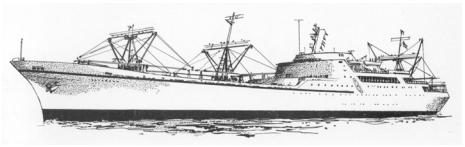

NUCLEAR SHIP SAVANNAH CHARACTERIZATION SAMPLING PLAN

NON RADIOLOGICAL AND RADIOLOGICAL SPACES ON THE NS SAVANNAH

BY

WPI

FOR

UNITED STATES MARITIME ADMINISTRATION

SHIP OPERATIONS

CONTRACT NUMBER: DTMA1C05013

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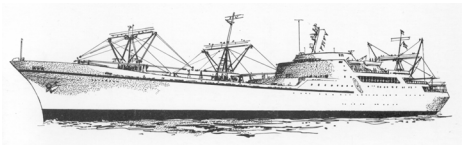


1.0 SUMMARY

The purpose of the Nuclear Ship Savannah Characterization and Sampling Plan is to provide direction to sampling personnel, assure that the ship is properly sampled and measured, and that the sample distribution is representative of existing radiological and non-radiological conditions on the ship. Results of the Characterization and Sampling effort will provide prospective bidders with a profile of radiological and non-radiological contaminants on the ship enabling them to develop appropriate decommissioning approaches and estimate associated costs for bidding purposes.

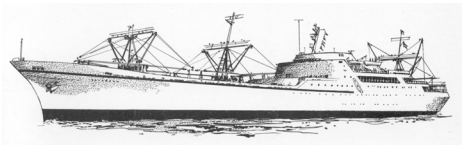
This preliminary characterization task is not intended to furnish a Multi-Agency Radiation Survey & Site Investigation Manual (MARSSIM) compliant termination survey that would be subjected to the rigors of a Nuclear Regulatory Commission review. Only locations and equipment that are expected to be radioactive or contain radioactive materials will be surveyed in depth to determine the extent of radioactive materials present and the type of materials. The remaining areas (principally aft of the engine room, forward of the reactor compartment and in the mid-ship house and public areas) will be surveyed less rigorously to confirm that no radioactive materials reside in those locations.

This Characterization and Sampling Plan will be implemented through compliance with appropriate project specific procedures that address radiological elements of the characterization program:

NSS-100	RADIATION WORKER TRAINING
NSS-110	DOSIMETRY ISSUE
NSS-120	ACCESS CONTROL FOR CONTAINMENT
NSS-130	CONTAMINATION CONTROL
NSS-140	RADIATION SURVEYS AND SAMPLING
NSS-150	RADIOACTIVE AIRBORNE SAMPLING
NSS-160	MANAGING RESPIRATORS
NSS-200	SHIPBOARD READWASTE MANAGEMENT

1.1 RADIOLOGICAL CHARACTERISTICS

Although the fuel has been removed from the NS Savannah and shipped off-site, fuel residues, fuel radioactive decay progeny, fission and activation products (both fuel and non-fuel) may remain in areas external to the reactor pressure vessel.

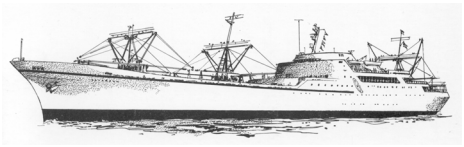


Materials on board the Savannah will likely contain radioactivity from both activation and contamination processes. Activation is a process by which a material is made radioactive through neutron bombardment produced by the fission of uranium fuel. Radioactivity is induced throughout the material such that the material may be considered radioactive. While an activated material such as steel cannot be cleansed of its radioactive nature, the radioactivity cannot be transported unless the steel itself is degraded (e.g., through cutting or abrasion) and transported. Activation products in steel-based reactor and primary system components could include Iron (Fe-55), Cobalt (Co-60), and Nickel (Ni-59 and Ni-63). (Note that Fe-55 on board NS Savannah has decayed through over 13 half-lives, and is now present in only trace quantities). Concrete may contain Tritium (H-3) and Calcium (Ca-41). Gaseous activation products (e.g., Krypton-85) as well as activation products of constituents of air (e.g., Carbon-14, Chlorine-36, Argon-42 and Krypton-81) are relatively inert (with the exception of Carbon-14) and likely have passed through the ventilation system and exited the stack.

