June 28, 2005

Ms. Lori Podolak
AEA Technology/QSA Inc.
40 North Avenue
Burlington, MA 01803

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9035 FOR THE MODEL NO. 680-OP PACKAGE

Dear Ms. Podolak:

As requested by your application dated September 30, 2004, as supplemented, and your application dated April 22, 2005, enclosed is Certificate of Compliance No. 9035, Revision No. 19, for the Model No. 680-OP package. This certificate supersedes, in its entirety, Certificate of Compliance No. 9035, Revision No. 18, dated September 13, 2001. Changes made to the enclosed certificate are indicated by vertical lines in the margin. The staff's Safety Evaluation Report is also enclosed.

Those on the attached list have been registered as users of the package under the general license provisions of 10 CFR 71.17 or 49 CFR 173.471. The approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471. Registered Users may request by letter to remove their names from the Registered Users List.

If you have any questions regarding this certificate, please contact me or Ms. Nancy Osgood of my staff at (301) 415-8500.

Sincerely,

/RA by Stewart Brown Acting For/

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

Docket No.: 71-9035
TAC No.: L23772

Enclosures: 1. Certificate of Compliance
No. 9035, Rev. No. 19
2. Safety Evaluation Report

cc w/encl: R. Boyle, Department of Transportation
J. Shuler, Department of Energy
RAMCERTS
Registered Users

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Distribution: (Closes L23772) RBellamy,RI JMadera,RIII BSpitzberg,RIV DCollins,RII SBaggett
SWilliams JBarto JUmana JWalker MRahimi JCaverly JCuadrado
Filename: E:\Filenet\ML051800152.wpd and 71-9035.r19.wpd
Package: ML051800136
Ltr & SE: ML051800152
CoC: ML051800234

OFC	SFPO	E	SFPO	E	SFPO		SFPO		SFPO	
NAME	NLOsgood		MRDeBose		TJChuang		GSBjorkman		RJLewis SBrown for	
DATE	6/15/05		6/15/05		6/20/05		6/23/05		6/28/05	

OFFICIAL RECORD COPY

SAFETY EVALUATION REPORT
Model No. 680-OP Package
Certificate of Compliance No. 9035
Revision No. 19

SUMMARY

By application dated September 30, 2004, as supplemented October 6, 2004, and May 5, 2005, AEA Technology/QSA, Inc., requested an amendment to Certificate of Compliance No. 9035, for the Model No. 680-OP package. The supplement dated May 5, 2005, included a consolidated application and superceded the previous submittals. AEA requested that the package identification number for the package be revised to include the “-96" designation. AEA requested minor design changes to the package, and submitted revised packaging drawings. AEA also provided a reformatted application, and made editorial and administrative changes throughout the document. In addition, by application dated April 22, 2005, AEA requested renewal of the Certificate of Compliance.

Based on the statements and representations in the applications, as supplemented, and for the reasons stated in this Safety Evaluation Report, we agree that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

EVALUATION

AEA requested the "-96" designation for the package, as specified in 10 CFR 71.19(e). AEA submitted a consolidated application that addressed the changes in regulatory requirements in the revised Part 71 regulations that became effective on October 1, 2004. The application was reformatted consistent with NRC draft Regulatory Guide DG-7003, dated December 2003, that was the update to Regulatory Guide 7.9, "Standard Format and Content of Part 71 Applications for Approval of Packages for Radioactive Material." The staff agrees that the changes in 10 CFR Part 71 that became effective on October 1, 2004, do not affect the package design.

1. GENERAL INFORMATION

1.1 Packaging Description

The Model No. 680-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 1/2 inches high. Polyurethane foam and wood inserts position the Model 680 series projectors in the center of the container and provide impact protection. The projector consists of an outer steel shell with a depleted uranium shield with a central "S" tube. The radioactive source is positioned within the shield in the "S" tube by a source cable locking device and shipping plug. 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 625 pounds and the maximum weight of the projector is 465 pounds.

The applicant revised the general packaging description in Section 1.2 of the application. In general, the changes were minor and editorial in nature. The maximum packaging weight was increased from 615 pounds to 625 pounds to account for reasonable variations in packaging manufacture. The applicant stated that the change in the maximum weight will not have a significant impact on the package performance.

1.2 Packaging Drawings

The applicant submitted a revised set of packaging drawings. The updated drawings included:

R68090, Sheets 1-7, Ref. F	Model 680 Projector
R680-OP, Sheets 1-5, Rev. B	Model 680-OP

These two drawings superceded the previously referenced packaging drawings. The drawings were revised to: combine drawings, show generic tolerances, remove information that was not related to safety, and clarify safety-related information. The applicant provided a complete list of drawing changes in an attachment to the original application dated September 30, 2004. The list included the reason for each change and the justification that the change would not impact safety.

