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
9379	0	71-9379	USA/9379/B(U)-96	1 OF	6

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)*

Orano Federal Services LLC
505 S. 336th Street, Suite 400
Federal Way, WA 98003

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Orano Federal Services LLC application dated July 19, 2018, 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.: 1105-SD

(2) Description

The Model No. 1105-SD package consists of multiple configurations. The package is a Category I container. When loaded and prepared for transport, the external dimensions of the 1105-SD package are approximately 83 inches (in.) (210.8 centimeters (cm)) tall and 70 in. (177.8 cm) in diameter (over the lower impact limiter). The maximum weight of the package is 10,100 pounds (lbs) (4,545.5 kilograms (kg)).

Unless noted in the application, all elements of the 1105-SD package are made of Type 304 stainless steel in conformance with the American Standards for Testing Materials (ASTM) A240. The major components of the package include:

(i) *A base*—The base consists of the lower torispherical head, lower flange, lower internal impact limiter, and external impact limiter. The volume inside the external impact limiter is filled with 15 pounds per cubic feet (lb/ft^3) polyurethane foam poured in place. The inside surface of the bottom shell is covered with a ¼-inch thick layer of refractory insulation paper. A full penetration weld connects the lower torispherical head (½-inch thick plate) to the lower flange.

(ii) *A bell*—The bell consists of the upper torispherical head, cylindrical shell, upper flange, vent and test port blocks, upper internal impact limiter, dual side thermal shield, head thermal shield, and the closure bolt access tube structure. Two, ¼-inch thick, layers of refractory insulation paper cover the area of the containment wall adjacent to the tubes. Machined blocks of 30 lb/ft^3 polyurethane foam are located between the tubes.

5.(a) Packaging (Continued)

(2) Description

(iii) *An internal lodgment*, made of aluminum, which supports the Long Term Storage Shield (LTSS)—The lodgment and the inner container designs allow maintaining the position of the payload in the package cavity during normal conditions of transport and hypothetical accident conditions. The LTSS rests on a ½-inch thick plate covered with a ½-inch thick layer of neoprene rubber.

(iv) *LTSS*—The LTSS consists of a central steel magazine, or barrel, surrounded by thick lead encased in a steel shell. The barrel contains four longitudinal holes, each of which can accommodate one drawer assembly.

(v) *An inner container*, which supports shielded devices—The inner container holds a shielded device and provides support for the device and the blocking (dunnage) materials during transport.

(vi) *Two internal impact limiters*—The internal impact limiters located at each end of the payload cavity include an array of 130 ASTM A249 or A269, Type TP304, stainless steel tubes. The impact limiters are curved on one side to match the inside of the torispherical head, and flat on the other. Each of the 130 tubes is tack-welded in three places to a stainless steel tube stabilizer sheet. Four stainless steel clips welded to the inner surface of the containment boundary in the lower and upper position hold the internal impact limiters in place.

The LTSS or shielded devices provide shielding. Shielding materials are lead, tungsten, steel, or depleted uranium. The LTSS provides the shielding for the sealed capsule content specified in Tables 1 and 2. Therefore, these sources must be packed in the LTSS drawer(s). The shielded devices, identified in Table 3, are self-shielding, and must be packed in an inner container for shipment as specified in Table 4.

(3) Drawings

The packaging is constructed in accordance with Orano Federal Services LLC drawings:

(i) 3021717-SAR, “1105-SD Package Assembly SAR Drawing,” Revision 0, sheets 1-7
(ii) 3021718-SAR, “1105-SD LTSS Lodgment SAR Drawing,” Revision 0, sheets 1-2
(iii) 3021719-SAR, “1105-SD Inner Container SAR Drawing,” Revision 0, sheets 1-2

5.(b) Contents

(1) Type and form of material

Radioactive sealed sources of isotopes described in Tables 1 and 2.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package

(i) LTSS

Table 1. Maximum Activity of LTSS Payload Source Nuclides [1, 2]

Nuclide	Maximum Activity Ci
^{60}Co	12,970
^{137}Cs	14,000
^{90}Sr	1,000
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^{241}Am (no Be) [3]	1,000
^{241}Am Be [3]	6.6
^{192}Ir	200
^{75}Se	80

Notes:
1. Physical form of all nuclides is solid material in a sealed capsule.
2. The maximum activity listed is the maximum for a single nuclide in the LTSS. For combinations of different nuclides, lower activity limits apply as discussed in Chapter 5, "Shielding Evaluation," and Operating Procedures in Chapter 7 of the application.
3. Impurities may include oxygen and chlorine.

