



U.S. Department of
Transportation

**Maritime
Administration**

SAVANNAH Technical Staff
Office of Ship Disposal

1200 New Jersey Ave., SE
Washington, DC 20590

Ref: 10 CFR 50.36(c)(5), 50.54(w), 50.59(d)(2)

February 28, 2011

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

SUBJECT: Docket No. 50-238; License No. NS-1; N.S. SAVANNAH
Annual Report for CY 2010, Revision 0

Pursuant to Technical Specification 3.4.2, the Maritime Administration (MARAD) is required to submit an annual written report. MARAD hereby submits Revision 0 to the CY 2009 Annual Report as Enclosure (1).

The annual report is also intended to meet the routine reporting requirements for:

- 10 CFR 50.59(d)(2) requires a summary of safety evaluations for activities implemented under 10 CFR 50.59; and,
- 10 CFR 50.54(w) Insurance Annual Report.

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 me at erhard.koehler@dot.gov.

Respectfully,

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

Enclosure

FSMEAD

**Docket No. 50-238; License NS-1; N.S. SAVANNAH
Submittal of Annual Report for CY 2010, Revision 0
February 28, 2011**

Enclosure:

1. Annual Report for CY 2010, Revision 0

**Docket No. 50-238; License NS-1; N.S. SAVANNAH
Submittal of Annual Report for CY 2010, Revision 0
February 28, 2011**

cc:

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MAR 610, 612, 615

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MAR-100, 640.2 (rf)

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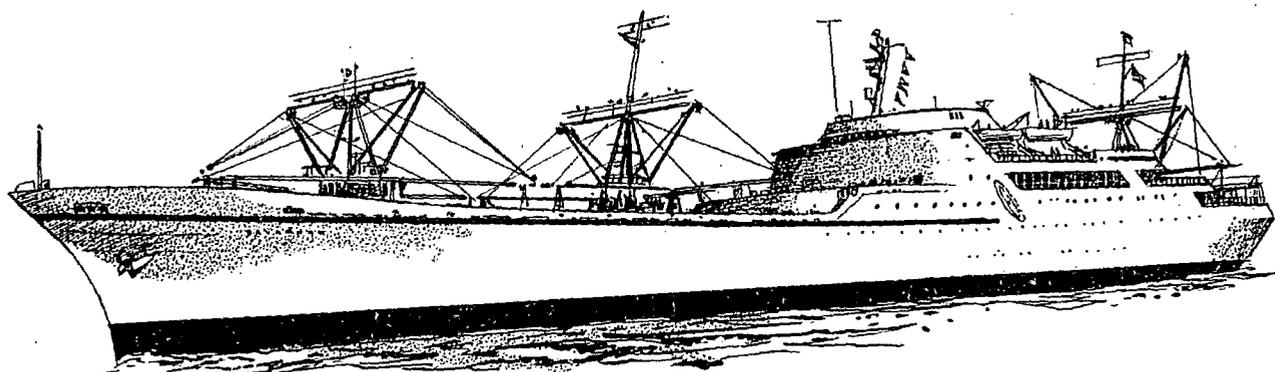
**Maritime
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Docket No. 50-238; License No. NS-1; N.S. SAVANNAH

Enclosure 1 to Submittal of Annual Report for CY 2010, Revision 0



**U.S. Department of Transportation
Maritime Administration
Office of Ship Disposal**



N.S. SAVANNAH

**ANNUAL REPORT
2010**

STS - 131
Revision 0

Approved:  02/28/2011
Date

Manager, N.S. SAVANNAH Programs

Prepared by:
Sayres and Associates Corporation

RECORD OF REVISIONS

Revision	Summary of Revisions
0	The original version of the 2010 Annual Report License NS-1

LIST OF EFFECTIVE PAGES

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1.0 INTRODUCTION

In accordance with the requirements of Technical Specification 3.4.2, an annual written report shall be submitted prior to March 1 of the following calendar year.

This report is arranged into two sections. Section 2.0 provides a discussion of the nine items required by the Technical Specifications. Section 3.0 provides a discussion of other issues.

