Form NRC-618
(12-73)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE

For Radioactive Materials Packages

1.(a) Certificate Number	1.(b) Revision No.	1.(c) Package Identification No.	1.(d) Pages No.	1.(e) Total No. Pages
9010	7	USA/9010/B( )F	1	5

2. PREAMBLE

2.(a) This certificate is issued to satisfy Sections 173.393a, 173.394, 173.395, and 173.396 of the Department of Transportation Hazardous Materials Regulations (49 CFR 170-189 and 14 CFR 103) and Sections 146-19-10a and 146-19-100 of the Department of Transportation Dangerous Cargoes Regulations (46 CFR 146-149), as amended.

2.(b) The packaging and contents described in item 5 below, meets the safety standards set forth in Subpart C of Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions."

2.(c) 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—

3.(a) Prepared by (Name and address):

NL Industries, Inc.
Nuclear Division
P.O. Box 2046
Wilmington, DE 19899

3.(b) Title and identification of report or application:

NL Industries, Inc. application dated March 7, 1980, as supplemented.

3.(c) Docket No. 71-9010

4. CONDITIONS

This certificate is conditional upon the fulfilling of the requirements of Subpart D of 10 CFR 71, as applicable, and the conditions specified in item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Fissile Class, Other Conditions, and References:

(a) Packaging

(1) Model No.: NLI-1/2

(2) Description

A depleted uranium, water, and lead shielded shipping cask, encased in stainless steel, and equipped with balsa impact limiters. The cylindrical cask body is 195-1/4 inches long by 47-1/8 inches OD. The principal shielding consists of 2-3/4 inches of depleted uranium, 2-1/8 inches of lead, and 5 inches of water.

A 7/8-inch thick stainless steel outer shell is welded to a solid stainless steel forging at each end of the cask. The outer shell of the cask is surrounded by a 1/4-inch thick steel water jacket that is also attached to the end forgings. A water expansion tank is welded to the water jacket shell. The innter cask cavity is formed by a 1/2-inch thick, stainless steel cylindrical shell; welded at its top end to the upper cask forging and at its bottom end to a circular plate.

There are two separate configurations of the cask.

Configuration (A): The containment vessel is a right circular stainless steel shell, 12-5/8 inches ID by 178 inches inside length by 1/4-inch thick, located within the inner cask cavity. The containment vessel is closed and sealed by a 5-inch thick, composite steel and uranium closure head, twelve, 1-inch diameter bolts, and a silver plated, metallic O-ring. Eight of the twelve closure bolts

5. (a) Packaging (continued)

(2) Description (continued)

are used to secure the containment vessel to the upper cask forging. Closure of the cask cavity is by a 1-1/2-inch thick steel closure head, eight, 1-inch diameter bolts, and elastomer O-ring. The radioactive contents are positioned and supported within the containment vessel (inner container) by an aluminum basket and internal support structure.

Configuration (B): The containment vessel is the 1/2-inch thick inner cavity shell. The 1/4-inch thick inner container is not used. The cask cavity is closed by two closure heads. The inner head is a 6-inch thick, composite steel and uranium plate secured to the upper cask forging by twelve, 1-inch diameter bolts and sealed with a silver plated, metallic O-ring. The outer head is 1-1/2-inch thick steel plate secured to the top of the upper cask forging by eight, 1-inch diameter bolts and sealed with an elastomer O-ring. The radioactive contents are positioned and supported within the containment vessel (inner cask cavity) by a modified aluminum basket and internal support structure.

The package, including impact limiters, has an overall length of 237 inches and an outside diameter of 75 inches. The maximum weight of the contents is 1,600 pounds. The weight of the package is approximately 47,500 pounds.

(3) Drawings

The Model No. NLI-1/2 shipping cask is constructed in accordance with the following National Lead Company Drawing Nos.:

General

70514F, Sheet 1, Rev. 7, Cask and Trailer General Arrangement
70514F, Sheet 2, Rev. 8, Cask and Trailer General Arrangement
70885F, Sheet 1, Rev. 3, Spent Fuel Cask Details
70885F, Sheet 2, Rev. 2, Spent Fuel Cask Details
70885F, Sheet 3, Rev. 2, Spent Fuel Cask Details
70885F, Sheet 4, Rev. 1, Spent Fuel Cask Details
70887F, Sheet 1, Rev. 1, Outer Closure Head

Configuration (A)

70516F, Sheet 1, Rev. 8, Spent Fuel Cask General Assembly
70562F, Sheet 1, Rev. 8, Inner Container
70562F, Sheet 2, Rev. 4, Inner Container