Radioactive surface contamination generally refers to loose or fixed radioactive material that is transported and deposited onto a surface. This contamination may result from processes such as abrasion, oxidation or erosion of fission and activation products. Radioactive surface contamination may be easily transported from surface to surface through direct contact. It is important to make the distinction that activated materials present a greater external exposure concern while contaminated materials are a greater internal exposure concern. In addition, during characterization or remediation activities such as cutting, grinding, coring, and other intrusive techniques, the potential for internal exposure is increased.

The large number of sample categories and locations identified in this Characterization Plan reflects the significance of both activation and surface contamination in the selection of safe, cost-effective decommissioning processes.

The routine duties of the Radiation Safety Officer (RSO) are delegated to the WPI Health Physicist. These duties include program monitoring, oversight, radiation work permit reviews/approvals, defining/posting radiological control areas (RCAs) along with describing appropriate dress-out requirements for entry into RCAs and dosimetry issuance. The duties specifically exclude the approval/oversight of the initial containment vessel entry. In addition, the RSO is to be notified immediately in the event of any licensee event occurring as a result of the sampling activities.



1.2 NON-RADIOLOGICAL CHARACTERISTICS

Hazardous materials which may impact the decommissioning activities will be surveyed to identify decommissioning requirements, constraints and potential waste streams. Surveys will be completed to support the characterization of hazardous materials in both radiological and non-radiological spaces. Types of non-radiological hazards that may be present onboard the NS Savannah includes:

- Asbestos-containing material (ACM) that could include insulation, gaskets, valve packing, and floor and ceiling tiles.
- Lead-based paint.
- PCB-containing equipment, e. g., electrical ballasts and gaskets.
- Mercury-containing equipment, e.g., fluorescent lights and instrumentation.
- Residual fuels, oils and solvents.

1.3 RADIOLOGICAL SAMPLING

To adequately characterize the existing radiological conditions aboard the Savannah, five kinds of sample data will be collected: smears for surface contamination, frisking for fixed contamination, dose rate measurements, paint samples, metal samples for induced activity, and core bores for shielding wall and rebar samples.

Dose Rate Measurements

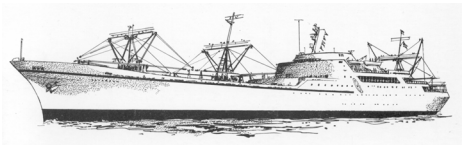
Dose rate measurements are taken throughout a room or compartment to determine the radiation levels from any residual radioactive materials or contamination.

Frisking

Frisking measurements (in counts per minute) generally precede the smear samples to identify any locations with fixed or loose radiological contamination.

Smears

Smears are 10 cm by 10 cm (4" by 4”) samples taken by rubbing a fixed size sample paper (nominally a circle about 2.5 cm (1") in diameter on a contiguous area. The area may be any set of dimensions that equals 100 square cm. The smear paper is protected from cross



contamination and numbered as to the area and sequential sample number. The smear is then placed in a shielded detector and any radioactive emissions which occur from decay are “counted” by the detector. The number of “counts” is an indication of the amount of residual radioactivity (removable) on the originally sampled area.

In determining the sample distribution in an area, it is important to emphasize areas that have been identified by frisking and are expected to be contaminated such as sumps, door sills, contaminated systems pipe flanges, any location with evidence of leakage, etc.

