

May 26, 2005

Mr. David W. Turner
GE Nuclear Energy
Vallecitos Nuclear Center
6705 Vallecitos Road
Sunol, CA 94586

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9228 FOR THE MODEL NO. 2000
PACKAGE

Dear Mr. Turner:

As requested by your application dated March 25, 2005, as supplemented May 4, 5, and 23, 2005, enclosed is Certificate of Compliance No. 9228, Revision No. 21, for the Model No. 2000 package. This certificate supersedes, in its entirety, Certificate of Compliance No. 9228, Revision No. 20, dated April 22, 2002. 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/

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

Docket No.: 71-9228
TAC No.: L23828

Enclosures: 1. Certificate of Compliance
No. 9228, Rev. No. 21
2. Safety Evaluation Report

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

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DATE	/ /05		/ /05		/ /05	/ /05

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SAFETY EVALUATION REPORT
Model No. 2000 Package
Certificate of Compliance No. 9228
Revision No. 21

SUMMARY

By application dated March 25, as supplemented May 4, 5, and 23, 2005, GE Nuclear Energy requested an amendment to Certificate of Compliance No. 9228 for the Model No. 2000 package. GE requested two changes: (1) that the package be approved for transport in the horizontal orientation for the source, byproduct, and special nuclear material and irradiated fuel contents described in Condition Nos. 5(b)(1)(i) and 5(b)(1)(ii) of the Certificate of Compliance, and (2) that the Package Identification Number be revised to include the "-96" designation. To support the request, GE provided a shielding evaluation for irradiated fuel and cobalt-60 sources with the package in the horizontal orientation to demonstrate that the radiation dose rates on the package and around the vehicle remain within the regulatory limits. GE also included an evaluation of the package to the revised 10 CFR Part 71 regulations in accordance with 10 CFR 71.19(e).

Based on the statements and representations in the application, 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.

HORIZONTAL SHIPPING CONFIGURATION

The applicant requested that the irradiated reactor fuel and the source, byproduct, and special nuclear material contents described in Condition Nos. 5(b)(1)(i) and 5(b)(1)(ii) of the Certificate be authorized for horizontal transport. In support of this request, the applicant provided a supplemental shielding analysis for the package.

The package was previously evaluated for shipment of research reactor (MTR and TRIGA) spent fuel in the horizontal orientation. The applicant performed additional shielding analyses for irradiated fuel and byproduct material sources with the package in the horizontal orientation. For irradiated fuel, the applicant used the source terms derived previously (Sections 5.2.1 and 5.2.2 of the application). Radiation dose rates were calculated using the MCNP 4a computer code. The dose points chosen for the evaluation included (1) a position corresponding to the occupied cab of a truck, (2) a point 2 meters from the vertical plane at the back edge of the truck trailer, and (3) the closest accessible point at the bottom (back) end of the package. The orientation of the package was assumed to be with the top (lid) end of the package oriented to the front of the truck, consistent with the previous analysis for MTR and TRIGA fuels. The orientation is specified in Condition No. 16 of the Certificate. The revised analysis was performed for the normal conditions of transport, since previous analyses for these contents are applicable to accident conditions. For byproduct material, the applicant used the cobalt-60 source term equivalent to 600 watts decay heat. Cobalt-60 was considered a conservative representation for byproduct materials to be shipped. The analyses included the lead liner. Condition No. 16 of the Certificate of Compliance has been revised to specify that for irradiated fuel and byproduct material shipments in the horizontal orientation, the lead liner must be used.

The results of the shielding analysis are shown in the table below.

Dose Point Location	Maximum Dose Rate (mRem/hr)		Dose Rate Limit (mRem/hr)
	Irradiated Fuel	Cobalt-60	
Package Surface Bottom (Back) End	102.4	74.5	200
2 Meters from Back End of Truck	1.51	5.68*	10
Truck Cab	0.25	0.009*	2

*Source term conservatively assumed to be 2000 watts cobalt-60.

The staff reviewed the supplemental shielding analysis. The staff confirmed the source terms for the irradiated fuel and the byproduct material. The staff performed confirmatory calculations for the cobalt-60 source term. The staff used the Microshield computer code and the SAS4 sequence of the SCALE 5.0 code system, and used shielding models similar to the applicant's. The staff's results were consistent with the applicant's. The staff finds that the package provides adequate shielding to meet the external radiation limits in 10 CFR Part 71, when transported in the horizontal orientation. In addition, the package operations in Section 7 of the application include a radiation survey prior to each shipment.

