U.S. Department
of Transportation
**Maritime
Administration**

Office of Ship Disposal

1200 New Jersey Ave., SE
Washington, DC 20590

Ref: 10 CFR 50.36a

May 7, 2020

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: **Docket No. 50-238; License No. NS-1; N.S. *SAVANNAH***

Submittal of Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports for CY2019, Revision 0

Pursuant to Technical Specifications 2.5.1 and 2.5.2, the Maritime Administration (MARAD) is required to submit an Annual Radiological Environmental Monitoring Report and an Annual Radioactive Effluent Release Report, respectively. MARAD hereby submits Revision 0 to the Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports as Enclosure (1).

This submittal contains no new Regulatory Commitments.

If there are any questions or concerns with any issue discussed in this report, please contact me at (202) 366-2631, and/or e-mail erhard.koehler@dot.gov.

Respectfully,

Erhard W. Koehler
Senior Technical Advisor, N.S. *SAVANNAH*
Office of Ship Disposal

Enclosure

A020
A009
IE25
IE48

Docket No. 50-238; License NS-1; N.S. *SAVANNAH*
Submittal of Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports, Revision 0
May 7, 2020

Enclosure:

1. STS-212, Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports, Revision 0

cc:

Electronic copy
NSS ESC
NSS SRC

MAR 610, 612, 615

Hardcopy, cover letter only
MAR-600, 640, 640.2

Hardcopy with all enclosures
MAR-100, 640.2 (rf)
USNRC (Ted Smith, Katherine Warner)
USNRC Regional Administrator - NRC Region I
MD Department of the Environment (Eva Nair)

EWK/jmo

U.S. Department
of Transportation
**Maritime
Administration**

Office of Ship Disposal

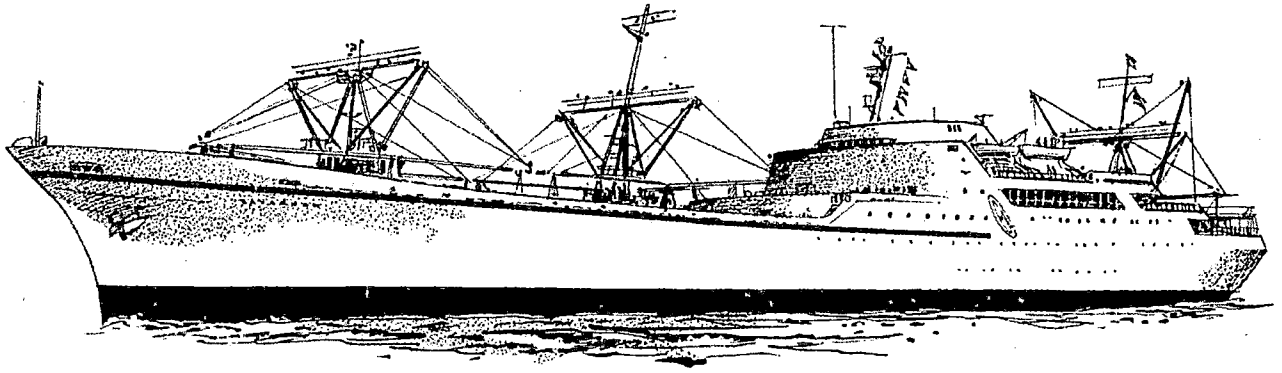
1200 New Jersey Ave., SE
Washington, DC 20590

Docket No. 50-238; License No. NS-1; N.S. *SAVANNAH*

Enclosure 1 to Submittal of Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports for CY2019, Revision 0

STS - 212, ANNUAL RADIOLOGICAL ENVIRONMENTAL MONITORING AND RADIOACTIVE EFFLUENT RELEASE REPORTS FOR CY2019

U.S. Department of Transportation
Maritime Administration



N.S. SAVANNAH

ANNUAL RADIOLOGICAL ENVIRONMENTAL MONITORING AND RADIOACTIVE EFFLUENT RELEASE REPORTS FOR CY2019

STS - 212

Revision 0

Approved: _____ Date: May 7, 2020

Manager, N.S. *SAVANNAH* Programs

Prepared by:
TOTE Services, Inc.