2.0 ITEMS REQUIRED BY TECHNICAL SPECIFICATION 3.4.1

The report shall include the following:

- a. The status of the facility.
- b. The results of the radiation surveys and monitoring station dosimeter readings.
- c. The results of environmental sample analysis surveys.
- d. The results of quarterly intrusion alarm system checks.
- e. The amount of radioactive materials removed from the N.S. *SAVANNAH* (NSS) by releases, discharges, and shipments of radioactive waste material.
- f. A description of the principal maintenance performed on the vessel.
- g. Any unauthorized entry into radiation control areas by visitors or employees and corrective action taken to improve access control.
- h. Any degradation of one of the several boundaries which contain the radioactive materials aboard the NSS.
- i. Results of occupational exposure indicated by personal dosimetry.

2.1 *Status of the Facility*

During 2010, the NSS has remained "Mothballed" per the requirements of Regulatory Guide (RG) 1.86, "Termination of Operating Licenses for Nuclear Reactors," Reference (a). This state of protective storage was approved in Reference (b). This RG describes the now outmoded Mothballing option of protective storage.

During calendar year (CY) 2010, the ship was berthed at Pier 13, Canton Marine Terminal, 4601 Newgate Ave., Baltimore, MD.

Similar to 2007 through 2009, MARAD and contractor personnel were routinely on board the NSS during normal workdays throughout 2010. This regular attendance had the beneficial effect of improving the ship's physical condition and improving staff proficiency with the conduct of licensed activities.

2.1.1 License Activities

MARAD completed one significant licensing action in 2010:

- Response to Revised Power Reactor Security Rule to Request an Exemption from 10 CFR Part 73 and 10 CFR 50.54(p), November 8, 2010.

MARAD continued developing and implementing a prioritized procedure and process development program.

The USNRC conducted no facility inspections during CY 2010.

2.1.2 Organization

In 2010, MARAD made no substantial changes to the organization. The Nuclear Advisor position was filled in February 2010; that individual also serves as acting Facility Site Manager. By mutual agreement between MARAD and the contractor, Areva Federal Services, Inc., the Engineering, Management and Oversight Services (EMOS) contract was allowed to expire at the end of its option year (December 31, 2010). There has been no activity on the contract in the most recent option year, and no work is projected in the upcoming period due to constrained project funding.

2.1.3 Review of Other Technical Specifications Requirements

In accordance with the NSS Technical Specification 3.6.3, the Safety Review Committee (SRC) is specifically required to review the following items with or without a formal meeting:

a. *Proposed changes to Technical Specifications.*

No changes were proposed to the Technical Specifications in CY 2010.

b. *Evaluations required by 10 CFR 50.59.*

In addition to Technical Specification review requirement by the Safety Review Committee, this paragraph is also intended to meet the reporting requirement of 10 CFR 50.59(d)(2) to provide a brief description of any changes, tests, and experiments, including a summary of the evaluation of each.

No Changes, Tests or Experiments were proposed in 2010 that would require a 50.59 evaluation.

c. *Proposed changes or modifications to a Radiological Controlled Area entry alarm system or reactor containment vessel system.*

Changes to the Alarm System were completed in 2010. The new system and the previous security system are functional.

There were no changes to a reactor containment vessel system.

d. *Evaluations of substantive changes to the results of radiological surveys.*

There were no substantive changes to the results of radiation surveys.

e. *Procedures and revisions per Technical Specification 3.5.*

Per Technical Specification 3.5, procedures and their revisions were reviewed prior to approval.

f. *Evaluations of reported violations of Technical Specifications.*

Two violations were identified during the calendar year and reported via Corrective Action Reports. The first event involved a visitor not being properly escorted as required by Technical Specification 3.3.2.2:

- Visitors shall be escorted by MARAD's designated personnel.

This event was reported on CAR 2010-035. The Safety Review Committee reviewed the evaluation of the violation and the corrective actions taken by licensee staff.

The second event involved a delayed procurement action by MARAD, which resulted in a one-week period during which emergency radiological protection was contractually not available to meet the requirements of Technical Specification 3.1.5:

- MARAD shall have a health physicist on duty or on call within two hours to provide health physics support and direction for radiological emergencies.