Paint Samples

Paint samples are taken using a rasp or roughened object to remove all levels (coats) of paint in recognition of the fact that early contaminated coats of paint may be over-coated with fresh paint and would be impervious to smears. The location from which each paint sample is removed must be estimated in terms of square inches of surface area when the sample is taken, and the sample location identified. While the same area planning philosophy as for smears should be followed, the sampling locations may be selected on a different basis such as accessibility. Paint samples should include only paint and undercoating, and not other undercoat materials including metal.

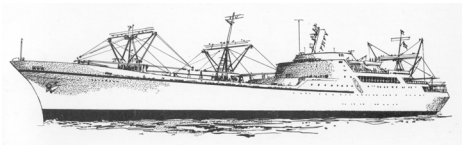
Metal Samples

Metal samples are small (less than one square inch) samples cut from the metal objects with saws, drills, or other bulk metal removal equipment. The objective is to obtain only metal and no paint, coatings or other foreign materials. It is necessary to weigh each sample and calculate the activity measured by the detector in terms of concentration and density.

Core Bores

Core borings will be taken through the steel inner liner of the secondary area and into the shield wall to determine the extent to which the concrete outside steel plate wall is contaminated or induced activity exists in the rebar. Core bore locations will be based on expected activity as well as accessibility (the core bore machine is quite large and must be bolted to the wall on pre-attached mounts).

It is also necessary to provide recyclable drilling water to the core boring machine which requires a water recovery system. Core bores must be removed intact and identified as to



the wall and inner ends. The steel cylinder removed from the core bore access hole in the wall also provides an induced activity sample if encountered. The core bore holes in the steel liner will be restored by sealing with an acceptable sealing device.

1.4 RADIOLOGICAL and NON-RADIOLOGICAL SURVEY GUIDELINES

The following guidelines apply to taking smears, obtaining dose rate information and sampling. These guidelines should be followed as practical.

1. Sampling/surveying teams must verify that they are in the right place when sampling.

2. Always plan the work in an area (never larger than a room) beforehand and identify as many of the sample points as possible.

3. Use the same points for smears and frisker readings to the extent practical.

4. Plan the entry and pre number the smears to the extent particle for the planned number of smears for the area.

5. Do the hardest to sample points first, all other things being equal.

6. Provide adequate lighting and/or ladders to access the sample points

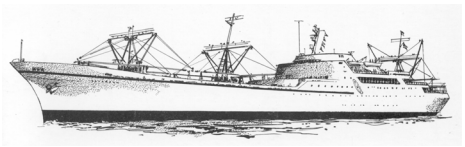
7. Tape a plastic bag to a surface to obtain all of the paint samples and write the sample location on the bag or tape.

8. Be sure that you have all samples and gear when you leave the room or area.

9. Record all samples, smears, and dose rate measurements on the survey form as you make them.

10. Complete all information on the survey form as appropriate. Be sure to identify yourself and date the sample data sheet.

11. Note on a piece of tape on the door or area wall that the location has been surveyed.



12. Always complete one area before proceeding to another area.

The number of data points in a room or area, and the number of data points from the entire ship are selected based on complexity of the areas, the general probability that an area could have become contaminated by some identifiable means, and the number of sampling points necessary to make the survey statistically meaningful. The guiding principle for this characterization is to furnish a basis for prospective contractors to select optimum methodologies and prepare estimates to decommission and free release the ship.

1.5 ENVIRONMENTAL SAMPLING

Environmental sampling will be conducted in the radiological and non-radiological portions of the ship, and will entail the following:

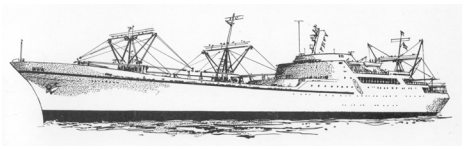
- In the non-radiological areas of the ship, samples will be collected of potentially hazardous materials that would warrant identification in advance of decommissioning. Samples will not be removed from the ship for testing, but will be catalogued, photographed, stored in secure containers and marked on a map of the ship.