Table 2. Maximum Mass of LTSS Payload Source Nuclides. [1, 2]

Nuclide	Maximum Mass grams of Pu
^{238}Pu (no Be)	75 g Pu
^{239}Pu (no Be)	15 g Pu
^{239}Pu Be	15 g Pu

Notes:
1. Physical form of all nuclides is solid material in a sealed capsule.
2. Impurities may include oxygen.

5.(b) Contents (Continued)

(2) Maximum quantity of material per package (Continued)

(ii) Inner Container-Shielded Devices

Table 3. Maximum Activity and Weight of Shielded Devices [1]

Model Name/Type	Maximum Activity Ci	Nominal Weight [2] lbs.	Sealed Source Device Registry No.[2]
Group 1 Devices			
Gammator 50B, B, B34, G-50-B	420	1,800	NR-0880-D-802-S
Gammator M34	1,920	1,850	NR-0880-D-806-S
Gammator M38	3,840	2,250	NR-0880-D-806-S
Gammacell 1000 (GC-1000) -Models A through D -Elite A through D, Type I and Type II	3,840 (bounding value)	2,800	NR-0880-D-808-S, NR-1307-D-102-S
Gammacell 3000 (GC-3000) -Elan A through C, Type I and Type II	3,048	3,300	NR-1307-D-102-S
Group 3 Devices			
Gammacell-40 (GC-40 Exactor)	2,250 [3]	2,650	NR-1307-D-101-S

Notes:
1. Radionuclide in all cases is ^{137}Cs.
2. Consult NRC's Sealed Source Device Registry for design and safety features of each model.
3. GC-40 activity is given for one of the two device components that make up a complete GC-40. Only one device component may be shipped at one time.

(3) Maximum weight of contents

(i) LTSS

For the LTSS, the payload of isotopes other than plutonium is limited by the activity rather than their weight.

5.(b) Contents (Continued)

(3) Maximum weight of contents (Continued)

(ii) Inner Container

Table 4. Maximum Weight of Inner Container Contents

Content Type	Maximum Weight lbs.
Dunnage	≤ 500
Group 1-Shielded Device	≤ 3,500
Group 3-Shielded Device	≤ 3,500

The maximum weight of the shielded device includes the mass of radioactive material and the source drawer.

(iii) The total fissile mass limit for the 1105-SD package is 15 grams.

(4) Maximum decay heat:

(i) For the contents described in Condition No. 5.(b)(2)(i), the maximum decay heat shall not exceed 200 watts per package.

(ii) For the contents described in Condition No. 5.(b)(2)(ii), the maximum decay heat shall not exceed 30 watts per package.

6. Plutonium sources are not permitted for transport by air.

7. Americium sources are not permitted for transport by air.

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 Chapter 7 of the application; and

(b) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration date: March 31, 2024.

REFERENCES

Orano Federal Services LLC application dated July 19, 2018 [Agencywide Documents Access and Management System (ADAMS) No. ML18215A182].

Supplement dated: January 14, 2019 (ADAMS No. ML19017A066).

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

Ilka T. Berrios, Acting Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: 3/26/19

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

SAFETY EVALUATION REPORT
Docket No. 71-9379
Model No. 1105-SD Transportation Package
Certificate of Compliance No. 9379
Revision No. 0

SUMMARY

By letter dated July 19, 2018 (Orano, 2018), as supplemented on January 14, 2019 (Orano, 2019), Orano Federal Services LLC (thereafter, Orano or the applicant), requested that the U.S. Nuclear Regulatory Commission (NRC, the staff) approve the Model No. 1105-SD package as a Type B(U)-96 package for the transport of radioactive sealed sources (gamma, beta, and small neutron sources) or shielded irradiation devices containing their gamma sources. Quantities of fissile materials [e.g., plutonium-239 (^{239}Pu)] are less than 15 grams.

The design of the Model No. 1105-SD package is based on the design of the Model No. 435-B, certificate of compliance (CoC) No. 9355, Revision 2 (NRC, 2018a). The staff issued Revision 2 of the Model No. 435-B on January 26, 2018 (NRC, 2018a).