A Safety Review Committee teleconference was convened upon discovery of this issue, and immediate corrective action was completed on the same day. This event is documented on CAR 2010-039.

g. *Evaluations of reportable events per Technical Specification 3.4.3.1.*

There were no reportable events during the reporting period.

h. *Evaluations of deviations allowed by Technical Specification 3.7.1.7.*

All deviations were reviewed prior to implementation. The following limited duration deviations were used as needed in the reporting period:

- Alarm Systems – Testing, Maintenance (Troubleshooting / Repair) and Modification.
- Loss of Electrical Power.
- Failure to patrol the vessel at least once during a twenty-four (24) hour period per Technical Specification 3.7.1.6 (Severe Weather prevents daily security patrols).

i. *Audits and self assessments to verify the effectiveness of the Decommissioning Quality Assurance Plan.*

Self assessments were performed in the following functional areas in the reporting period:

- MARAD Program Excellence and Quality Assurance Group (PEQAG) review of NSS Programs;
- License Compliance;
- License Termination Compliance;
- Radiological Program;
- RCA Boundary Inspection;
- Security Compliance; and,
- Technical Specification Deviations.

j. *Annual reports to the NRC.*

The CY 2009 Annual Report was reviewed prior to its submittal on February 26, 2010.

2.1.4 Decommissioning Planning Activities

Decommissioning planning during the reporting period focused on reviewing and updating decommissioning plans and cost estimates.

2.1.5 SAVANNAH Emergency Radiological Assistance Team (SERAT)

There were no significant changes to the staff or changes to the ship location. All SERAT members are located within a 2-hour response radius of the ship's current location.

2.2 Radiation Surveys and Monitoring Station Dosimeter Readings

A routine radiological survey program continued to be followed in 2010. Radiological survey measurements were taken in various non-Radiological Controlled Areas and Radiological Controlled Areas. There were no significant changes found in 2010. All readings in non-Radiological Controlled Areas were insignificant as compared to background radiation levels.

2.2.1 2010 Radiation Survey Results in Radiologically Controlled Areas

Area	General Area Radiation levels μR/hr (micro-R/hr)	Highest Radiation Level μR/hr (micro-R/hr)	General Area Contamination Level (DPM/100cm²)	Highest Contamination Level (DPM/100cm²)
Reactor Compartment Cupola Level	1.0 – 4.0	10	<1000	<1000
Reactor Compartment Upper Level	1.0 – 1.5	15 at open hatch to Reactor vessel	<1000	<1000
Reactor Compartment Forward Middle Level	1.5	1.5	<1000	<1000
Reactor Compartment Aft Middle Level	1 - 2.5	10 on hose	<1000	<1000
Reactor Compartment Lower Level	40 - 4000	120,000 on contact with pipe 8 ft in overhead; 10,000 @ 30 cm.	<1000	4041 inside drum
Containment Vessel 1 st Level	150 - 450	2500 along Steam Drum	<1000	<1000
Containment Vessel 2 nd Level	150 - 2000	4000 - 5000 along Steam Drum	<1000	<1000
Containment Vessel 3 rd Level	200 - 4000	12000 on contact with Steam Generator; 8000 @30cm	<1000	<1000
Containment Vessel 4 th Level	500 - 4000	80,000 on contact with pipe; 10,000 @30cm	<1000	4092 STBD side off Deck
Port Charge Pump Room	1.5 - 40	150 to 250 on contact with pump suction line	<1000	<1000

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Area	General Area Radiation levels μR/hr (micro-R/hr)	Highest Radiation Level μR/hr (micro-R/hr)	General Area Contamination Level (DPM/100cm²)	Highest Contamination Level (DPM/100cm²)
Starboard Charge Pump Room	1.0 - 25	100 to 180 on contact with pump suction line	<1000	<1000
Hot Chemistry Lab	1.7	4.0 on contact with sink drain trap shielding. 25 on contact with trap.	<1000	<1000
Health Physics Lab	2.0 - 4.0	30 on contact with Steam Generator Primary Side Samples	<1000	<1000
Port Stabilizer Room	1.0 - 4.5	6.0 grate level	<1000	<1000
Port Booster Pump Area	4.0 - 30	1000 on contact with piping with 30cm readings up to 150.	<1000	<1000
Starboard Stabilizer Room	.05 - 1.5	1.5 lower level off walkway	<1000	<1000
Stateroom B-1 Rad Waste Storage Area	2.0 - 5.0	10	<1000	<1000
Fan Room B Deck	1.0 - 2.0	2.0	<1000	<1000
Cold Chemistry Lab Area C Deck	1.5 - 6.0	26 on contact with the floor	<1000	<1000
Sample Room D-Deck	20 - 500	3200 on contact with overhead line	<1000	5139 inside sample sink
Gas Absorber Room D-Deck	4.0 - 60	450 on Suction Strainer	<1000	<1000
Cargo Hold D Deck	<1.0 - 6.0	150 on contact behind aft deck plates along Port side	<1000	<1000