- In the radiological areas of the ship, the same objectives as noted above remain. However, in the radiological areas, selected samples will be collected and sent offsite for analysis in a controlled laboratory.

- The sampling efforts in both the radiological and non-radiological areas for the hazardous materials survey will involve detail documentation to support future decommissioning activities. This will involve comprehensive sample logs, photo documentation, sample demarcation via permanent marker at the location where a sample was collected, and a mark out of the sample locations on a map of the ship.

1.6 RADIOLOGICAL SAMPLING EQUIPMENT

The following equipment will be used to survey, collect and measure radioactive samples. Quantities of nuclear instrumentation are shown in ( ):

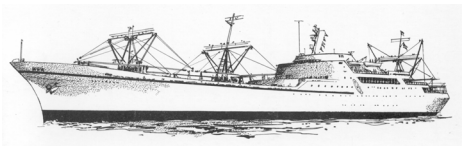


- Exploranium GR-135, Hand-held Spectrometer (with NaI and extended range GM detector) (1)
- Ludlum Alpha Scintillator (ZnS), Model 43-5 with six spare Mylar windows (1)
- Ludlum Pancake GM detector, Model 44-9 (2)
- Ludlum Scaler/Ratemeter, Model 2221 (2)
- Ludlum Scaler with Sample Counter, Model 2929 (2)
- Xetec Telescoping (up to 15 ft.) Dose Rate Meter with sleeves, Model 330 A (1)
- Check Sources – Th230 & Tc99
- Swipes
- Camera
- Concrete core drill
- Scraper
- Sampling bags/containers
- Field logbook

The need for other equipment/materials may be identified as the survey progresses, and will be added to the Health Physics inventory.

Each of two sampling/survey team will consist of two persons per team. One person will staff the shipboard counting laboratory on a dedicated basis, and will prepare and record smear samples in accordance with pre-established health physics procedures. The use of two Scaler/Sample Counter setups in the Health Physics lab supplemented with a rapid data recording/archiving system will expedite the work flow of this critical path activity. Recorded data will include date, sample number, sampling team, location and count rates for beta and alpha radiation.

Use of a portable energy spectrometer (GR-135) will enable instantaneous isotopic identification of samples. If on-site equipment is unable to identify nuclide content of multiple isotopic samples, they will be sent off-site to controlled laboratories for analysis.



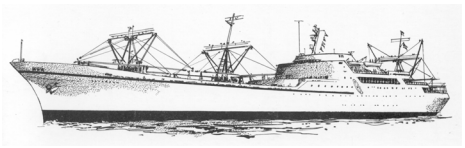
1.7 RADIOLOGICAL CHARACTERIZATION METHODOLOGY

The following describes the methodology that will be used to characterize radiological hazards in sufficient detail for decommissioning contractors to prepare work scope and associated costs in response to a request for proposal. As previously stated, this characterization program is abbreviated in scope compared to the final survey, which will be performed in preparation for the NRC license termination following decommissioning.

- Containment vessel structures and internal and external steel structures may contain trace amounts of radioactivity due to induced activity from exposure to neutron radiation in operation. Samples of the structural metal (without damaging or affecting the structural strength for the non-operable plant) will be taken and activated nuclides, if any, will be identified.

- The reactor vessel and its internals have been characterized by WPI based on existing materials and operating data and by using the latest analytical means approved by the NRC, and found to meet the waste acceptance criteria (WAC) for the Barnwell disposal site. The values in reviewing these earlier results are solely to reduce the total previously calculated radioactive nuclide inventory assumed to be in the vessel package by obtaining better information (direct dose rates from the reactor vessel exterior and smears from the inside surfaces of the external piping attached to the reactor vessel that would be representative of the internal crud or solids smears), which can be extrapolated to the entire vessel interior and internals surfaces. It is important to note that each curie assumed to be buried as part of the assumptions has an affect on the design weight of the package, which involves yet another additional surcharge at Barnwell and also greater costs for transportation to Barnwell. WPI will take the steps necessary to reduce these inventories, weights and their resulting surcharges to the extent possible and credible.