The staff reviewed the application for the Model No. 435-B, including relevant information in the supplements to the application, using the guidance in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material." This guidance also applies to the review of Model No. 1105-SD. Based on the statements and representations in the application, as supplemented, and the conditions listed below, the staff concludes that the Model No. 1105-SD meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71, "Packaging and Transportation of Radioactive Material."

EVALUATION

The Model No. 1105-SD package is based on the design of the Model No. 435-B, CoC No. 9355, Revision 2 (NRC, 2018a). In Attachment 2 to the letter dated July 19, 2018 (Orano, 2018), the applicant included a "road map" related to the changes corresponding to the safety analysis report corresponding to Revision 2 of the CoC for to the Model No. 435-B compared to the application for the Model No. 1105-SD. The staff reviewed the application for the Model No. 1105-SD, Revision 0, and compared it to the safety analysis report corresponding to Revision 2 of the CoC for the 435-B and found that the two package designs are essentially the same. The main changes to the safety analysis report corresponding to CoC, Revision 2, of the Model No. 435-B were as follows:

1) editorial differences related to the change to Model No. 1105-SD from Model No. 435-B (e.g., drawing numbers);

2) changes related to the change of the package model number,

3) commitment to the use of the American National Standards Institute (ANSI) N14.5-2014, "American National Standard for Radioactive Materials – Leakage Tests on Packages for Shipment" (ANSI, 2014).

In the January 14, 2019, letter (Orano, 2019), the applicant supplemented its application by responding to a request for supplemental information (NRC. 2018c) as part of the acceptance review of the application (NRC, 2019). As part of the response to question RSI-1, the applicant included a list of documents that constitute the licensing basis for the Model No. 1105-SD. (Appendix A of this Safety Evaluation Report includes the list of documents provided by the applicant in its January 2019 letter.) The staff considers the information provided in the January 14, 2019, letter part of the application for Revision 0 for the Model No. 1105-SD package.

In observation OBS-Co-1 (NRC. 2018c), the staff requested clarification about the applicant's requirements to develop and approve procedures to perform leak tests to verify the applicant's commitment to follow the 2014 Edition of ANSI N14.5 (ANSI, 2014). Moreover, the staff wanted to ensure the following:

1) ***personnel developing and approving leakage rate testing procedures*** is certified as an American Society for Nondestructive Testing (ASNT) nondestructive testing (NDT) Level III, and

2) ***personnel performing leakage rate testing*** is qualified and certified in accordance with ASNT Recommended Practice No. SNT-TC-1A (ASNT), in accordance with Sections 8.5, "Leakage rate testing," and 8.8, "Quality assurance," of ANSI N14.5-2014 (ANSI, 2014).

The applicant noted in its response to OBS-Co-1 (Orano, 2019) that leakage rate testing procedures must be approved by personnel certified as an ASNT NDT Level III. The staff finds the applicant's response acceptable based on the staff's review of Sections 8.5 and 8.8 of ANSI N14.5-2014 (ANSI, 2014). The applicant also noted in its response to OBS-Co-1 (Orano, 2019) that leakage rate testing must be performed by personal qualified and certified personnel in accordance with ASNT Recommended Practice No. SNT-TC-1A (ASNT). The staff also finds this part of the applicant's response acceptable based on the staff's review of Sections 8.5 and 8.8 of ANSI N14.5-2014 (ANSI, 2014).

The applicant summarized in the response to OBS-Co-1 (Orano, 2019) that written leakage rate testing procedures for the 1105-SD package are developed, approved, and performed by qualified and certified NDT personnel for leakage testing in accordance with industry standards. The staff confirmed that ANSI N14.5-2014 is referenced in Chapters 7 and 8 of the application and that Chapters 7 and 8 are also referenced in the CoC. The applicant will use the NRC-approved quality assurance program under Docket No. 71-0938 (NRC, 2018b) for this package (Orano, 2019).

EVALUATION FINDINGS

The staff concludes that besides the above described differences and other minor editorial differences (e.g., replace "435-B" with "1105-SD"), the two applications are essentially the same, with the exceptions noted in Attachment 2 to the application submitted in July 2018). As the package design has already been approved as part of the 435-B technical review, the staff concludes that the same safety evaluation findings can be made for the 1105-SD.

Based on the statements and representation in the application, as supplemented, and the conditions listed below, the staff concludes that the package design meets the requirements of 10 CFR Part 71 and is described in sufficient detail to provide an adequate basis for its evaluation.

