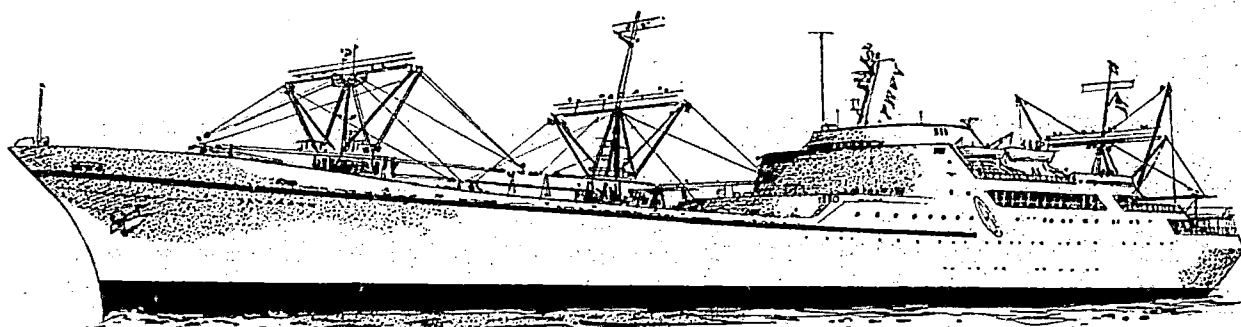




**U.S. Department of Transportation  
Maritime Administration  
Office of Ship Disposal**



***N.S. SAVANNAH***

**UPDATED  
FINAL SAFETY ANALYSIS  
REPORT**

**STS-004-002**

Revision IX

Change 1

Approved:

Date:

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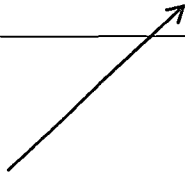
Senior Technical Advisor

Prepared by:  
TOTES Services, Inc.

**Updated Final Safety Analysis Report – (STS-004-002)**

**RECORD OF REVISIONS**

Revision	Summary of Revisions Following Final Shutdown and Permanent Defueling
STS-004-002, UFSAR Revision IV	A complete revision to the FSAR that incorporates numerous changes that occurred from 1968 through March 2007
STS-004-002, Revisions 1-4	These revision numbers to the STS were not used. By not using these numbers, the revision number for the FSAR and the revision number to STS-004-002 will be the same revision number.
STS-004-002, Rev. 5; FSAR Revision V	This revision incorporates changes that occurred after March 2007. The most significant changes are in Chapter 2 (Fire Detection and Alarm Systems, Security Systems and General Alarm) and Chapter 3 (Ship Movement and Port Operating Criteria).
STS-004-002, Rev. 6; FSAR Revision VI	This revision incorporates changes that occurred after March 2009. The most significant change is the electrical modifications to deenergize all originally installed 450 volt switchgear. All required 450/480 volt loads were moved to a new 800A Shore Power Switchboard. Chapter 2.4.2, Fire Detection and Alarm system (FA) and Chapter 2.9. Dehumidification System were rewritten.
STS-004-002, Rev. 7; FSAR Revision VII	This revision incorporates changes that occurred after March 2011. These changes clarify historical discussion in Chapter 1 and correct grammatical errors in Chapter 11.
STS-004-002, Rev. 8; FSAR Revision VIII	This revision incorporates changes that occurred after March 2013. These changes note restoration of manual control for releasing fire doors, clarify location and local alarm characteristics of the fire, flooding and security alarm panels, note discovery that the Soluble Poison Tank is not drained and clarify review requirements for Port Operating Plans.
STS-004-002, Rev. 9; FSAR Revision IX	This revision incorporates changes that occurred after March 2015. The foreword to each revision has been removed and summarized in section 1.3.4. Other changes include 1) discussion of the Emergency and Port Operating Plan that replaces Port Operating Plan and 2) changes to the security and fire alarm systems.



Change 1

Change 2 Deleted Forewords. CATS # 2777

Change Source: Request by LCM to remove redundant information.

Type 1 Change Criteria and Justification: Criteria 6. Minor clarifications that involve rearranging information currently in the FSAR to be more easily understood

- Delete Forewords and revise 1.3.4 to include the content that is common to all of them. While the current forewords provided a summary of actions taken and issues since the last revision to the FSAR, this information was redundant to previously docketed information in Annual Reports.

