July 9, 2010

Dr. James M. Shuler
Manager, Packaging Certification Program
Safety Management and Operations
Office of Environmental Management
U.S. Department of Energy
Washington, DC 20585

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9329, REVISION 3, FOR THE MODEL NO. S300 PACKAGE (TAC NO. L24431)

Dear Dr. Shuler:

As requested by your application dated March 23, 2010, as supplemented June 15, and 30, 2010, enclosed is Certificate of Compliance No. 9329, Revision No. 3, for the Model No. S300 package. Changes made to the enclosed certificate are indicated by vertical lines in the margin. The staff's Safety Evaluation Report is also enclosed.

The Department of Energy has been registered as a user of the package under the provisions of 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.

If you have any questions regarding this certificate, please contact me or Michele Sampson of my staff at (301) 492-3300.

Sincerely,

/RA/

Eric Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9329
TAC No. L24431

Enclosures:
1. Certificate of Compliance No. 9239, Rev. No. 3
2. Safety Evaluation Report

cc w/encls: R. Boyle, Department of Transportation

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OFC:	SFST	E	SFST		SFST		SFST		SFST		SFST	E
NAME:	M. Sampson		J. Piotter		M. Rahimi for A. Barto		G. Hornseth		J. Borowsky		M. DeBose	
DATE:	07/07/2010		07/07/2010		07/09/2010		07/07/2010		07/07/2010		07/07/2010	
OFC:	SFST		SFST		SFST		SFST					
NAME:	M. Rahimi		C. Regan		D. Jackson		E. Benner					
DATE:	07/09/2010		07/08/2010		07/08/2010		07/09/2010					

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SAFETY EVALUATION REPORT

Docket No. 71-9329
Model No. S300 Package
Certificate of Compliance No. 9329
Revision No. 3

SUMMARY

By application dated March 23, 2010, as supplemented June 15, and 30, 2010, the U.S. Department of Energy (DOE or the applicant), requested revision of Certificate of Compliance (CoC) No. 9239, for the Model No. S300 package. The applicant requested the addition of general plutonium contents, Content No. 2, and revised the criticality analyses for the package to reflect the new contents and to model the neutron source without assuming a quantity of tantalum in the source capsule. Additionally, the applicant made minor changes to the drawing to include the removal of the metal nameplate for the packaging.

NRC 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, as supplemented, the staff finds that these changes do not affect the ability of the package to meet the requirements of 10 Code of Federal Regulations (CFR) Part 71.

1.0 GENERAL INFORMATION

The revision numbers for the IAEA Certificate of Competent Authority Special Form Radioactive Materials Certificate Nos. USA/0695/S-96 and USA/0696/S-96, issued by the U.S. Department of Transportation (DOT) have been removed from the CoC. In place, the special form capsule (SFC) drawing number and revision have been listed on the CoC. The drawing provides the design information for the SFC. Therefore, any future changes to the SFC drawing will require NRC review and incorporation into the CoC. This will allow the applicant to request non-design changes to the special form certificates from DOT, without having to also request NRC to revise the CoC.

The application included the addition of a general plutonium content, in addition to the plutonium-beryllium neutron source previously authorized for the Model No. S300. The general plutonium content was added to the CoC as Content No. 2, as plutonium which is not in the form of neutron sources with (α,n) target material. Examples of the type of material which may be shipped as Content No. 2 include: alpha reference standards (e.g., check sources), foils (e.g., threshold detectors), and other source configurations containing plutonium.

The staff evaluated the applicant’s request to remove the requirement for a fixed stainless steel nameplate from Drawing No. 60999-SAR, Rev. 0, sheet 1, general note 2. The packaging has dual use as a DOT 7A Type A package for non-fissile contents. To accurately reflect the nature of the contents, the applicant intends to only mark the package as Type AF when it is being used for transport of fissile contents in accordance with CoC No. 9239. Staff finds that a pre-printed label could provide a sufficiently durable marking to meet the requirements of 10 CFR 71.85 and 49 CFR 172.310; however, because the marking is not permanent, the package user must perform an inspection prior to each shipment to ensure a durable, legible marking has been applied.

