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DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION
1000 INDEPENDENCE AVENUE SW
WASHINGTON DC 20585-1000

NR:RR:JHKampen G#C22-05956
December 28, 2022

Unclassified upon removal of Enclosures (1) and (2).

Enclosures (1) & (2) Removed.

John Lubinski
Director, Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, DC 20555

S-6213 POWER UNIT SHIPPING CONTAINER—SAFETY ANALYSIS REPORT FOR
PACKAGING OF S9G POWER UNITS; REQUEST FOR NUCLEAR REGULATORY
COMMISSION REVIEW AND CONCURRENCE (U)

References: (a) NR letter G#C21-04464 dated September 23, 2021
(b) NR letter G#22-00013 dated January 18, 2022

Background:

a. The S-6213 power unit shipping container (PUSC) is used to transport submarine power units (fully assembled and unirradiated cores). The S-6213 PUSC is certified as a Type B package for shipment of fissile and highly radioactive material. Compliance with Title 10, Code of Federal Regulations, Part 71 (10CFR71) is demonstrated through a safety analysis report for packaging (SARP). The S9G power unit in the S-6213 PUSC SARP evaluates the Next Generation Reactor (NGR) and VIRGINIA Forward Fit (VAFF) cores as authorized contents in the S-6213 PUSC.

b. Reference (a) notified the NRC that a design modification was being pursued for the S-6213 PUSC and that NRC review and concurrence would be requested with the revised SARP incorporating the design modification. Reference (b) requested renewal of NRC Certificate of Compliance (CoC) USA/9186/B(U)F-96 for the S-6213 PUSC, and recommended NRC take action on the renewal request as part of the review of the SARP revision for the S-6213 PUSC design modification.

Discussion:

a. The Naval Nuclear Propulsion Program has designed and manufactured a new internal pressure cap design for the S-6213 PUSC. The S9G Power Unit in the S-6213

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Classified By: N. S. Plate - Nuclear Engineer
Derived From: DOE-DOD CG-RN1 Rev 3 Feb 1996, DOE OC

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PUSC SARP is revised via an Addendum that, together with the SARP, demonstrates compliance with 10CFR71 for the S9G power unit in the S-6213 PUSC package. The Addendum addresses all aspects of the S9G power unit in the S-6213 PUSC package that have changed as a result of the internal pressure cap design change. Enclosure (1) provides a high level summary of the changes presented in the Addendum. Enclosure (2) provides the full text of the Addendum.

b. Reference (b) requested renewal of the S-6213 PUSC NRC CoC (USA/9186/B(U)F-96) and removal of NGR and TDC power units as authorized contents because no further shipments of these contents are planned. Naval Reactors requested NRC take action on the renewal as part of this SARP review. Additionally, no shipments of S6W power units are planned and S6W power units are removed as authorized contents from the CoC. The S9G power unit in the S-6213 PUSC package weight is revised because the Addendum calculates a slightly different weight compared to previous analyses. Enclosure (3) contains all CoC changes requested in reference (b) and this letter.

Request for Action: Naval Reactors requests NRC review and concurrence with the S9G Power Unit in the S-6213 PUSC SARP Addendum, Revision Original, provided in Enclosure (2). NRC is requested to renew NRC CoC USA/9186/B(U)F-96, as requested in reference (b), with the changes as documented in Enclosure (3). To support planned shipments of S9G power units to support national security needs for VIRGINIA Class submarine construction, Naval Reactors requests NRC schedule their review to complete by October 2023. Naval Reactors will schedule a review kickoff meeting with the NRC.

If you have any questions, please do not hesitate to call me at (202) 781-6034.

N. S. Plate
Naval Reactors

Enclosure: (1) SUMMARY OF CHANGES IN THE S9G POWER UNIT IN THE S-6213 PUSC SARP ADDENDUM
(2) S9G POWER UNIT IN THE S-6213 POWER UNIT SHIPPING CONTAINER SAFETY ANALYSIS REPORT FOR PACKAGING ADDENDUM, REVISION ORIGINAL
(3) REQUESTED CHANGES TO THE NRC CERTIFICATE OF COMPLIANCE FOR THE S-6213 PUSC, USA/9186/B(U)F-96, REVISION 20 (DRAFT)

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NTK: PRNR-REC, PRNR-REP

Copy to (Hard copy with Enclosure (2)):

Director, Division of Fuel Management, NMSS, NRC (S. Helton)

Chief, Storage and Transportation Licensing Branch, DFM, NMSS, NRC (Y. Diaz-Sanabria)

Project Manager, STLB, DFM, NMSS, NRC (C. Allen)

Copy to (Electronic, without Enclosure (2) contents):

NNL ADSARS

General Manager, NNL (T. Sambolt)