EVALUATION FOR THE -96 DESIGNATION

The applicant requested an amendment to Certificate of Compliance No. 9228 to revise the package identification number from USA/9228/B(U)F-85 to USA/9228/B(U)F-96, as specified in 10 CFR 71.19(e). To support its request for the "-96" designation, the applicant provided a table addressing the 19 issues considered in the rulemaking process that resulted in the revised rule, which was published on January 26, 2004 (69 FR 3698). The staff evaluated the applicant's request, as described below.

- Issue 1, Changing Part 71 to the International Systems of Units (SI) Only. This proposal was not adopted in the final rule, and therefore no changes were needed in the package application or the Certificate of Compliance to conform to the new rule.
- Issue 2, Radionuclide Exemption Values. The final rule adopted radionuclide activity concentration values and consignment activity limits in TS-R-1 for the exemption from regulatory requirements for the shipment or carriage of certain radioactive low-level materials. In addition, the final rule adopted an exemption from regulatory requirements for certain natural material and ores containing naturally occurring radionuclides. The applicant stated that this revision was not applicable to the Model No. 2000 package. The staff agrees, based on the design purpose of the Model No. 2000 package and the allowed contents specified in the certificate. Thus, no changes were needed to conform to the new rule.
- Issue 3, Revision of A_1 and A_2 . The final rule adopted changes in the A_1 and A_2 values from TS-R-1, with the exception of two radionuclides. The A_1 and A_2 values were

modified in TS-R-1 based on refined modeling of possible doses from radionuclides, and the NRC agreed that incorporating the latest in dosimetric modeling would improve transportation regulations. The applicant stated that this change was not applicable to the Model No. 2000, since it is shown to be leak tight. The containment analysis was not based on the A_2 values in Part 71. Thus, no changes were needed to conform to the new rule.

- Issue 4, Uranium Hexafluoride (UF_6) Package Requirements. The Model No. 2000 is not authorized for the transport of uranium hexafluoride. Therefore, no changes were needed to conform to the new rule.
- Issue 5, Criticality Safety Index (CSI). The final rule adopted the new term Criticality Safety Index from TS-R-1. The applicant revised Chapters 1 and 6 of the application to incorporate the CSI nomenclature. The Certificate of Compliance has been revised to delete reference to the Transport Index for criticality control.
- Issue 6, Type C Packages and Low Dispersible Material. This proposal was not adopted for the final rule. Thus, no changes were needed.
- Issue 7, Deep Immersion Test. The final rule adopted an extension of the previous version of 10 CFR 71.61 from packages for irradiated fuel to any Type B package containing activity greater than $10^5 A_2$. The applicant stated that the package was previously evaluated for buckling of the shell from external pressure. The critical buckling load was calculated as approximately 750 MPa. Since the external pressure due to the 200 meter immersion test is 2 MPa, there is a very large margin against buckling under this test condition. Thus, no changes were needed to conform to the new rule.
- Issue 8, Grandfathering Previously Approved Packages. The final rule adopted a process for allowing continued use, for specific periods of time, of previously approved package designs without demonstrating compliance to the final rule. The applicant has decided in accordance with 10 CFR 71.19(e) to submit information demonstrating compliance with the final rule. Thus, grandfathering the design of the Model No. 2000 package is not necessary.
- Issue 9, Changes to Various Definitions. The final rule adopted several revised and new definitions. These changes were adopted to provided clarity to Part 71. Thus, no changes were needed to conform to the new rule.
- Issue 10, Crush Test for Fissile Material Packages. The revised 10 CFR 71.73 expanded the applicability of the crush test to fissile material packages. The crush test is required for packages with a mass not greater than 500 kilograms (1100 pounds). Since the Model No. 2000 package has a mass greater than this, the crush test is not applicable. Therefore no changes were needed to conform to the new rule.
- Issue 11, Fissile Material Package Design for Transport by Aircraft. The final rule adopted a new section, Section 71.55(f), which addresses design requirements for packages transporting fissile material by air. The applicant stated that this requirement is not applicable to the Model No. 2000, since fissile materials will not be transported by

air. Therefore, for clarity, the Certificate of Compliance has been revised to specify that air transport is not authorized for fissile material.