REFERENCES

(ANSI, 2014) American National Standards Institute, ANSI N14.5-2014, "American National Standard for Radioactive Materials - Leakage Tests on Packages for Shipment," ANSI, New York, NY.

(ASNT) American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing," ASNT, Columbus, OH.

(NRC, 2018a) Rahimi, Meraj, U. S. Nuclear Regulatory Commission (NRC), letter to Al-Daouk, Ahmad M., National Nuclear Security Administration (NNSA), January 26, 2018, Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML18026A874.

(NRC, 2018b) Rahimi, Meraj, U. S. Nuclear Regulatory Commission (NRC), letter to Lloyd, Christopher, Orano Federal Services (Orano), June 4, 2018, ADAMS Package Accession No. ML18155A238.

(NRC, 2018c) García Santos, Norma, U.S. Nuclear Regulatory Commission (NRC), letter to Noss, Phillip, Orano Federal Services LLC (ORANO), December 21, 2018, ADAMS Package Accession No. ML18360A572.

(NRC, 2019) García Santos, Norma, U.S. Nuclear Regulatory Commission (NRC), letter to Noss, Phillip, Orano Federal Services LLC (ORANO), February 6, 2019, ADAMS Package Accession No. ML19036A911.

(Orano, 2018) Noss, Phillip, Orano Federal Services LLC (ORANO), letter to U. S. Nuclear Regulatory Commission (NRC) (Attn: Document Control Desk), July 19, 2018, ADAMS Package Accession No. ML18215A243.

(Orano, 2019) Noss, Phillip, Orano Federal Services LLC (ORANO), letter to U. S. Nuclear Regulatory Commission (NRC) (Attn: Document Control Desk), January 14, 2019, ADAMS Package Accession No. ML19017A066.

CONDITIONS

The conditions for the CoC for the 1105-SD are the same as CoC, Revision 2, for the Model No. 435-B, with the following main exceptions:

1) CoC holder's information,

2) application's title,

3) references to the Model No. 1105-SD instead of the Model No. 435-B, and

4) changes in drawing names.

The expiration date for this CoC is March 31, 2024.

CONCLUSION

Based on the statements and representations contained in the application, as supplemented, and the conditions listed above, the staff concludes that the applicant adequately described and evaluated the design of the Model No. 1105-SD transportation package and that the package meets the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9379, Revision No. 0,
on 3/26/19.

Appendix A. Licensing Basis Documents Applicable to the Model No. 1105-SD (Orano, 2019)

Discipline	Title	Document Number	Documentum	Revision No.	Date	Description
Structural	"435-B Drop Analysis"	01916.01.C004.01-07	CALC-3006972-000	0	5/14/12	This calculation forms the basis for Section 2.12.4 SAR. This analysis includes computer files.
	"435-B Weight Calculation"	01916.01.C004.01-01	CALC-3003541-000	0	3/1/12	This calculation forms a partial basis for the structural analysis in the SAR. This analysis includes computer files.
	"Buckling Analysis for the Model No. LANL-B" (i.e., Model No. 435-B)	01916.01.C004.01-02	CALC-3003967-000	0	2/7/11	This calculation forms a partial basis for the structural analysis in the SAR. This analysis includes computer files.
Thermal	"Thermal and Gas Generation Analysis for the 435-B Package"	01916.01.C004.01-08	CALC-3007066-005	5	1/25/17	This calculation forms the basis for the thermal evaluation in the SAR. This analysis includes computer files.
Shielding	"LANL-B Device Shielding Analysis"	01916.01.C004.01-05	CALC-3006640-001	1	4/11/12	This calculation forms the basis for Section 5.5.3 of the SAR. This analysis includes computer files.
	"435-B LTSS Shielding Analysis"	01916.01.C004.01-06	CALC-3006972-001	1	9/10/15	This calculation forms the basis for the shielding analysis in the SAR. This analysis includes computer files.
Certification Test	"435-B Package Certification Test Procedure"	PKG-TP-SPC-008	SPC-3004633-002	2	11/2/11	Includes the description of the requirements of the certification tests to be performed on the 435-B with a LTSS and Shielded Device.
	"435-B Package Certification Test Report"	PKG-TR-SPC-011	SPC-3006329-001	1	4/17/12	This calculation forms the basis for Section 2.12.3 of the SAR. This analysis includes computer files.