2.0 STRUCTURAL

2.1 Crush Analysis

The applicant submitted a revised analysis of the dynamic crush evaluation which consisted of a finite element model of the pipe component and the SFC. The model was a detailed half symmetry model of the pipe component with bolted lid, the polyethylene shielding insert, and a representative SFC, a drop plate, and an unyielding surface. The results of the simulation demonstrated that the shielding insert inner dimensions remain larger than the largest external dimension of the SFC. Since no crushing contact occurred between the shielding insert and the SFC, no significant forces are transmitted to the SFC from the crush plate. Furthermore since the SFC was qualified by a 30-foot free drop and no forces are imparted by the crush plate, the 30-foot drop bounds the dynamic crush event.

2.2 Chemical, Galvanic, or Other Reactions

For the hypothetical accident condition involving a fully engulfing fire, it is assumed that the "pipe component" (which contains the SFC which contains and provides the containment boundary for the plutonium metal) is fully exposed to the effects of the fire. None of the shipping drum insulating materials or pipe component shielding materials are credited for providing any insulation for the SFC against the fire. Given this severe, but bounding assumption, the applicant provided an assessment of potential adverse chemical, galvanic, or other reactions between the SFC and its contents and/or other package materials.

The applicants' assessments are summarized as follows:

2.2.1 *Effect of Fire on SFC Itself*

The pipe component and SFC are made from type 304 stainless steel. The pipe component lid bolts are made from a similar austenitic stainless steel. Stainless steels are heat and corrosion resistant and have been used "For Decades" in radioactive material transportation packages without incident. Due to the heat resisting capabilities of stainless steels, the temperatures resulting from an assumed fully engulfing fire (flame temperature of 800°C, for 30 minutes) will not adversely or permanently affect the structural or containment integrity of the SFC itself.

2.2.2 *Effect of Plutonium Metal Contents on the SFC*

During a hypothetical fire, the temperature of the SFC is assumed to be above the melting temperature of plutonium (or plutonium alloys) for the entire duration of the 30-minute hypothetical fire and associated 60-minute post-fire cool-down period. Plutonium is known to be chemically reactive in the molten state, and can corrode stainless steels.

A literature review of the metallurgical data describing the reaction between plutonium and stainless steel revealed that plutonium corrodes stainless steel at a predictable rate. This corrosion rate can be used to predict the amount of SFC wall thickness that would be lost to corrosion during a hypothetical fire exposure. The calculation, using a conservative time duration of 90 minutes total, plus an assumed molten plutonium metal temperature of 600°C, showed that the wall thickness lost for this duration of exposure to molten plutonium would amount to 0.019 inches. The SFC wall thickness is 0.469 inches. Thus, the amount of penetration by the molten plutonium would be only 4% of the containment vessel thickness. Thus, the calculated thinning of the SFC containment boundary is conservatively estimated.

2.2.3 *Pyrophoric Effects of Plutonium*

The SFC is not inerted when loaded with plutonium. Air is present inside the SFC along with the plutonium metal. Plutonium is pyrophoric. The amount of air inside the small volume of the SFC was considered to ensure that no significant heat release would occur due to the plutonium burning as a result of a hypothetical fire event. Calculating for a typical plutonium metal quantity and the corresponding amount of air inside the closed SFC, the applicant showed that 1.1 gram of plutonium would oxidize. If that oxidation occurred as a pyrophoric reaction instead of a slow corrosion-type oxidation, the amount of heat released would not significantly raise the overall SFC temperature.

2.2.4 *Effect of Other Package Materials on the SFC*

High density polyethylene (HDPE) is used as a neutron shield material. It surrounds the SFC and is held in place by the pipe component.

Since the pipe component is assumed to be fully exposed to the hypothetical fire, the temperatures reached inside the pipe component will exceed the melting point of the HDPE. Thus the SFC would be immersed in a bath of molten or burning HDPE.

HDPE is a thermoplastic material based on chains of CH2 monomers. It does not contain any corrosive ions such as chlorides. As a thermoplastic, the material melts without significant chemical change. It is not corrosive to the SFC stainless steel. If the material burns, the combustion products will consist mainly of carbon dioxide and carbon monoxide. The smoke may contain low levels of aldehydes, ketones, organic acids, or hydrocarbons. These substances are generally not corrosive to stainless steel. Additionally, since the fire is of limited duration, exposure to the combustion products of HDPE will have no significant effect on the SFC.