  One other important source of reactor vessel condition confirmatory data will be available and taken advantage of during the characterization program. That is the direct dose rate on the vessel outside wall at the core mid-plane elevation. The NS SAVANNAH was a unique nuclear power plant in that the power level detectors were external to the reactor vessel (versus detectors in currently operating reactors that are inserted through bottom entry dry tubes into the flux area on flexible shafts).



The detectors have been removed from the NS SAVANNAH and the detector tubes can be accessed to obtain reactor vessel mid-plane gamma dose rates.

- The containment vessel rests on a support frame in a concrete shield lined on the inside with a painted carbon steel plate liner. This concrete shield provided radiation shielding and impact protection in a collision in operation. While no contamination or induced activity is expected in the concrete behind the liner, that assumption will be confirmed by drilling through the liner at strategic locations with a hole saw, and core boring the concrete with a magnetic base core boring machine to obtain appropriate samples for off-site evaluation. The concrete wall will be rehabilitate with grout and a 6" by 6" gasketed plate will be placed over each drill site.

- Several specific points will be investigated such as the inside surfaces of the primary system (by removing a flanged relief valve on the pressurizer and/or opening the tube side of one steam generator or removing the jumper pipe in the letdown cooling system. Other systems will be opened as necessary by removing valve bonnets, heat exchanger manways, pipe flanges, etc. to gain access and samples. All systems openings will be closed to an airtight (but not hydrostatically tested) condition. Inner bottom tanks in the reactor area and forward in the engine room, under the charge pump rooms, will be opened and surveyed. Air handling systems (shutdown and in use) will be opened and investigated.

- Steam plant (secondary side) will be characterized by opening the condenser near the steam jet air ejector (SJAE) and the steam generator steam and mud drums on one side.

The expected number of radiological samples to be taken by area aboard the vessel is shown in Table 1. This sample number is assumed to be adequate initial findings indicate the need for additional samples and/or locations.

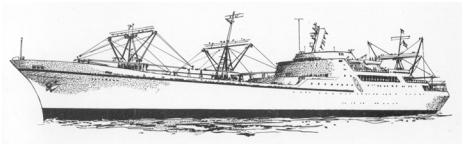
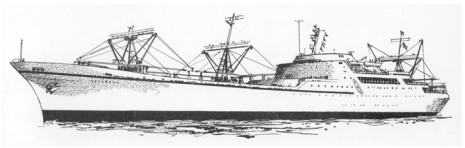


TABLE 1
SUMMARY OF RADIOLOGICAL SAMPLES

1. Presumed non-radiological and uncontaminated areas

Area	Swipes	Dose Measurements	Paint Scrapings
Fo'c'sle, chain locker, holds 1 through 4 and shaft alley except for the forward sample area	50	60	15
Holds 5 and 6 excluding the hold 5 engineering spaces and hot chemistry lab area	100	100	30
House and habitable areas	70	0	15
Passenger public areas, staterooms, crew berthing areas	200	200	20



2. Radiological and contaminated areas – reactor vessel space and irradiated metal areas (except for reactor vessel, internals and neutron shield tank, including secondary steam system):

Area	Swipes	Dose Measurements	Paint Scrapings
Opening steam generators and primary manways, removing relief valve and pressurizer manway, core boring of concrete shield wall, obtaining metal samples from lower secondary wall liner, and direct reactor vessel dose rate measurements taken through ex-core reactor power level detector tubes. Includes: 10 metal samples 6 core borings 15 primary and secondary scrape (crud) samples	200	250	30
Engine room, charge pump rooms, inner-bottoms, main condenser, and ventilation ducting to point of discharge. Includes: 5 metal samples 3 scrape (crud) samples	130	100	
Port and starboard charge pump rooms and stabilizer spaces, and forward sample area. Includes: 3 scrape (crud)	60	120	20

1.8 NON-RADIOLOGICAL (HAZARDOUS) MATERIALS METHODOLOGY

The field and laboratory activities associated with the hazardous (non-radiological) materials survey of the NS Savannah have been divided into two distinct tasks that will be performed concurrently. Sampling activities will be performed by two 2-person teams.