- HVAC installation on "B" Deck for offices / conference room; and "C" Deck Technical Library and Baggage Room (document storage);
- Electrical distribution system surveys and inspections; restoration of interior and exterior lighting; and,
- Repairs to aft mooring capstans and controllers.

### 1.3.3 Radiological and Environmental Characterization Scoping Survey

In September 2005, a radiological and environmental characterization scoping survey of the NSS was conducted. This characterization task was intended to provide a basis for estimating the cost of decommissioning. It is documented in NSS Radiological and Non-Radiological Spaces Characterization Survey Report and further described in Chapter 13.

The principle findings of the characterization scoping survey include the following:

- The CV entries were the first in over thirty years. The observed conditions generally supported the reported conditions of 1976. However, discrepancies were noted such as presence of hydraulic oils, migration of primary system water, significant quantities of trash/debris and superficial surface corrosion of components and lighting fixtures.
- Absence of fission products (other than trace quantities of cesium-137), uranium and its daughter isotopes, as well as transuranics (e.g., plutonium), indicates there were no significant fuel failures;
- Crud contribution to total curie content is minimal;
- No contamination was found in the non-radiological spaces;
- Minimal contamination was found in radiological spaces;
- Overall dose rates were much lower than expected;
- Sites previously identified as radiologically contaminated were found uncontaminated; and,
- Containment vessel systems, structures and components were exceptionally radiologically clean.

The scoping survey concluded that the NSS is in very good condition from a radiological perspective to support decommissioning. Note that during the assessment approximately 1500 gallons were found in the primary system. This volume is approximately 15% of the normal operating water volume of the system (approximately 10,000 gallons).

### 1.3.4 Current Status of N.S. *SAVANNAH* April 2009 to present

Change 2

The ship and its nuclear facilities remain in protective storage. The ship is in an active layberthing condition, with a retention crew and regular attendance by the Maritime Administration's nuclear operations staff. This condition is projected to continue throughout the next two-year biennial UFSAR update period. The updated safety analyses found in this revision apply to all activities within the site boundary (i.e.; all shipboard activities), regardless of how they may be characterized.

The UFSAR has been updated every two years since 2007.

In November 2010, electrical system modifications were completed. These included deenergizing all originally installed 450 volt switchgear. All required 450/480 volt loads were moved to a new 800A Shore Power Switchboard.

Change 5      Correct discussion in Table 1-1 for September 24, 1980 to note that in 2015, four sources were discovered in the cold chemistry lab. The characterization plan will determine all sources remaining on the ship. Source is Annual Report 2015 and 2016 CATS 2782

Change Source: Annual Reports for STS-196 Annual Report 2015 Rev 0 and STS-199 Annual Report 2016.

Type 1 Change Criteria and Justification: 1. Adding information to the FSAR/POP/PSDAR/LTP to make it consistent with other previously docketed correspondence to AEC or NRC.

**Updated Final Safety Analysis Report – (STS-004-002)**

<b>Table 1-1 Chronology of Significant Events</b>	
	secondary system was analyzed and does not have to be disposed of as nuclear waste.
May 19, 1976	Possession Only License issued (License Amendment 8) and recognized the ship was in a state of protective storage. Total estimated residual activity 1.09E+5 Ci.
April 1980	Main reduction bull gear was removed (NRC Inspection Report 81-01, March 2, 1981).
August 28, 1980	Public law 96-331 was enacted to authorize the NSS to be sent to Patriots Point, Mt. Pleasant, SC for use as a Museum and other public purposes.
September 24, 1980	Bureau of Radiological Health, South Carolina Department of Health & Environmental Control certifies all ten remaining radioactive sources have been transferred from the ship to them. (Note that in 2015, four sources were discovered in the cold chemistry lab. The characterization plan includes a requirement to determine all sources remaining on the ship.)
August 14, 1981	Patriots Point Development Authority (PPDA) became a co-licensee and the ship was bareboat chartered for public display at the Patriots Point Naval and Maritime Museum, Mt. Pleasant, SC from 1981 through 1994.
October 15, 1983	The American Society of Mechanical Engineers designated the ship as the Fourteenth International Historic Mechanical Engineering Landmark.
July 15, 1986	The NS-1 License was renewed for ten years by License Amendment 11.
September 1989	Hurricane Hugo hits the Charleston, SC area.
July 17, 1991	The National Park Service designated the ship as a National Historic Landmark.
October 1991	The Board of Directors for the American Nuclear Society approved the ship for a Nuclear Historic Landmark Award.
July 1991	Shortly after the second bareboat charter renewal in 14 July 1991, a hull leak developed. After a series of surveys and inspections, funding was requested from Congress in 1993 to drydock the ship to correct deterioration of the underwater hull.
December 1993	Public Tours of the ship were no longer allowed.
May 24, 1994	NSS left Patriots Point on the spring flood tide to minimize silting effects from Hurricane Hugo of September 1989.
June 29, 1994	License Amendment 12 removed PPDA as co-licensee. After routine drydocking and hull maintenance in Drydock # 4, Sparrows Point, Baltimore, MD, the ship was placed in protective storage at the James River Reserve Fleet, Ft. Eustis, VA. Numerous minor modifications including installation of a DH system were completed. Modifications associated with the DH system (i.e., vent ducting and cabling) generally obstructs the doorways, passageways and ladders throughout ship as is typical in the

