or American Society for Testing Materials (ASTM) material specifications and/or material grades that would be permitted for fabrication. The licensee desires to have a variety of material specification and material grades approved and available for use in fabrication. This provides the licensee needed flexibility in material procurement to reflect differing suppliers or market changes in available material specifications and/or grades.

The ITS components fabricated from titanium (Ti) will all use commercial grade 2 Ti, produced to any one of several specifications that include multiple specifications for plate, seamless drawn tube or pipe, and welded tube or pipe, among other product forms.

The stainless steel components composing the Model No. SPEC 150 package tamper-resisting lock may be fabricated from any one of the large number of 300-series stainless steel types covered by some 21 ASTM/ASME material specifications. Specification of such a broad range of potential material grade choices is unusual. However, the 300-series stainless steels all have similar mechanical properties despite their differing chemical compositions. For the intended application, the applicant found that the strength requirements for the lock components would be met by any 300-series stainless steel, thus making any grade acceptable. Such a broad materials choice would thus easily satisfy the applicant's desire to have a variety of approved material grades available for fabrication.

The staff finds the applicant's Bill of Materials, although unusual in its broad scope, to be acceptable for its intended application.

2.3 Conclusion

Based on the statements and representations in the application, staff agrees that the applicant has shown that the use of the Model No. SPEC-150 package meets the structural and material requirements of 10 CFR Part 71.

3.0 THERMAL REVIEW

The amendment request does not affect the thermal performance of the Model No. SPEC-150 package.

Staff had previously assessed whether the package temperatures remain within their allowable values or criteria for NCT and HAC, as required in 10 CFR Part 71. Based on its review, staff concluded that the Model No. SPEC-150 package design has been adequately evaluated and meets the thermal requirements set forth in 10 CFR Part 71.

4.0 CONTAINMENT REVIEW

The primary containment is the sealed source capsule meeting the requirements of 10 CFR 71.75 and 49 CFR 173.469 for special form radioactive material. The Model No. SPEC-150 package meets the containment requirements set forth in 10 CFR Part 71.

5.0 SHIELDING REVIEW

The staff reviewed the application to verify that the shielding design has been described and evaluated under NCT and HAC, as required in 10 CFR Part 71. This application was also reviewed to determine whether the package fulfills the acceptance criteria listed in Section 5 (Shielding Review) of NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

5.1 Shielding Review Description

The staff reviewed the application to assess the impact of adding ⁷⁵Se and ¹⁶⁹Yb to the list of approved contents for the Model No. SPEC-150 package.

5.2 Evaluation

The NRC staff evaluated the amendment request, as well as some portions of the current application and previous staff' SER inputs. The following tables show the maximum dose rates presented in the application. These are based on the applicant's measurements of Iridium-192.

Table 5-1: Peak Dose Rates for Normal Conditions of Transport [mSv/h (mrem/hr)]

	Package Surface			1 Meter from Package Surface		
	Top	Side	Bottom	Top	Side	Bottom
Gamma*	1.1 (110)	1.4 (144)	1.1 (116)	0.011 (1.1)	0.016 (1.6)	0.011 (1.1)
10 CFR 71.47(a) Limit	2 (200)	2 (200)	2 (200)	0.1 (10)**	0.1 (10)**	0.1 (10)**
* There is no neutron component to the dose rate.						
** Transport index may not exceed 10.						

Table No. 5-2: Peak Surface Dose Rates for Hypothetical Accident Conditions [mSv/h (mrem/hr)]

	On Package Surface		
	Top	Side	Bottom
Gamma*	1.64 (164)	2.29 (229)	1.47 (147)
10 CFR 71.51(a) Limit	10 (1000)	10 (1000)	10 (1000)
* There is no neutron component to the dose rate.			

Dose rate measurements at one (1) meter from the package surface were not included since the results in Table No. 5-2 show that surface dose rates are below the one (1) meter limits specified in 10 CFR 71.51(a)(2).