2.3 <u>Evaluation Findings</u>

Staff reviewed the calculations and reasoned arguments provided by the applicant and staff finds that the 30-foot free drop of the SFC conservatively bounds the damage imparted by a dynamic crush test of the SFC within the pipe component of the S300 package, therefore 10 CFR 71.73(c)(2) is satisfied.

The staff finds the licensees' evaluations and analyses of potential chemical and galvanic reactions to be acceptable. The licensee has shown that no significant degradation of the SFC will occur as a result of the analyzed accident conditions.

The analyzed reactions are bounding cases because of the conservative assumption that the SFC will be completely unprotected during a hypothetical fire event. This assumption creates a high temperature environment for the SFC. This assumed environment induces the plutonium payload to melt and the HDPE to melt and/or burn. The consequences of these conditions were shown to be minor for the period of exposure.

The staff finds that the applicant has satisfied the requirement in 10 CFR 71.43(d) that "…no significant chemical, galvanic, or other reaction…" will occur.

Staff also completed an audit review of the entire Structural section of the application and determined that the findings for the remaining sections are still valid.

3.0 THERMAL

3.1 Description of Thermal Design

The Model No. S300 package consists of a stainless steel SFC that is surrounded by a high density polyethylene neutron shield insert layer, a stainless steel pipe, cane fiberboard insulation layer, and 55-gallon steel drum container. The Type A quantity of fissile material is sealed in a single special form capsule; two special form capsule designs (Model II and Model III) are available.

The decay heat for the maximum payload of 350 grams of plutonium is bounded by 1.1 watts. The application states that there is no internal pressure associated with the normal condition of transport (NCT) or hypothetical accident condition (HAC) because the cavities of the Model No. S300 packaging are vented. The material properties and component specifications were addressed in the application.

3.2 Normal Condition of Transport

The applicant addressed heat and cold conditions of transport. The cold conditions included a -40°F ambient temperature with no insolation. The heat conditions included 100°F ambient temperature and diurnal variation of solar insolation. The applicant constructed a two-dimensional axisymmetric lumped thermal model using the Thermal Desktop and SINDA/FLUINT programs to model the package under the normal condition of transport. It was found that the package's accessible external surface temperature was below the non-exclusive use shipment, 10 CFR 71.43(g) regulation of 122°F. Table 3.1-1 of the application provided a summary of component temperatures for the NCT analyses conducted by the applicant. The table showed that the maximum calculated component temperatures were within their allowable temperature limits.

3.3 Hypothetical Accident Condition

The applicant took no credit for the packaging to resist the fire accident scenario. Rather, it was assumed that the SFC was ejected during the accident and exposed to the 1475°F fire with an emissivity of one. The fire heat-up and cool-down analyses were 30 minutes and 60 minutes, respectively, and were based on zero dimensional lumped thermal calculations. Based on the fire heat-up analysis, it was found that the plutonium within the SFC reached its melting temperature within less than 10 minutes of fire heat-up and approached the 1475°F fire temperature in less than 30 minutes. The plutonium reaching its melting temperature was considered acceptable for two reasons. First, the plutonium was initially within a solid form during shipment; it is the extremes of the accident fire condition that would result in a molten state. Second, the stainless steel special form capsule remained well below its melting point, therefore satisfying the intent of the DOT definition of special form material and 10 CFR 71.75(a)(3). It was stated in the application that the chemical reactions between the molten plutonium and the stainless steel capsule (e.g., Pu-Fe eutectic formation, oxidation of plutonium with air at high temperature) would not compromise the structural integrity of the capsule. Likewise, the application stated that in the event that the high density polyethylene shielding remained adjacent to the SFC and underwent combustion, the products of combustion would not corrode the stainless steel SFC during the HAC time period.

3.4 Evaluation Findings

Based on a review of the thermal sections of the application, the staff finds reasonable assurance that the package meets the thermal requirements of 10 CFR Part 71.

4.0 CONTAINMENT

Containment is provided by the special form capsule. The applicant has made no changes to the containment section of the application.