Area	General Area Radiation levels $\mu\text{R/hr}$ (micro-R/hr)	Highest Radiation Level $\mu\text{R/hr}$ (micro-R/hr)	General Area Contamination Level (DPM/100cm ²)	Highest Contamination Level (DPM/100cm ²)
Hold Deck Aft of Reactor space port side	5.0 - 7.0	50 on contact with piping under the deck plate	N/A	N/A

2.2.2 Monitoring Station Dosimeter Results

Forty-six (46) permanently placed thermoluminescent dosimeter (TLD) monitoring stations are dispersed throughout the non-radiological controlled areas of the NSS and in those areas of the NSS that are routinely occupied. Fixed point radiation surveys are performed during TLD change outs. Results from the TLDs from all monitoring stations indicated that readings were insignificant as compared to the background radiation levels. No fixed point radiation dose rate exceeded 5 $\mu\text{R/hr}$ (micro-R/hr).

2.3 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 and potential ship's movement to new piers.

The environmental sample results indicate that the radiological conditions in the environment surrounding NSS are insignificant as compared to expected background conditions. Therefore, based on the results of the radiological environmental monitoring program, NSS operations did not have any adverse effects on the health and safety of the public or on the environment in 2010.

2010 RADIOLOGICAL ENVIRONMENTAL SAMPLING RESULTS

Sample Location	Sample Date	Type of sample	Co-60	Cs-137
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Port Side (Mid)	05/19/2010	Sediment (A)	3.02E-02 pCi/g (B)	1.48E-01 pCi/g (C)
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Port Side (Aft)	05/19/2010	Sediment (A)	2.50E-02 pCi/g (B)	1.49E-01 pCi/g (C)
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side (Fwd)	11/18/2010	Sediment (A)	3.74E-02 pCi/g (B)	6.40E-02 pCi/g (B)
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side (Aft)	11/18/2010	Sediment (A)	7.23E-02 pCi/g (B)	7.67E-01 pCi/g (B)
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Port Side (Mid)	05/19/2010	Water	1.50E+00 pCi/L (B)	1.71E+00 pCi/L (B)
Pier #13 Canton Marine Terminal, Baltimore, MD NSS Port Side (Aft)	05/19/2010	Water	2.23E+00 pCi/L (B)	2.26E+00 pCi/L (B)
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side (Fwd)	11/18/2010	Water	2.90E+00 pCi/L (B)	2.48E+00 pCi/L (B)

Sample Location	Sample Date	Type of sample	Co-60	Cs-137
Pier #13, Canton Marine Terminal, Baltimore, MD NSS Port Side (Aft)	11/18/2010	Water	2.05E+00 pCi/L (B)	1.85E+00 pCi/L (B)

Table Data Notes

- (A) Sediment samples are reported on a dry weight basis and are decay corrected to the Sample Collect date
- (B) Calculated MDA as an a-posteriori value at the 95% confidence Level
- (C) Results are statistically positive at the 95% Confidence level (Activity is greater than or equal to the two sigma uncertainty)

2.4 Quarterly Intrusion Alarm System Checks

Routine security surveillances were conducted as required by Technical Specification 3.7.2.1 and the Key and Seal log was reviewed on a quarterly basis. Other monitored doors were tested. Identified deficiencies were corrected on the spot.

2.5 Radioactive Materials Removed by Releases, Discharges and Waste Shipments

No radioactive materials were removed from the ship as described below:

2.5.1 Releases

There were no releases.

2.5.2 Discharges

There were no discharges.

2.5.3 Shipments

There were no shipments.

2.6 Principal Maintenance and Related Activities

The major maintenance activities of CY 2010 continued to focus on routine preventative maintenance, preservation of the ship's structural integrity, and restoration of ship systems and equipment necessary for husbanding the ship and for its long-term retention. In addition, the following significant discrete activities were performed:

2.6.1 American Bureau of Shipping (ABS) Surveys

Annual surveys are being performed as required. ABS reviewed the electrical load center modification described below in 2.6.4. ABS is currently reviewing the revised electrical one line diagram.

