

1. EXECUTIVE SUMMARY

The N/S SAVANNAH (NSS) Characterization Project is intended to provide the Maritime Administration (MARAD) with a profile of radiological and non-radiological contaminants on the ship in radiological spaces. The scope of work was to perform a radiological and environmental hazard characterization program of the radiological spaces to document the location and extent of radiological and environmentally hazardous materials within these spaces preceding the decommissioning effort. In addition, a number of smears and samples were taken in non-radiological spaces to facilitate future analyses. The information obtained from this project will enable MARAD to develop appropriate decommissioning strategies and to estimate associated costs.

This characterization task was not intended to document a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)–compliant termination survey that would be subjected to the rigors of a Nuclear Regulatory Commission (NRC) review. The intent of the characterization program was to provide a basis for which the government could estimate the cost of performing the decommissioning. In addition, the end state of the ship is expected to be complete free release and therefore a MARSSIM based survey is not required. Only those locations and equipment/structures that were expected to be radioactive were surveyed in depth to determine the extent and types of radioactive materials present. The remaining areas (principally aft of the engine room, forward of the reactor compartment, and in the mid-ship-house and public areas) were surveyed less rigorously than radiological areas but in sufficient detail to confirm that no radioactive materials reside in those locations. The characterization program conducted from March 20, 2005 to April 25, 2005 did not include the radiological characterization of the reactor vessel, internals, or neutron thermal shield tank.

The characterization effort was implemented in accordance with a preestablished Characterization Plan that included project-specific procedures encompassing radiological aspects of the project.

The following sampling was performed during the characterization program:

- 1423 smears surveys
- 26 paint scrapings
- 14 metal samples
- 6 secondary containment concrete core bores

- 10 crud (solids) samples from the primary system
- 4 primary water samples from the steam generators
- 1 water sample (chromated water over-rinse residue) from the empty neutron shield tank
- 11 air samples for radioactive contaminants

A representative number of paint, metal, and core bores were sent to General Engineering Laboratories (GEL) in Charleston, S.C. for confirmatory analysis, including detection of tritium in core bores, which was not possible with any shipboard instrumentation. The results of the confirmatory analyses performed by GEL confirmed the finding of the shipboard instrumentation.

Findings of this characterization effort are as follows:

- Confirmed the absence of fission products (other than trace quantities of cesium-137), uranium and its daughter isotopes, as well as transuranics (e.g., plutonium), indicating no discernable fuel failures.
- Minimal crud contribution to total curie content.
- No contamination found in the non-radiological spaces.
- Minimal contamination found in radiological spaces.
- Overall dose rates much lower than expected.
- Previously radiologically identified sites found uncontaminated.
- Containment vessel systems, structures, and equipment exceptionally radiologically clean.

In conclusion, the N/S SAVANNAH is in very good condition from a radiological perspective to support decommissioning. The data gathered during this exercise, and subsequently verified by a certified, independent laboratory, would allow MARAD to develop comprehensive decommissioning strategies along with bounding the costs.