5.0 SHIELDING

The applicant revised the shielding analysis for the Model No. S300 to add non-neutron source plutonium (i.e., plutonium without (α,n) target material, such as beryllium), to add other (α,n) neutron sources as allowable contents, and to include the polyethylene drum liner in the shielding analysis for normal conditions of transport.

For the non-neutron source plutonium, the applicant did not perform any additional shielding analyses. The gamma source for the plutonium contents is identical to that of the neutron source plutonium contents that were previously evaluated for this package design, and the neutron source is negligible compared to the plutonium-beryllium ($PuBe_{13}$) source material. Therefore, the external dose rates for the non-neutron source plutonium material will be bounded by those for the $PuBe_{13}$ contents.

Table 9 of the application for the Model No. S300 shows a list of target isotopes that may be used in (α,n) neutron sources, and compares the total neutron source to that from the $PuBe_{13}$ source material. This table demonstrates that, for the target isotopes considered, the neutron source associated with the $PuBe_{13}$ source material considered in the shielding analysis bounds the target materials in Table 5-9, for the same mass of plutonium. The following isotopes were considered in the analysis, and would be acceptable contents in the Model No. S300, when authorized in the Model II or Model III special form source capsule, and when the plutonium content is limited to that shown in the CoC for each capsule:

^{9}Be	^{18}O	^{22}Ne	^{21}Ne	^{17}O	^{19}F	^{13}C	^{26}Mg
^{10}B	^{25}Mg	^{7}Li	^{29}Si	^{27}Al	^{37}Cl	^{14}N	^{31}P

Staff notes that these additional target materials are not currently incorporated into the Model II or Model III special form source capsule, IAEA Certificate of Competent Authority Special Form Radioactive Materials Certificate Nos. USA/0696/S-96, and USA/0695/S-96, and will not be incorporated into the CoC at this time.

The applicant revised the shielding analysis for normal conditions of transport to include the 0.11 inch (0.28 centimeter) 55-gallon drum liner that is part of the shielding design. Additionally, for all shielding calculations, the applicant revised the analysis to remove the conservative assumption that the plutonium is infinitely dilute in beryllium, and instead model the material as $PuBe_{13}$, which reduces the neutron source output. All other modeling assumptions to determine the external dose rates under normal conditions of transport remain unchanged from the previously submitted application.

The applicant used the MCNP v1.40 three dimensional Monte Carlo neutral particle transport code with continuous energy cross sections for all gamma and neutron shielding calculations. The MCNP code system is a standard in the nuclear industry for performing Monte Carlo criticality safety and radiation shielding calculations. The resulting calculated fluxes are converted to dose rates using the ANSI/ANS-6.1.1-1977 flux-to-dose-rate conversion factors for both neutron and gamma radiation.

The resulting maximum external dose rates under normal conditions of transport for both the Model II and Model III special form capsules are given in Tables 5-2, 5-3, and 5-4 of the application, and are summarized in the following Tables.

Table 1: NCT Maximum Dose Rates (mrem/hr)

	Model II Capsule (206 g Pu)		Model III Capsule (160 g Pu)	
Location:	Surface	1 Meter	Surface	1 Meter
Gamma:	12.4	0.5	9.6	0.4
Neutron:	187	7.0	145.2	5.4
Total:	199.4	7.5	154.8	5.8

Table 2: NCT Maximum Dose Rates Under Exclusive Use (mrem/hr)

	Model II Capsule (Exclusive Use – 350 g Pu)			
Location:	Surface	Vehicle Surface	2 Meters from Vehicle Surface	Occupied Location
Gamma:	21.0	0.9	0.1	<0.1
Neutron:	317.7	11.8	1.6	<1.6
Total:	338.7	12.7	1.7	<1.7

The applicant's shielding analysis under normal conditions of transport demonstrates that the package meets all applicable dose rate limits in 10 CFR 71.47.

The applicant also revised the shielding analysis under hypothetical accident conditions to include the shielding effect of the special form capsule. The shielding model conservatively treats the special form capsule as a point neutron source, with spherical stainless steel shielding the same thickness of the special form capsule wall. The resulting external dose rates are given in Table 5-5 of the application, and summarized in the following table.