2.6.2 ABS Classification Certificate

Effective November 18, 2010, the NSS was restored to classification (hull only) by the American Bureau of Shipping (ABS). The hull is classed as a barge in inland / river service for the purpose of providing independent oversight of its material condition and maintenance; the hull envelope serves as the outer perimeter and primary boundary of the licensed nuclear site. ABS issued a classification certificate to document the action; this certificate replaced the previously-issued interim classification certificate.

2.6.3 Fire, Smoke, Flooding and Intrusion Detection and Alarm System

Installation of the Fire, Smoke, Flooding and Intrusion Detection System was completed in 2010. The system includes a complete (U.S. Coast Guard type-approved) Marine listed Underwriter Laboratories (UL) programmable (addressable) Detection and Alarm System. The system consists of speaker strobe devices, smoke and heat detectors, pull stations, flood sensors, limit and magnetic switches, control panel (primary and 2 remotes), and ancillary electrical components. The cables used for these systems are Shielded, Low Smoke, Commercial Marine Type that met IEEE Standard 45 and were USCG and ABS accepted.

2.6.4 Electrical Load Center for Shore Power Distribution

As an improvement to electrical safety, a significant modification was installed. As originally designed and installed, the shore power supply is directed to the main switchboards in the main control room with shore power voltage indicated on the main control room console. Engineering walkdowns had concluded that the age and vintage of electrical components precluded cleaning and inspecting the switchboards. Rerouting shore power to deenergize the main control room provided the most cost effective safety solution to maintaining aging electrical equipment. The modification included:

- Installing a new load center in the battery room located on “C-deck” cross passageway at approximately frame 146.
- Replacing Lighting Load Panel A-176-4 with Lighting Load Panel 480V, 225A (item # 16) located in lighting load center space port-side “A” deck, frame 176.
- Replacing Lighting Load Panel A-177-2 with Lighting Load Panel 120V, 400A (item # 17) located in lighting load center space port-side “A” deck, frame 176.
- Installing a new Secondary Power Panel “A” to be located on “B” deck at frame 105 in stairwell space port-side.
- Installing a new Secondary Power Panel “B” to be located on “A” deck in Asst. Pursers room at approximately frame 189 port-side.

Existing loads needed for current activities are wired on to the panels. Future loads will be added as needed. Deenergizing the switch boards in the main control room allows MARAD to electrically insulate unnecessary loads. More importantly, the modification establishes a known electrical plant status that will improve electrical safety. Revision 6 of the FSAR will include this modification.

2.6.5 Underwater Hull Survey

An underwater hull inspection survey was accomplished on July 6, 2010. The overall condition of the coating system was found to be good, with no breakdown. Moderate marine growth (1/2 inch to 1 inch) was noted to be accumulating on the vessel’s hull from the waterline to a depth of approximately 10 feet over the length of the vessel.

2.6.6 Reactor Space Ventilation (RSV) System

In 2009, the staff investigated water in-leakage in the overhead A Deck starboard passageway near the forward passenger staterooms and discovered significant ventilation duct degradation. The investigation verified that water in-leakage was from the RSV supply-air housing that is situated on the Promenade Deck, starboard side of the reactor hatch. The housing was deteriorated at the deck edge.

The RSV system was deactivated in the mid-1970’s, and serves no active function. It is not planned to be restored to operation.

In 2009, ship's force installed temporary blanks in the RSV ductwork to prevent further water in-leakage and system degradation. In 2010, the deteriorated ventilation intake enclosure housing was removed. New deck plating was inserted into the opening in the promenade deck. The insert plating forms the new barrier to isolate the fresh air supply to the RC ventilation system.

The ventilation intake enclosure house on the promenade deck was repaired and replaced in its original position to maintain the historic appearance of the deck, in accordance with the Secretary of the Interior's Standards: for a) the Treatment of Historic Properties, and b) Historic Vessel Preservation Projects.

2.6.7 Emergency Lighting

US Coast Guard type approved battery powered emergency lighting units were installed throughout the normally occupied areas of the ship.

2.7 *Unauthorized Entry Into Radiation Control Areas and Corrective Actions Taken to Improve Access Control*

No unauthorized entries were made into any Radiological Controlled Area in 2010.

2.7.1 Event Discussion

None

2.7.2 Improvements to Access Control

None

2.8 *Inspection of Boundaries Containing Radioactive Materials*

The annual inspection required by Technical Specification 3.7.6 was conducted in November and December 2010.

There was no notable change in the condition of the primary and auxiliary systems since the last inspection in November 2009.