- Issue 12, Special Package Authorization. The final rule adopted provisions for special package authorization that will apply only in limited circumstances and only to one-time shipments of large components. This provision is not applicable to the Model No. 2000 package. Thus, no changes were needed to conform to the new rule.
- Issue 13, Expansion of Part 71 Quality Assurance (QA) Requirements to Certificate Holders. The final rule expanded the scope of Part 71 to apply to any person holding or applying for a Certificate of Compliance. Quality assurance requirements apply to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of components of packaging that are important to safety. The applicant revised Section 1 of the application to explicitly indicate that its Quality Assurance program satisfies the specific requirements of 10 CFR 71.101(a), (b), and (c). No further changes were needed to conform to the new rule.
- Issue 14, Adoption of the American Society of Mechanical Engineers (ASME) code. This proposal was not adopted in the final rule. Thus, no changes were needed to conform to the new rule.
- Issue 15, Change Authority for Dual-Purpose Package Certificate Holders. This proposal was not adopted for the final rule. Thus, no changes were needed to conform to the new rule.
- Issue 16, Fissile Material Exemptions and General License Provisions. The final rule adopted various revisions to the fissile material exemptions and the general license provisions in Part 71 to facilitate effective and efficient regulation of the transport of small quantities of fissile material. The criticality safety of the Model 2000 package does not rely on limiting fissile materials to exempt or generally licensed quantities. Chapter 6 of the package application demonstrates criticality safety of the package with the authorized fissile contents. Therefore, no changes were needed to conform to the new rule.
- Issue 17, Double Containment of Plutonium. The final rule removed the requirement that packages with plutonium in excess of 0.74 terabecquerel (20 curies) have a second, separate inner container. The application does not refer to the double containment of plutonium, and no revisions were needed to conform to the new rule.
- Issue 18, Contamination Limits as Applied to Spent Fuel and High Level Waste Packages. This proposal was not adopted for the final rule. Thus, no changes were needed to conform to the new rule.
- Issue 19, Modification of Events Reporting Requirements. The final rule adopted modified reporting requirements. While the final rule is applicable to the package, no changes were needed to conform to the new rule.

The staff concluded that the design has been adequately described and meets the requirements of the revised regulations in 10 CFR Part 71. The Certificate of Compliance has

been revised to include the "-96" designation in the package identification number. To allow time to modify the packaging markings to include the "-96" designation, the certificate has been conditioned to allow use of packages marked with the "-85" designation for a period of approximately one year. After May 31, 2006, the packaging must be marked with the package identification number including the "-96" designation.

CONDITIONS

As requested by the applicant the Certificate of Compliance has been revised to include the "-96" designation in the Package Identification Number, and to allow horizontal transport of the irradiated fuel, byproduct, source, and special nuclear material contents described in Condition Nos. 5(b)(1)(i) and 5(b)(1)(ii) of the certificate.

The following additional or revised conditions were included in the Certificate of Compliance:

16. For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(v), and 5(b)(1)(vi), the package may be transported horizontally. For horizontal transport, the package must be secured to the truck bed with the top end of the package (closure end) facing the front (cab) of the truck. For horizontal transport of irradiated fuel and byproduct material contents described in 5(b)(1)(i) and 5(b)(1)(ii), the maximum decay heat is limited to 600 watts per package and the lead liner described in 5(a)(3)(ix) must be used.
17. Packagings may be marked with Package Identification Number USA/9228/B(U)F-85 until May 31, 2006, and must be marked with Package Identification Number USA/9228/B(U)F-96 after May 31, 2006.
18. Air transport of fissile material is not authorized.

For clarity, the specification of the design drawings of the lead liner was moved from Condition No. 13 to Condition No. 5(a)(3)(ix). Condition No. 19 (previously Condition No. 17 in Revision 20 of the Certificate of Compliance) was revised, since the general license section number was changed in the revised Part 71 regulations that became effective October 1, 2004.

CONCLUSIONS

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. 9228,
Revision No. 21, on May 26, 2005.