RECORD OF REVISIONS

Revision	Summary of Revisions
0	The original version of the 2019 Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports

LIST OF EFFECTIVE PAGES

Page No.	Rev. No.	Page No.	Rev. No.	Page No.	Rev. No.
1-27	0				

Table of Contents

1.0 Introduction **4**

2.0 Items Required by Technical Specifications **4**

3.0 Annual Radiological Environmental Monitoring Report **4**

3.1 TS 3.4.2.1.c. Environmental Sample Analysis Surveys 5

4.0 Annual Radioactive Effluent Release Report **5**

4.1 Summary of Quantities of Radioactive Liquid and Gaseous Effluents Released 5

4.2 Summary of the Quantities of Solid Waste Released 5

4.3 Process Control Program (PCP) Changes 5

4.4 Offsite Dose Calculation Manual (ODCM) Changes 6

4.4.1 Criteria and Justification for the Change to 4.4.2 6

5.0 References **7**

APPENDIX A. CY2019 Radiological Environmental Sampling Results **8**

APPENDIX B. STS-005-020, Offsite Dose Calculation Manual (ODCM), Revision 1 **9**

1.0 INTRODUCTION

This Annual Radiological Environmental Monitoring and Radioactive Effluent Release Reports for CY2019are submitted by the Maritime Administration (MARAD) as licensee for the Nuclear Ship *SAVANNAH* (NSS) and covers the Calendar Year (CY) 2019 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 provides the discussion of the various reporting items required by the Technical Specifications (TSs). Section 3.0 is the Additional items required by the TS are also included in Section 2 as stated 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 4.1).

d. TS 2.2.1, Changes to the Offsite Dose Calculation Manual (ODCM) (see 4.2).

This report was reviewed by the Safety Review Committee at the meeting on February 27, 2020 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 2019.

Environmental samples were also taken at Philadelphia Ship Repair, Philadelphia, PA prior to the ship's arrival on September 10, 2019.

The results of the CY2019 Radiological Environmental Sampling Results are listed in Appendix A, *CY2019 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 AND GASEOUS EFFLUENTS RELEASED

No radioactive liquid or gaseous effluents were released in 2019.

4.2 SUMMARY OF THE QUANTITIES OF SOLID WASTE RELEASED

No solid wastes were released in 2019.

4.3 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).

4.4 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 was one change to the ODCM after it was reviewed by NRC as part of the approval of License Amendment 17, Reference (a).

4.4.1 CRITERIA AND JUSTIFICATION FOR THE CHANGE TO 4.4.2

During a review by MARAD contractors, an error was noted in:

4.4.2 Gaseous Dose Assessment

a. Requirements

Using the analysis of the particulate air sample, perform a dose analysis for any measurable radionuclides of NSS origin, using the following equation:

$$D_{eff} = 5.7x10^{-3} * t \sum_{i} {}^{C_i}/_{EC_i}$$

Where:

D_{eff} = Effective dose equivalent to a Member of the Public assumed to be exposed to the effluent release for the duration of the release (mrem)

C_i = concentration for radionuclide "i" in the effluent release (μCi/ml)

t = duration of sampling (release) period (hours)

EC_i = Effluent concentration value for radionuclide "i" from 10 CFR 20, Appendix B, Table 2, Column 1 (μCi/ml)

$5.7x10^{-3}$ = conversion factor (50 mrem effective dose [EC_i value for 1-year exposure] divided by 8760 hours per year)

Specifically,

In Revision 0, t = duration of sampling (release) period *(minutes)* [emphasis added]. The unit of time should have been hours. In Revision 1, the definition of t was revised to

t = duration of sampling (release) period (hours)

There were no other changes. A complete copy of Revision 1 is attached as Appendix B, STS-005-020, Offsite Dose Calculation Manual (ODCM). It is a User Controlled copy.

5.0 REFERENCES

a. Letter from Mr. Theodore B. Smith 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*

APPENDIX A. CY2019 RADIOLOGICAL ENVIRONMENTAL SAMPLING RESULTS

Sample Location	Sample Date	Type of sample	Co-60	Cs-137
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Aft	04/04/2019	Sediment (A)(B)	<MDA (minimum detectable activity)	<MDA [6.5E-02 pCi/g (C)] MDA = 1.26E-01
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Aft	09/05/2019	Sediment (A)(B)	<MDA	1.47E-01 pCi/g (C) MDA = 7.96E-02
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Forward	4/04/2019	Sediment (A)(B)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Forward	09/05/2019	Sediment (A)(B)	<MDA	<MDA [6.68-02 pCi/g (C)] MDA = 8.82E-02
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Aft	4/04/2019	Water (A)	<MDA	<MDA
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Stbd Side, Aft	09/05/2019	Water (A)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Forward	4/04/2019	Water (A)	<MDA	<MDA
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side, Forward	09/05/2019	Water (A)	<MDA	<MDA

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)

APPENDIX B. STS-005-020, OFFSITE DOSE CALCULATION MANUAL (ODCM), REVISION 1

The following 18 pages are a complete copy of Revision 1 of STS-005-020, Offsite Dose Calculation Manual (ODCM).