Forward and Aft RCLL Sump levels continue to be monitored quarterly. We attribute lowering sump levels to the RSV system repair described in 2.6.6.

2.9 *Summary of 2010 Occupational Exposure*

As a result of the NSS being in the Mothballed state of protective storage, no individual is expected to receive in one year from sources external to the body, a dose in excess of 10% of the limits specified in 10 CFR 20.1201. Thirty-eight (38) individuals were monitored with TLD and self reading dosimetry during their entries into radiological controlled area. All personnel received zero dose from occupational sources during the monitoring period. Therefore, MARAD has no requirement under 10 CFR 20.1502, "Conditions requiring individual monitoring of external and internal occupational dose," to reasonably anticipate that there is a need to "monitor exposure to radiation and radioactive materials at levels sufficient to demonstrate compliance with the occupational of dose limits." Likewise, MARAD has no requirement under 10 CFR 20.2106, "Records of individual monitoring results," to maintain records of doses when an individual is not required to be monitored.

3.0 OTHER NRC REPORTS

3.1 *10 CFR 50.59 Biennial report*

Historically, the Biennial Summary Report has been included in each Technical Specification Annual Report. No 10CFR50.59 Evaluations were completed in 2010.

Many Safety Evaluation Screenings were performed. An example is the Safety Evaluation Screening performed on the modification to install a new Electrical Load Center for Shore Power Distribution. This screening determined that no 10CFR50.59 Evaluation was required.

3.2 *Summary of Technical Specification Deviations*

One new Technical Specification Deviation was approved by the SRC on February 5, 2010. The deviation is titled "Failure to patrol the vessel at least once during a twenty-four (24) hour period per Technical Specification 3.7.1.6 (Severe Weather prevents daily security patrols)." This deviation describes how the underlying intent of Technical Specification 3.7.1.5 is met when severe weather prevents daily security patrols. Two deviations were determined to no longer be needed and were deleted:

- a. Loss of Electrical Power during Ship Movement; and,
- b. Personnel Performing Security Patrols.

3.3 *Decommissioning Funding Status*

Beginning with CY 2009, MARAD no longer included the decommissioning funds status report in the Annual Report. The annual decommissioning funds status report will be submitted independently.

3.4 *10 CFR 50.54(w)(3) Insurance Annual Report*

The regulations require each power reactor licensee to obtain insurance available at reasonable costs and on reasonable terms from private sources or to demonstrate to the satisfaction of the NRC that it possesses an equivalent amount of protection covering the licensee's obligation. MARAD adheres to the federal rules of self-insurance as a matter of established policy.

4.0 SIGNIFICANT MARAD ISSUES

4.1 *Public Events and Visitation*

During 2010, the SAVANNAH played host to a number of public events and large group tours for a variety of educational, professional and celebratory purposes. Access controls and procedures were modified and refined to incorporate lessons learned after each event. Significant events of the year included the observance of National Maritime Day on May 22, and a public visitation in conjunction with the Ninth (triennial) Maritime Heritage Conference on September 18. Over 500 visitors participated in the various public events during 2010.

4.2 *Historic Stewardship*

As a National Historic Landmark (NHL) site, MARAD maintains a continuous focus on its historic stewardship responsibilities when conducting activities on the NSS site. All work on the ship, whether radiological or not, is sensitive to maintaining the historic fabric and appearance of the ship. MARAD's Federal Preservation Officer (FPO) provides expert advice and guidance to licensee staff in these matters, particularly with respect to the implementation of the Secretary of the Interior's Standards for the Treatment of Historic Properties and Historic Vessel Preservation Projects.

Decommissioning activities are subject to the provisions of the National Historic Preservation Act of 1966, as amended, and MARAD includes such planning and consultation as is necessary to ensure that decommissioning activities are in compliance with all applicable historic preservation statutory and regulatory requirements, as well as the relevant executive orders.

5.0 REFERENCES

- a. Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors, June 1974
- b. Letter from Mr. Robert W. Reid (NRC) to U.S. Department of Commerce, Maritime Administration, dated May 19, 1976, No Title [Issuance of Amendment 8, Possession-only License]
- c. N.S. SAVANNAH Post Shutdown Decommissioning Activities Report (PSDAR), Revision 1, submitted December 11, 2008 under cover letter from Mr. Erhard W. Koehler (MARAD) to U.S. Nuclear Regulatory Commission.