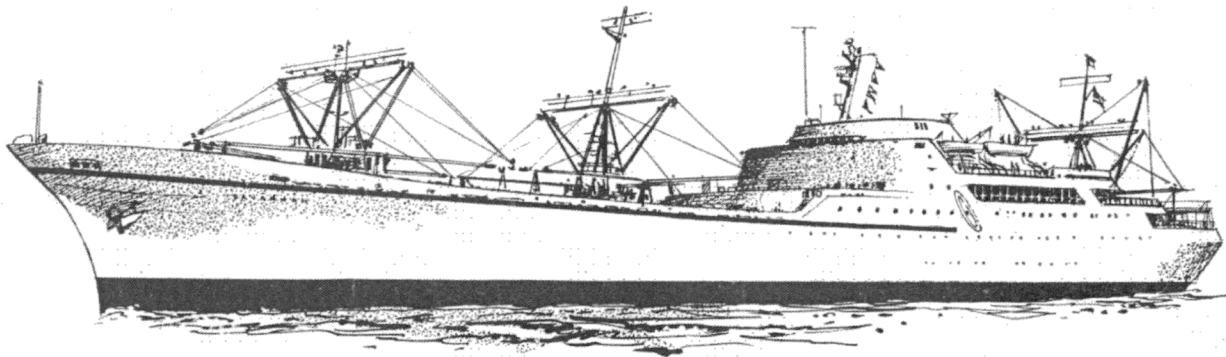




U.S. Department of Transportation
Maritime Administration



N.S. SAVANNAH

**ANNUAL RADIOLOGICAL ENVIRONMENTAL
MONITORING AND RADIOACTIVE EFFLUENT
RELEASE REPORTS
FOR CY2020**

STS - 216

Revision 0

Approved:

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Manager, N.S. *SAVANNAH* Programs

Prepared by:
TOTE Services, Inc.

RECORD OF REVISIONS

Revision	Summary of Revisions
0	The original version of the 2020 Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports

LIST OF EFFECTIVE PAGES

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1-8	0				

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1.0 INTRODUCTION

This Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports for CY2020 are submitted by the Maritime Administration (MARAD) as licensee for the Nuclear Ship *SAVANNAH* (NSS) and cover the Calendar Year (CY) 2020 reporting period.

In accordance with the requirements of TS 2.5 Reporting Requirements, "... the following reports shall be submitted prior to April 1 of each year in accordance with 10 CFR 50.4:

- Annual Radiological Environmental Monitoring Report.
- Annual Radioactive Effluent Release Report.

This report is arranged into four sections following the introduction. Section 2.0 lists items required to be reported by the Technical Specifications (TSs). Sections 3.0 through 5.0 report those items as described in Section 2 below.

2.0 ITEMS REQUIRED BY TECHNICAL SPECIFICATIONS

The items specifically required to be included in these written annual reports are as follows:

- a. TS 2.5.1, Annual Radiological Environmental Monitoring Report (see 3.0).
- b. TS 2.5.2, Annual Radioactive Effluent Release Report (see 4.0).
- c. TS 2.1.1, Changes to the Process Control Program (PCP) (see 5.1).
- d. TS 2.2.1, Changes to the Offsite Dose Calculation Manual (ODCM) (see 5.2).

This report was reviewed by the Safety Review Committee at the meeting on February 4, 2021 and by the Executive Steering Committee members during its concurrence routing prior to submission of this report to the NRC.

3.0 ANNUAL RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

Per TS 2.5.1,

The Annual Radiological Environmental Monitoring Report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the previous calendar year. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Section IV.B.2.

The Annual Radiological Environmental Monitoring Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the previous calendar year pursuant to the ODCM.

In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

Note that TS 3.4.2, *Annual Report* specifically requires reporting one environmental monitoring item in the Annual Report. In addition to being reported in the Annual Report, the item is also reported here.

3.1 TS 3.4.2.1.C. ENVIRONMENTAL SAMPLE ANALYSIS SURVEYS

Environmental water and sediment samples were taken adjacent to the ship at various times during the calendar year as required by TS. The environmental sample results indicate that any changes in the radiological conditions in the environment surrounding NSS are insignificant as compared to the samples taken shortly before the NSS arrived at Pier 13. Therefore, based on the results of the radiological environmental monitoring program, NSS operations at Pier 13 did not have any adverse effects on the health and safety of the public or on the environment in 2020.

The results of the CY2020 Radiological Environmental Sampling Results are listed in Appendix A, *CY2020 Radiological Environmental Sampling Results*.

4.0 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Per TS 2.5.2,

the Annual Radioactive Effluent Release Report shall include a summary of the quantities of 1) radioactive liquid and gaseous effluents and 2) solid waste released from the NSS. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

4.1 SUMMARY OF QUANTITIES OF RADIOACTIVE LIQUID EFFLUENTS RELEASED

No radioactive liquid effluents were released in 2020.

4.2 SUMMARY OF QUANTITIES OF RADIOACTIVE GASEOUS EFFLUENTS RELEASED

No radioactive gaseous effluents were released in 2020.

4.3 SUMMARY OF THE QUANTITIES OF RADIOACTIVE SOLID WASTE RELEASED

There were three shipments of radioactive solid waste in 2020.