Executive Manager, RS.Reactor Servicing (RS), NNL (V. Pantlioni)

Executive Manager, RSS.Reactor Servicing Systems (RSS), NNL (M. Drewen)

Subdivision Technical Manager, RSS.Shipping Containers, NNL (S. Fiscus)

Unit Technical Manager, RSS.New Fuel and Exams, NNL (A. Brenneman)

Advisor Engineer, RSS.Shipping Container Recapitalization, NNL (M. Uhl)

Manager, NRLFO (J. Showman)

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ENCLOSURE (3)

**RECOMMENDED CHANGES TO THE NRC CERTIFICATE OF COMPLIANCE FOR
THE S-6213 PUSC, USA/9186/B(U)F-96, REVISION 20 (DRAFT)**

Enclosed are recommended changes to the NRC Certificate of Compliance, showing additions and deletions from the latest revision (Revision 19) of the certificate. These changes include those recommended in Naval Reactors letter G#22-00013 dated January 18, 2022.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER 9186	b. REVISION NUMBER 19 20	c. DOCKET NUMBER 71-9186	d. PACKAGE IDENTIFICATION NUMBER USA/9186/B(U)F-96	PAGE 1 OF 5	PAGES 5
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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)

U.S. Department of Energy
Division of Naval Reactors
Washington, DC 20858

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Safety Analysis for Shipping S8G Power Units in the S-6213 Container, Rev. 7, dated June 16, 1975, as supplemented; and Safety Analysis for Shipment of S6W Shipboard Power Units in the Model 2 S-6213 PUSC, 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 Nos.: Model 1, S-6213 Power Unit Shipping Container
Model 2, S-6213 Power Unit Shipping Container

(2) Description

A power unit shipping container (PUSC) for shipment of a power unit complete with control rods and control rod drive mechanisms installed.

The Model 1 S-6213 PUSC consists of a carbon steel cylindrical shell approximately 9-1/4 feet in outside diameter by 39-1/2 feet long, including hemispherical steel end impact limiters, with 10-3/4-foot outside diameter central flanges joining the barrel and cover halves. The Model 2 S-6213 PUSC is of the same design as the Model 1, except that the primary container material is HY-80 steel. A power unit is supported in the PUSC by a centrally located thick circular steel plate (PU head) which is clamped between the central mating flanges of the PUSC and fastened by 94, 2-inch diameter high strength studs. The upper and lower extremities of the power unit cantilever into the barrel and cover halves without additional support. ~~A lower support adapter is installed in the barrel end of the container during shipment of the S6W shipboard power unit.~~ A shipping/lifting ring, a flange adapter, and a lower support adapter are installed in the container during shipment of the S9G shipboard power unit. ~~An adaptor ring is installed in the container during shipment of the S8GP/TDC power unit.~~

An internal pressure cap and seal ring are attached to the PUSC barrel flange.

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5.(a) Packaging (Continued)

(2) Description

The PUSC is shipped in the horizontal position on a support frame which is secured to a specially built flatbed rail car.

The weight of the PUSC, including frame and contents, is approximately ~~429,900 pounds~~ ^{320,400} for shipment of the S6W shipboard power unit, and ~~329,000~~ pounds for shipment of the S9G shipboard power unit. ~~The loaded weight of the S8GP/TDC power unit is approximately 340,600 pounds.~~

(3) Drawings

The Model 1 and Model 2 S-6213 PUSC are constructed in accordance with the Drawings included in the applications (see references, below).

5.(b) Contents

(1) Type and form of material

- ~~(i) Unirradiated S6W advanced fleet reactor shipboard power unit as described in Chapter 6 of "S6W Prototype Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report" WAPP-REG(c)1210, Revision 1, and containing uranium enriched in the U-235 isotope.~~
- ~~(ii) Unirradiated S9G shipboard power unit, as described in Chapter 6 of "S9G Shipboard Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report For Packaging," Revision 2, and containing uranium enriched in the U-235 isotope.~~
- ~~(iii) (i) Unirradiated S9G power unit containing the Virginia Forward Fit Core, as described in supplement dated June 22, 2015.~~
- ~~(iv) Unirradiated S8GP/Technology Demonstration Core (TDC) power unit as described in the supplement dated June 13, 2018.~~

(2) Maximum quantity of material per package

For the Model 1 S-6213 PUSC:

~~One S9G Shipboard Power Unit, or~~
One S9G Power Unit containing Virginia Forward Fit Core.