Change 5

Change 6 FSAR Rev 9 Type 1 Change: Section 11.1 b and c FSM and DPM positions vacant.  
CATS # 2781

Change Source: STS-118, Annual Report 2008 for FSM and STS-191 Annual Report 2014 for DPM.

Type 1 Change Criteria and Justification:

1. Adding information to the FSAR/POP/PSDAR/LTP to make it consistent with other previously docketed correspondence to AEC or NRC.

## 11 CONDUCT OF LICENSED ACTIVITIES

Until the N.S. *SAVANNAH* (NSS) is licensed to proceed with decommissioning activities, the NSS is being maintained in a state of protective storage in accordance with the operating, possession-only, License, Technical Specifications and Port Operating Criteria. These documents contain the significant design and protective storage criteria for the ship. These criteria are established to ensure the health and safety of the public.

### 11.1 Organization

The MARAD Office of Ship Disposal has the responsibility for safely performing licensed activities. As a result of the 2007 reorganization, this responsibility was moved from the Office of Ship Operations to the Office of Ship Disposal. Lines of authority, responsibility and communication are procedurally defined and established. The relationships shall be identified and updated, as appropriate, in organizational charts, functional responsibility and relationship descriptions, job descriptions for key personnel positions, or equivalent forms of documentation.

- a. The Maritime Administration's Senior Technical Advisor (STA) has overall responsibility for administration of the NS-1 license and will provide guidance and oversight to the Manager-N.S. *SAVANNAH* Programs (MSP). The MSP is responsible for the execution of all program activities including routine radiation surveillance, ship custody decommissioning and historic preservation. MARAD may assign a single incumbent to both positions. Change 6
- b. The Decommissioning Program Manager position is currently vacant. The duties and responsibilities of this position have been delegated to incumbent staff, and the position as described is under review.
- c. The Facility Site Manager is directly responsible for the physical reactor, nuclear systems, and radiologically controlled material, components, and equipment onboard the N.S. *SAVANNAH*. The FSM provides on-site management and oversight of licensed activities, including direct oversight of the routine radiological monitoring and surveillance program. The FSM provides technical direction and guidance on overall ship husbanding and maintenance. The position is currently vacant, but will be filled when funding for decommissioning is available. The non-inherently governmental functions of the position are currently filled by contractors. Change 6
- d. The Radiation Safety Officer (RSO) is responsible for the conduct and oversight of all radiation safety activities through implementation of the Health Physics Manual. All radiological controls personnel have stop work authority in matters relating to or impacting radiation safety.
- e. The Quality Assurance Manager (QAM) is responsible for assuring implementation of the Decommissioning Quality Assurance Plan. This manual has been established to control the activities performed by the NSS Decommissioning Project and its contractors, within the scope of this Plan.
- f. A significant portion of the decommissioning project work is intended to be performed by contractors. MARAD personnel, reporting directly to the MSP, will be responsible for assigned contractors and providing the contractor direction, coordination and interfacing communications. The QA Manager will provide independent verification of contractors and the contractor's QA Manual (if applicable) which will be approved by the NSS Project on a case by case basis.
- g. Safety Review Committee was established by License Amendment 14 to replace the Review and Audit Committee. Because the audit function is performed in accordance with the Decommissioning Quality Assurance Plan, the audit did not have to be exclusively assigned to the Review and Audit Committee. As part of their review function, they review completed audits.