Configuration (B)

70888F, Sheet 1, Rev. 3, Spent Fuel Cask General Assembly
70886F, Sheet 1, Rev. 2, Basket Concept
70884F, Sheet 1, Rev. 2, Inner Closure Head

(b) Contents

(1) Type and form of material

(i) Irradiated PWR or BWR uranium oxide fuel assemblies of the following specifications:

	PWR	BWR
Fuel form	Clad UO_2 pellets	Clad UO_2 pellets
Cladding material	Zr or SS	Zr or SS
Maximum initial fuel pin pressure at 100°F, psig	550	200
Maximum initial U content/assembly, kg	475	197
Maximum average initial U-235 enrichment, w/o	3.70	2.65
Maximum bundle cross section, inches	8.75	5.75
Fuel pin array size	14x14/15x15 16x16/17x17	7x7 8x8
Maximum active fuel length, inches	144	144
Maximum specific power, kw/kgU	40	27
Maximum average burnup, MWD/MTU	40,000	34,000
Minimum cooling time, days	150*	120

The PWR type assemblies may be shipped either with or without burnable poison rods or control rods.

*Four (4) fuel rods may have minimum cooling time of 120 days.

5. (b) Contents (continued)

(1) Type and form of material (continued)

(ii) Solid, non-fissile, irradiated hardware and neutron source components.

(iii) Byproduct and special nuclear material in the form of irradiated uranium and plutonium oxide fuel rods. Prior to irradiation, the maximum enrichment in U-235 plus plutonium not to exceed 3.70 w/o.

(iv) Irradiated PWR uranium oxide fuel assemblies including additional irradiated fuel rods inserted and secured in the guide thimbles. The fuel assemblies shall conform to the maximum active dimensions as described in Item 5(b)(1)(i) except that maximum initial U content shall be 495 kg and the maximum average initial U-235 enrichment shall be 3.35 w/o.

(2) Maximum Quantity of material per package

The maximum decay heat load per package not to exceed 10.6 kilowatts, and;

(i) Items 5(b)(1)(i) or 5(b)(1)(iv) above: one (1) PWR fuel assembly; or two (2) BWR fuel assemblies.

Above assemblies to be contained in their respective fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev 8 or 70886F, Sheet 1, Rev. 2.

(ii) Item 5(b)(1)(ii) above, weight not to exceed 1,600 pounds.

(iii) Item 5(b)(1)(iii) above, the maximum mass of U-235 plus plutonium shall not exceed 4.0 kg. Fuel rods shall be contained in fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 8 or 70886F, Sheet 1, Rev. 2.

(c) Fissile Class III

Maximum number of packages per shipment One (1)

6. The cask cavity and containment vessel (inner container) shall be dry (no free water) when delivered to a carrier for transport. Residual moisture shall be removed from the cask cavity and containment vessel by the methods described in Section XV of the Application. Removal of residual moisture from cask cavity when package is used in Configuration (B) is not required providing the decay heat load does not exceed 2 KW. The containment vessel shall be filled with 1 ATM of helium.

7. Prior to each shipment, the package shall meet the tests and criteria specified in Section XVI of the Application.

8. The helium coolant is considered part of the package contents. The radioactive limits specified in 10 CFR §71.35(a)(4) do not apply.

9. The package contents shall be so limited that under normal conditions of transport, the sum of the gamma and neutron dose rates shall not exceed 21 mrem/hr when measured at a distance of three (3) feet from the exterior surface of the package.

10. The neutron shielding tank shall be filled with a mixture of water and ethylene glycol (52% by volume).

11. The structures used to support the package on the transport vehicle shall be as described in the Application.

12. Any system used for cooling down the package shall be provided with a pressure relief device set so that during the cool-down process, the maximum pressure in the containment vessel cannot exceed 310 psig when the package is used in Configuration (A) or 365 psig when the package is used in Configuration (B).

13. The systems and components of each packaging shall meet the periodic tests and criteria specified in Section XVI of the Application.

14. Repair and maintenance shall be as described in Section XVI of the Application.

15. As needed, appropriate component spacers shall be used in the cask cavity to limit movement of contents during shipment.

16. Prior to first use, each packaging shall meet the acceptance tests and criteria specified in Sections XIII and XIV of the Application when used in Configuration (A) and in Appendix A to Sections XIII and XIV when used in Configuration (B).

17. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12(b).

18. Expiration date: March 31, 1985.

REFERENCES

NL Industries, Inc. application dated March 7, 1980.

Supplement dated: July 11, 1980.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald

Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety

Date: JUL 16 1980