1.3 Contents

The authorized content of the package is a maximum 110 curies (output) of cobalt-60 in sources that meet the requirements of special form. The term "output curies" is intended to quantify the source activity in terms of radiation dose rate from the sealed source. The conversion of dose rate to source activity was defined in American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography." To clarify the method used to determine the output activity, Condition No. 5(b)(2) of the certificate has been revised to specify the dose rate to activity conversion value. That is, the quantity of radioactivity in output curies is to be 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. This method is documented in the ANS N432-1980 standard. This change in the certificate is considered editorial in nature, and was made for clarity. In addition, the maximum quantity of radioactivity per package in terabecquerels equivalent to 110 curies (4.1 TBq) has been added.

2. STRUCTURAL

The applicant made minor changes throughout Section 2 of the application, and provided a list of changes in an attachment to the original application dated September 30, 2004. The staff reviewed the revised Section 2 of the application. In general, the section was revised for clarity and to be consistent with the revised packaging drawings. The section was also reformatted to address new regulatory requirements for the "-96" designation, as described in 10 CFR 71.19(e), and to be consistent with Draft Regulatory Guide DG-7003. The applicant also revised Section 2.4.1 to correct calculations for package lifting. The revised calculations showed that the package meets the lifting standards in 10 CFR 71.45(a).

The applicant made minor design changes to the packaging, and provided a revised set of packaging drawings. The maximum total dead weight of the package was increased from 615 to 625 pounds. However, the maximum weight of the projector (465 pounds) was not changed. The package was evaluated by a combination of physical tests and analyses, and the consolidated application includes the test plans and test reports in Appendix 2.12.

The applicant used physical tests and analyses to demonstrate that the package design meets the requirements under normal conditions of transport. The thermal evaluation due to insolation and decay heat were performed to show the maximum wall temperature was below the regulatory limit. Other requirements, for example, cold temperatures, reduced and increased external pressure, vibration, water spray, were not affected by the design changes. Based on the test results and analyses, it was concluded that the package maintained its structural integrity and shielding effectiveness under the tests in 10 CFR 71.71.

The applicant also used tests and analyses to demonstrate that the package design meets the performance requirements under hypothetical accident conditions. Two test specimens (TP72(D) and TP72-S1(B)) were tested in the accident sequence of a 30-foot drop, followed by the puncture and thermal tests. Four specimens (TP72(B), TP72-S1(C), TP72(E) and TP89(B)) were subjected to the drop and puncture tests. The test results showed that the maximum dose rates after the tests meet the requirements of 10 CFR 71.51(a)(2), i.e., dose rates were less than 1 rem/hour at 1 meter from the package surface. Section 2.7 was revised to include justification that the corner drop was not most damaging, when compared to the drop orientations chosen for the physical tests. Section 2.5.1 was revised to include a description of the test pad and puncture bar, to demonstrate that they meet the requirements specified in 10 CFR 71.73(c). Section 2.6.2 was revised to clarify that the physical testing performed at -40°C was considered to be worst case for showing the package was not susceptible to failure by brittle fracture. The test results are summarized in Table 2.7A of the application. In addition, the applicant provided corrected calculations for stresses in the thin-walled cylindrical capsule subjected to hypothetical accident conditions. The revised calculations were included in Section 2.7.4.3. This section was also revised to correct the inside diameter of the source capsule.

The applicant has shown and the staff agrees that the changes made in the package design do not affect the ability of the package to meet the structural requirements of 10 CFR Part 71.

CONCLUSIONS

The Certificate of Compliance has been amended as follows:

- The package identification number has been revised to USA/9035/B(U)-96 in accordance with 71.19(e). To allow time to modify the packaging markings to include the “-96" designation, Condition No. 9 has been added to allow use of packages marked with the “-85" designation for a period of approximately one year.

- Condition No. 5(a)(2), packaging description, was revised to specify a maximum package weight of 625 pounds.

- Condition No. 5(a)(3) of the certificate has been revised to reference the updated packaging drawings.

- Condition No. 5(b)(2) of the certificate has been revised to clarify the derivation of the maximum quantity of cobalt-60 in terms of output curies, and to include the corresponding radioactivity in units of terabecquerel.

- As specified in the revised Condition No. 11, the certificate has been renewed for a five year term that expires June 30, 2010.

Based on the statements and representations in the application, as supplemented, the staff agrees 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. 9035,
Revision No. 19, on 6/28/2005.