Specific survey techniques will consist of the following:

1. Available details of the vessel's infrastructure and operational equipment for potential sources, amounts and relative hazards of potential contaminants will be reviewed. Target sampling items/locations will be indexed and located on vessel schematics.

2. Fuels/Lubricants/Coolants: The location of equipment and tanks which potentially contain fuels, lubricants, and coolants will be identified and noted on vessel schematics and an index will be compiled. To the extent practicable, estimates of potential quantities of material will be provided through actual readings or through engineering judgment., Should liquid components be identified during field activities, they will be measured (i.e., volumetric determination) and/or sampled accordingly. For oil-based materials, samples may be collected for halogen content (i.e., Total Organic Halogens, TOX) to assess whether the material is suitable for recycling. Should aqueous materials be encountered, samples may also be collected for laboratory testing. Depending on the location of the aqueous material, the suggested analytical parameters may vary, but would likely include volatile organic compounds (VOCs) via EPA method 8260, semi-volatile organic compounds (SVOCs) via EPA method 8270, and EPA priority pollutant metals via EPA method 6010. At least one duplicate sample will be collected for each analytical parameter, an one aqueous field blank would be collected for VOC analyses for each day that one or more VOC samples have been collected.

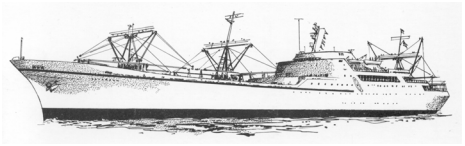
3. Potential PCB-containing Materials: Electrical equipment that potentially contains PCB-containing dielectric and electrical conduit will be identified through review of vessel information and visual survey. To the extent practicable, quantifies of materials will be estimated based on observations and other available information. The teams will be prepared to obtain

samples to verify dielectric makeup (i.e., dry or liquid type), as necessary. Potential PCB-containing materials may be on the NS Savannah. Such materials are typically associated with dielectric fluids in electrical equipment, namely liquid transformers or capacitors. PCBs may also be found in hydraulic oils. Although preliminary information does not suggest the presence of such materials on the vessel, should dielectric fluids or hydraulic oils be encountered, volumetric estimates of liquids will be made and samples may be collected to assess PCB content. The WPI team will work with onboard electrical personnel to facilitate sampling of any electrical equipment. Representative samples will be collected as necessary. It is likely that older light ballasts associated with fluorescent lights may contain PCBs; selected light ballasts will be collected for possible analyses.

4. Asbestos-Containing Materials (ACM): Using available information and visual surveys, the type and quantity of potential ACM will be identified, indexed, and mapped. Within the radiological spaces, up to 50 samples of potential ACM will be acquired and analyzed to identify asbestos content. Within non-radiological spaces, representative samples will be acquired and bagged to facilitate future analysis, as necessary. To the extent practicable, quantities of materials will be estimated based on observations, data, and other available information. Asbestos-containing materials (ACMs) are likely to be the most prevalent hazardous materials on the NS Savannah. Initial visual inspection suggests that much of the pipe insulation, floor tiles, mastic, and ceiling tiles likely contain asbestos, with much of it in poor condition.

   The ACM inspection and bulk sampling will be performed in accordance with the methods outlined in the United States Environmental Protection Agency (USEPA) guidance document titled, *Guidance for Controlling Asbestos-Containing Materials in Buildings* (Document No. 560/5-85/024).