An analysis was performed to demonstrate the shielding efficiency of the package when containing up to 150 Curies of either Selenium-75 or Ytterbium-169 source material. Using the exposure rate constants derived from the 1970 Edition of the Radiological Health Handbook, the

exposure (in mR/hr) at the package surface and one (1) meter from the surface was calculated and shown to be significantly less than the limits specified in 10 CFR 71.47, as presented in Table No. 5-3.

Table No. 5-3: Dose Rates for ⁷⁵Selenium and ¹⁶⁹Ytterbium

	Package Surface (mR/hr)	1 Meter from Package Surface (mR/hr)
⁷⁵ Selenium	0.012	4.8×10^{-5}
¹⁶⁹ Ytterbium	0.0086	3.5×10^{-5}

5.3 Conclusion

The staff reviewed the proposed changes for the SPEC-150 radiography device. Based on the statements and representations in the application, the staff finds that the proposed changes are acceptable. The proposed changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71, and will be incorporated into the Certificate of Compliance.

Based on its review, staff concludes that the Model No. SPEC-150 package design has been adequately evaluated for radiation shielding for the sources to be added and meets the requirements set forth in 10 CFR Part 71.

6.0 CRITICALITY REVIEW

This section is not applicable. The package does not contain and is not designed for transport of fissile material.

7.0 PACKAGE OPERATIONS

The staff reviewed the revisions to Chapter 7 of the application to verify that the revised operating procedures meet the requirements of 10 CFR Part 71. At staff's request, the applicant added a visual check of the exposed fasteners and welds. Based on the statements and representations in the application, the staff concludes that the revised acceptance tests for the packaging meet the requirements of 10 CFR Part 71.

8.0 ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

The staff reviewed the revisions to Chapter 8 of the application, including the description of the weld joints that are visually inspected, the survey of every shield prior to first use, and the visual check of fasteners to verify that the acceptance tests for the packaging meet the requirements of 10 CFR Part 71.

The Model No. SPEC 150 package will be fabricated and inspected in accordance with the 2007 or later edition of the ASME Code, Section VIII, Division 1. Alternatively, the 2007 or later

edition of the AWS D1.9 Welding Code may be used for fabrication and inspection. Regardless of which construction code is used, any single package must be entirely fabricated and inspected in accordance with only a single edition of the referenced construction code. No mixing of codes or editions is permitted for a single package.

Based on the statements and representations in the application, the staff concludes that the revised acceptance tests for the packaging meet the requirements of 10 CFR Part 71.

CONDITIONS

The following changes have been made to the Certificate:

Item No. 3(b) was amended to include the consolidated application dated February 14, 2011, as supplemented on February 18, 2011.

Condition No. 5(a)(3) was amended to include the latest revisions of the licensing drawings, i.e., Drawing Nos. 15B000, Rev. 10; 15B002A, Rev. 9; 15B008, Rev. 7; 19B005, Rev. 3; 19B006, Rev. 3; and 190909, Rev. 0. The Bill of Materials is included as Drawing 15B001-3, Rev.3.

Condition No. 5(b)(1) was modified to include Selenium-75 and Ytterbium-169 as authorized encapsulated contents in special form sealed sources.

Condition No. 8(c) was added to specify that no mixing of codes or editions is allowed. The packaging must be entirely fabricated and inspected in accordance with only a single edition of the referenced construction and or welding code.

Condition No. 10 was modified to allow the use of Revision No. 7 of the certificate for approximately one year.

As a consequence of the modification of previous Condition No. 10 in the certificate, the previous Condition No. 10 was renumbered 11. The expiration date of the certificate was not changed. The consolidated application, dated February 14, 2011, as supplemented, was included in the References Section.

CONCLUSION

Based on the statements and representations in the application, and the conditions listed above, the staff concludes that the Model No. SPEC-150 package design has been adequately described and evaluated and that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9263, Revision No. 8,
on February 14, 2011.



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/9263/B(U)-96, Revision 10

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