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5.(b)(2) (Continued)

For the Model 2 S-6213 PUSC:

~~One S6W Advanced Fleet Reactor Shipboard Power Unit,~~
~~One S9G Shipboard Power Unit,~~
~~One S9G Power Unit containing Virginia Forward Fit Core, or~~
~~One S8GP/TDC Power Unit~~

5.(c) Criticality Safety Index (CSI):

Minimum CSI to be shown on
label for nuclear criticality control: 100

6. All control rods shall be restrained in the power unit fuel cells by the control rod holddown latches.
7. Transport by air of fissile material is not authorized.
8. For the Model 1 S-6213 PUSC, a nondestructive examination of the entire length of both inner and outer surfaces of the four tie-down support bracket-to-container wall butt welds shall be conducted prior to each loaded shipment.

(a) The nondestructive examination in accordance with a written procedure may be by either:

(1) The liquid penetrant method in accordance with:

- (i) Article 6, Section V, ASME Code, or
- (ii) MIL-STD-271E, "Nondestructive Testing Requirements for Metals," Section 5, October 31, 1973, or
- (iii) NAVSHIPS 250-1500-1, "Welding Standard," Section 12.5

(2) or the magnetic particle method in accordance with:

- (i) Article 7, Section V, ASME Code (Yoke Technique; Dry Particle Method; direct or rectified current), or
- (ii) MIL-STD-271E, Section 4; specifically 4.3.1 (General) and 5.6.1 (coatings), 4.3.3 (Dry Powder), 4.3.3.3.6 (Continuous), and 4.3.3.3 (Procedure) as excepted by using direct or rectified current, 4.3.3.3.3 (Yoke Technique), 4.3.2.5 (sensitivity and cleaning), and 4.3.1.3 (smoothness), or
- (iii) NAVSHIPS 250-1500-1, Section 12.4, 12.4.1 (General), 12.4.3 (Dry powder), 12.4.3.3.2.1 (Yoke Technique) using direct or rectified current.

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(b) If any indications, as defined in accordance with either:

- (1) Paragraph UA-93(a), Appendix VIII, Division 1, Section VIII, ASME Code (with 7(b)(2)(i), above), or
- (2) Paragraphs UA-72 and UA-73, Appendix VI, Division 1, Section VIII, ASME Code (with 7(b)(2)(i), above), or
- (3) Class 1 acceptance criteria of NAVSEA 0900-LP-003-8000, "Surface Inspection Acceptance Standards for Metal," with Change 2, July 1, 1974 (with 7(b)(1)(ii) or 7(b)(2)(ii), above), or
- (4) NAVSHIPS 250-1500-1, Section 10.3.2 (with 7(b)(1)(iii) or 7(b)(2)(iii), above), as noted,

are detected, the packaging shall be repaired and reinspected prior to use and shall be inspected prior to each shipment thereafter. Any defects shall be reported in accordance with 10 CFR §71.95.

9. Expiration date: ~~March 31, 2022~~ March 31, 2027

REFERENCES

For the Model 1 S-6213 PUSC:

U.S. Naval Reactors application dated July 24, 1975.

Supplements dated: June 3, 1977; July 24, 1978; Naval Reactors letter G#C89-2838, dated May 22, 1989; Naval Reactors letter G#C90-03664, dated September 5, 1990; Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; Naval Reactors letter G#C97-03614, dated September 29, 1997; Naval Reactors letter G#01-03619, dated December 11, 2001; Naval Reactors letter G#06-04833, dated December 18, 2006; Naval Reactors letter G#C08-00667, dated March 13, 2008; Naval Reactors letter G#11-04084, dated September 20, 2011; Naval Reactors letters G#C15-02760 dated June 22, 2015, and G#C01632 dated April 13, 2016; Naval Reactors letter G#16-04427, dated September 20, 2016; ~~and~~ Naval Reactors letter G#C18-02888, dated June 13, 2018; Naval Reactors letter G#22-00013, dated January 18, 2022; and Naval Reactors Letter G#22-05956 dated December 28, 2022.

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For the Model 2 S-6213 PUSC:

U.S. Naval Reactors application G#C91-11165, dated December 19, 1991.

Supplements dated: Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; Naval Reactors letter G#C97-03614, dated September 29, 1997; Naval Reactors letter G#01-03619, dated December 11, 2001; Naval Reactors letter G#06-04833, dated December 18, 2006; Naval Reactors letter G#C08-00667, dated March 13, 2008; Naval Reactors letter G#11-04084, dated September 20, 2011; Naval Reactors letters G#C15-02760 dated June 22, 2015, and G#C01632 dated April 13, 2016; Naval Reactors letter G#16-04427, dated September 20, 2016; ~~and~~ Naval Reactors letter G#C18-02888, dated June 13, 2018; **Naval Reactors letter G#22-00013, dated January 18, 2022; and Naval Reactors Letter G#22-05956 dated December 28, 2022.**

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Renew

John McKirgan
John McKirgan, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Renew

Dated

2/13/19