Table 3: HAC Dose Rates for Maximum Source (mrem/hr)

1 Meter from 350 g Pu Source	
Gamma:	2.7
Neutron:	58.3
Total:	61.0

The applicant's shielding analysis under hypothetical accident conditions demonstrates that the package meets the applicable dose rate limits in 10 CFR 71.51(a).

The staff performed calculations to confirm the applicant's calculated hypothetical accident conditions external dose rates. Using assumptions similar to the applicant's, staff performed a hand calculation for a point neutron source, using the ANSI/ANS-6.1.1-1977 flux-to-dose-rate conversion factors for neutron radiation. The staff's calculation resulted in external dose rates under hypothetical accident conditions that agreed with those calculated by the applicant.

Based on review of the statements and representations in the application, the applicant has shown and the staff finds that the Model No. S300 package, when limited to the contents as described in the shielding analysis, meets all applicable dose rate limits in 10 CFR Part 71.

6.0 CRITICALITY

The applicant revised the criticality analysis to consider plutonium-beryllium neutron sources without tantalum cladding, and to include non-neutron source plutonium as allowable contents. The applicant also revised the criticality analysis under normal conditions of transport to modify several input assumptions, and revised the criticality analysis under hypothetical accident conditions to consider finite arrays.

For the criticality analysis of both the neutron source and general plutonium contents under normal conditions of transport, the applicant assumed that the outer packaging was removed, and only the pipe component with the SFC and polyethylene shielding remained. For the single package evaluation, the pipe component is modeled with a thick water reflector external to the package. The array under normal conditions of transport is modeled as an infinite hexagonal array. The k_{eff} under both scenarios is negligible due to the fact that 1) under normal conditions of transport, no water is present inside the package, 2) the single package reactivity is limited by geometry and the small amount of fissile material present, and 3) the polyethylene shielding prevents neutron communication between packages in an array.

For the criticality analysis of single packages with neutron source and general plutonium contents under hypothetical accident conditions, the applicant considered the SFC either inside the pipe component or by itself, to determine which scenario is more reactive. In both cases, water was assumed to flood the SFC. For the neutron source contents, the water is modeled in the void space around the source, since the source is clad with stainless steel which prevents mixing of the contents with water. For the general plutonium contents, the plutonium is modeled either as a discrete lump or homogeneously mixed with water. For either content type, the package is most reactive assuming the SFC remains in the pipe component, due to the better neutron reflection provided by the polyethylene. The maximum reactivity for any of the single package cases under hypothetical accident conditions is less than a k_{eff} of 0.4.

The criticality analysis of arrays of packages under hypothetical accident conditions for neutron source contents was significantly revised from the previous analysis, which considered infinite arrays of SFCs external to the S300 packaging. As it can't be shown that all neutron sources were manufactured with tantalum cladding, which was modeled in the previous analysis, the applicant has removed this material from the criticality model. Since tantalum is a strong neutron absorber, and removing it makes the sources much more reactive, the hypothetical accident conditions analysis now considers finite arrays.

The applicant considered hexagonal, close-packed arrays of Model II SFCs containing up to 350 grams ^{239}Pu in $PuBe_{13}$, and Model III SFCs containing up to 160 grams ^{239}Pu in $PuBe_{13}$. The sources are modeled external to the S300 packaging, and include the $PuBe_{13}$ source material and the stainless steel capsule material. The applicant considers varying amounts of water leakage into the SFC, as well as varying density of water between each SFC. The array model includes full water reflection external to the array. The applicant modeled the hypothetical accident conditions array as a cylinder of at least 334 packages, to support a criticality safety index (CSI) of 0.3. Between two and four layers of SFCs were modeled, and the number of SFCs was adjusted to maintain the cylindrical shape of the array, often resulting in more than 334 packages being modeled. The results of the criticality analysis for an array of S300 packages with neutron source contents under hypothetical accident conditions are contained in Tables 6-11, 6-12, and 6-13 of the application. The most reactive condition was for a three-layer array of Model II SFCs, with full density water inside the SFC and void between the SFCs. This condition resulted in a calculated k_{eff} of 0.9045, well below the calculated upper subcritical limit (USL) of 0.9257.