## STS-004-013 (ATT 01) REV (0)

### FSAR/POP/PSDAR/LTP CR PACKAGE FORM

FSAR/POP/PSDAR/LTP Change Request (CR) Package No. (CATS #): 1906 (Rev 9 Type 1 Changes)			
To: <u>Licensing and Compliance Manager</u>		Date: <u>24 April 2017</u>	
From: <u>John Osborne</u>		Work Group: <u>Licensing &amp; Compliance</u>	Extension: <u>(910)540-3209</u>
Print Preparer Name			
Part A - Change Initiation			
This change applies to: (Check all that apply) <input checked="" type="checkbox"/> FSAR <input type="checkbox"/> POP <input type="checkbox"/> PSDAR <input type="checkbox"/> LTP			
Description of Change:			
Rev 9 Type 1 Changes: See attached additional pages			
(Additional pages are attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No)			
Sections of FSAR/POP/PSDAR/LTP Affected by Change: (Attach marked-up pages)			
See attached			
<input type="checkbox"/> Field Work Required	Estimated Completion Date:		N/A
Individual responsible for field work: N/A			
Change Source		See attached pages	
Document Title and identifying information (revision, date, etc.):			
(List LAR, NRC Generic Correspondence, Procedure or other document.)			
Part B - CR Package Classification			
Type 1 Change 10 CFR 50.59 screening not required per Attachment 2 Criteria No.: See attached pages Justification: As described in attached pages			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Type 2 Change (Check one below and attach copy of document, as applicable.) <input type="checkbox"/> 10 CFR 50.59 & 50.82 Screening.			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No



FSAR/POP/PSDAR/LTP Change Request (CR) Package No. (CATS #): 1906 (Rev 9 Type 1 Changes)

- 10 CFR 50.59 & 50.82 Evaluation. 10 CFR 50.59 & 50.82 Log No. #:
- NRC Safety Evaluation Report attached.
- Does the change alter the intent or contradict the License or any Technical Specification? (If checked, contact Licensing and Compliance Manager)

**Part C - Cross-disciplinary Review**

Signature indicates the technical content of the proposed change agrees with the intent of the License, Technical Specifications, current design information, and, as appropriate, FSAR, POP, PSDAR, LTP. The Preparer may be a Cross-disciplinary Reviewer of those portions of the CR package that fall within their areas of technical competence.

Reviewer's Name:	Robert P Sheranko		4/24/2017
	Print Name	Signature	Date
Reviewer's Name:			
	Print Name	Signature	Date
Reviewer's Name:			
	Print Name	Signature	Date

Justification for no Cross-disciplinary Review:

**Part D - Decommissioning Project Manager Review**

Signature indicates proposed change agrees with the intent of the License, Technical Specifications, current design information, and, as appropriate, FSAR, POP, PSDAR, LTP. For Type 1 CR Packages, signature also indicates concurrence with the basis for Type 1 classification.

Decommissioning Project Manager (or designee):	Erhard Koehler		05/01/2017
	Print Name	Signature	Date

**Part E - Approval**

Licensing and Compliance Review and Approval:	John Osborne		5/1/2017
	Print Name	Signature	Date

**Part F - Change included in revision to FSAR/POP/PSDAR/LTP (as appropriate)**

Revision No.: 9  
 Signature: Date: 5/1/2017

Part G - CATS Item closed by  
 Signature: Date: 5/1/2017

FSAR/POP/PSDAR/LTP Change Request (CR) Package No. CATS 1906 Type 1 Changes

These attachments support the consolidated Type 1 changes for FSAR Revision IX (Rev. 9)

Change 1      Update the tables - Record of Revisions and Previous Issues. CATS # 2778

Change Source: Previous safety analysis and hazard summary reports.

Type 1 Change Criteria and Justification: Criteria 1 (Change consistent with previous FSAR) - This change updates these tables to summarize the changes to Rev. 9 and to list previous issues of the FSAR, safety analysis and hazard summary reports.