Asbestos containing materials (ACM) was generated during ACM abatement of the reactor compartment and containment vessel. ACM abatement was completed in early 2019. Representative samples of the ACM insulation were collected and sent to GEL Laboratories (GEL) in February of 2019 for radiochemistry analyses of gamma emitting radionuclides (via gamma spectroscopy), Sr-90 and H-3. Bags of ACM insulation materials were consolidated into five (5) twenty-foot shipping (Sealand) containers in preparation for waste disposal transportation. The ACM insulation waste was shipped to EnergySolutions (ES) facility in Kingston, Tennessee by Hittman Transportation on March 30, 2020. The ACM insulation materials were processed for disposal by Bulk Survey For Release (BSFR).

Container Details follow:

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Container ID	# Bags	Gross Weight (lbs)	Tare Weight (lbs)	Waste Weight (lbs)
273856	302	13,100	4,810	8,290
312833	270	12,800	4,920	7,880
122622	300	16,000	4,960	11,040
138134	338	10,400	4,820	5,580
141439	319	17,100	4,810	12,290
Total	1,529	69,400	24,320	45,080

Container Total Radioactivity summary follows:

Container ID	Co-60 uCi	Cs-137 uCi	H-3 uCi
273856	4.8	17.0	113.4
312833	4.6	16.2	107.7
122622	6.4	22.6	151.0
138134	3.3	11.4	76.3
141439	7.2	25.2	168.0
Total	26.3	92.5	616.4

For transportation of the ACM insulation waste, the radioactivity was low concentration such that it met the exempt material criteria (49CFR173.436) and therefore, was not considered radioactive material for the purpose of transportation. No additional radiation surveys were necessary given this determination. There was sufficient asbestos in the waste that it was transported as hazardous material (Class 9).

The waste was received by ES. There were no issues during loading or transportation of the waste. The material was properly disposed.

5.0 PROCEDURE CHANGES REPORT

5.1 PROCESS CONTROL PROGRAM (PCP) CHANGES

Per TS 2.1,

The PCP shall describe the administrative and technical controls for liquid and solid radioactive waste systems management. Changes to the PCP will be outlined in the Annual Radioactive Effluent Release Report per Section 2.5.2. This submittal shall contain:

- 2.1.1. Information to support the rationale for the change and the changed pages of the PCP or a statement there were no changes;

There have been no changes to the PCP since it was reviewed by NRC as part of the approval of License Amendment 17, Reference (a).

5.2 OFFSITE DOSE CALCULATION MANUAL (ODCM) CHANGES

Per TS 2.2,

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents; in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints; and in the conduct of the radiological environmental monitoring program. Changes to the ODCM will be outlined in the Annual Radioactive Effluent Release Report per Section 2.5.2. This submittal shall contain:

- 2.2.1 A complete copy of the ODCM with an accompanying criteria and justification for the changes or a statement there were no changes;

There have been no changes to the ODCM since its Revision 1 was forwarded to the NRC on May 7, 2020, Reference (b).

6.0 REFERENCES

- a. Letter from Mr. Theodore B. Smith (NRC) to Mr. Erhard W. Koehler (MARAD), dated June 11, 2019, *Issuance of Amendment 17 to revise the Technical Specifications to revise the Radioactive Effluent Controls and make an Administrative Change*
- b. Letter from Mr. Erhard W. Koehler (MARAD) to Document Control Desk (NRC), dated May 7 2020, *Submittal of Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports for CY2019, Revision 0*

APPENDIX A. CY2020 RADIOLOGICAL ENVIRONMENTAL SAMPLING RESULTS

Sample Location	Sample Date	Type of sample	Co-60 (pCi/g)	Cs-137 (pCi/g)
Pier #13 in the vicinity of the forward location of the ship (Prior to return from drydock), Canton Marine Terminal, Baltimore, MD	02/07/2020	Water (A)	<MDA (minimum detectable activity)	<MDA
Pier #13 in the vicinity of the forward location of the ship (Prior to return from drydock), Canton Marine Terminal, Baltimore, MD	02/07/2020	Sediment (A)(B)	<MDA	9.01E-02 (C) MDA = 8.26E-02
Pier #13 in the vicinity of the aft location of the ship (Prior to return from drydock), Canton Marine Terminal, Baltimore, MD	02/07/2020	Water (A)	<MDA	<MDA
Pier #13 in the vicinity of the aft location of the ship (Prior to return from drydock), Canton Marine Terminal, Baltimore, MD	02/07/2020	Sediment (A)(B)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Forward	10/22/2020	Water (A)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Forward	10/22/2020	Sediment (A)(B)	<MDA	1.01E-01 (C) MDA = 5.99E-02
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Aft	10/22/2020	Water (A)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Aft	10/22/2020	Sediment (A)(B)	<MDA	<MDA (C)

Table Data Notes

- (A) Calculated MDAs are a-posteriori values at the 95% confidence level.
- (B) Activity is reported on a dry weight basis unless otherwise indicated in the case narrative and is decay corrected to the sample collect date.
- (C) Results are statistically positive at the 95% confidence level. (activity is greater than or equal to the two sigma uncertainty)