For the general plutonium contents under hypothetical accident conditions, the applicant modeled hexagonal, close-packed arrays of Model II SFCs containing up to 300 grams ^{239}Pu, and Model III SFCs containing up to 160 grams ^{239}Pu. Since the geometric form of the plutonium is unspecified, water that is assumed to enter the SFC under hypothetical accident conditions is assumed to mix homogeneously with the ^{239}Pu contents, resulting in a much more reactive condition than the discrete neutron sources modeled previously. The result is that only 25 packages with general plutonium contents can be shown to be subcritical under hypothetical accident conditions, leading to a CSI of 4.0. The results of the criticality analysis for an array of S300 packages with general plutonium contents under hypothetical accident conditions are contained in Tables 6-14, and 6-15 of the application. The most reactive condition was for a single-layer array of 25 Model II SFCs, with full density water inside the SFC and void between the SFCs. This condition resulted in a calculated k_{eff} of 0.9239, below the calculated USL of 0.9257.

The applicant used the MCNP5 v1.40 three dimensional Monte Carlo neutral particle transport code, primarily with continuous energy ENDF/B-VI cross sections, for all criticality calculations. The applicant performed a benchmarking analysis using 102 critical experiments selected from the *International Handbook of Evaluated Criticality Safety Benchmark Experiments*, based on their similarity to the S300 package model. The selected experiments span a wide range of neutron energies, due to the fact that the S300 models typically involve an intermediate spectrum. The applicant determined a USL for four groups of benchmark neutron spectra: fast, intermediate, thermal, and all experiments. The lowest of these, 0.9257 for intermediate experiments, was selected as the USL for the S300 criticality analysis.

The staff performed confirmatory analyses of the S300 package using the CSAS26 sequence of the SCALE code system with the KENO VI three dimensional Monte Carlo criticality transport program and continuous energy ENDF/B-VII cross sections. Using assumptions similar to the applicant's for the arrays of SFCs under hypothetical accident conditions, the staff's confirmatory calculations resulted in a maximum k_{eff} similar to what was reported in the application. The staff's analyses therefore confirm that the S300 package will meet the criticality safety requirements of 10 CFR Part 71.

Staff identified that the application did not provide a minimum limit for beryllium in the PuBe source. All analysis was performed assuming $PuBe_{13}$. Staff has limited the maximum grams of plutonium to 300 grams, and assigned the CSI of 4.0 to the PuBe contents.

Based on review of the statements and representations in the application, the staff concludes that the nuclear criticality safety design has been adequately described and evaluated and that the package meets the criticality safety requirements of 10 CFR Part 71.

CONDITIONS:

As a result of the revision request, the following changes have been made to the Certificate:

Condition No. 5.a(2) was revised to remove the reference to plutonium-beryllium contents.

Condition No. 5.a(3), was revised to reflect Revision 1 of the S300 Packaging SAR Drawing.

Condition No. 5.b(1) was revised to designate plutonium-beryllium neutron sources as Content No. 1, and to specify the limit of 1.519E+5 neutrons/second per gram of plutonium. The general plutonium contents were added as Content No. 2. Additionally, the revision number, Revision 4, of the special form source certificates for both the Model II and Model III source capsules was removed. The source capsule drawing for each special form certificate was added.

Condition No. 5.b(2) was revised to reflect the addition of the general plutonium contents as Content No. 2, and to provide the maximum quantity of fissile plutonium allowed in each model source capsule for Content No. 2, in grams. The maximum quantity of plutonium was reduced from 350 grams to 300 grams for Content No. 1.

Condition No. 5.c was updated to incorporate the change in Criticality Safety Index (CSI) from 0.0 to 4.0, to reflect the results of the revised criticality analysis for the existing contents (Content No. 1). Additionally, a CSI of 4.0 was added for Content No. 2.

Condition No. 8 was added to require inspection of the package identification marking prior to each shipment.

As a consequence of the inclusion of the new Condition No. 8, the previous Condition Nos. 8 and 9, were renumbered 9 and 10, respectively.

CONCLUSION

Based on the statements and representations in the application, and the conditions listed in the Certificate, the staff concludes that the design has been adequately described and evaluated and meets the requirements of 10 CFR Part 71. 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. 9329, Revision No. 3,
on July 9, 2010.