5. Lead-based Paints: onsite X-Ray Fluorescence (XRF) Technology will be used for rapid lead content quantification in paints throughout the vessel. Representative locations will be sampled and analyzed to quantify lead content in real-time using XRF techniques. Data will be indexed and mapped. To the extent practicable, quantities of lead-based paint on the vessel, or parts of the vessel will be estimated. Additional confirmatory samples (approximately 30) will be collected for offsite laboratory analytical



testing. It is likely that some of the paint used on interior and exterior surfaces of the NS Savannah contain lead. The current condition of the ship has many painted surfaces with pealing paint. As part of the survey of potentially hazardous materials, ERM will conduct a survey of lead-based paint throughout the ship. The most efficient means to accomplish this task is through the use of an onsite X-Ray Fluorescence (XRF) Technology for rapid lead content quantification in painted surfaces throughout the vessel. Working with WPI, representative locations will be sampled (ad analyzed instantaneously) to quantify lead content in real-time sing XRF. Sample locations will be

6. Other Hazardous Materials: There may be other potentially hazardous materials on the NS Savannah that will be identified during the course of the hazardous materials survey. In some instances, these may be merely noted on the map of the ship and in the field notebook; in other instances, samples may be collected for analytical testing. For example, there may be mercury-containing switches, though none are known to exist. There are also several alcohol-based thermometers on the ship, and these will merely be noted during the course of the survey in the field logbook.

   There are fluorescent lights throughout the ship. These lights may contain ballasts that have small quantities of PCBs. Several representative ballasts will be collected for potential testing of PCB content.

Table 2 presents a summary of estimated samples by media and compound of concern.

Table 2
Summary of Estimated Samples

Non-Radiological Areas		
Asbestos	EPA Method 600	500 samples
Pb in Paint	XRF (*in-situ* results)	1000 samples
Pb in Paint	EPA method 7420	30 samples
Halogens in Fuel	EPA 9020B (TOX)	5 samples
VOCs/SVOCs in water	EPA 8260B/8270B	5 samples
Metals in water	EPA 6010	5 samples
PCBs in oils	EPA 8082	5 samples
Radiological Area (*)		
Asbestos	EPA Method 600	50 samples
Pb in Paint	XRF (*in-situ* results)	100 samples
Pb in Paint	EPA method 7420	5 samples
Halogens in Fuel	EPA 9020B (TOX)	0 samples
VOCs/SVOCs in water	EPA 8260B/8270B	0 samples
Metals in water	EPA 6010	0 samples
PCBs in oils	EPA 8082	0 samples

Asbestos samples will be analyzed by Polarized Light Microscopy (PLM) by Aerosol Monitoring & Analysis, Lanham, Maryland

Confirmatory paint chip samples for lead analysis will be analyzed by EPA Method 7240 (or 6010B) by Aerosol Monitoring & Analysis, Lanham, Maryland

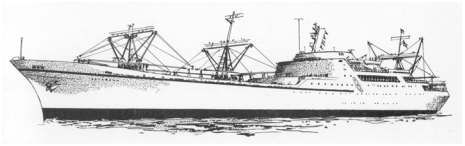
VOC analysis in aqueous samples will be analyzed by EPA Method 8260B by Phase Separation Services, of Baltimore, MD

SVOC analyses in aqueous samples will be analyzed by EPA Method 8270B by Phase Separation Services, of Baltimore, MD

Metals in aqueous samples will be analyzed by EPA Method 6010 by Phase Separation Services, of Baltimore, MD

PCBs in aqueous samples will be analyzed by EPA Method 8082 by Phase Separation Services, of Baltimore, MD

- Only samples from the radiological area will be analyzed by ERM



2.0 Sample Location Guidance

Sampling points in the following areas are identified as the key locations for radiological assessment.

AREA NR-1

CARGO HOLDS 1-3, B DECK TO HOLD DECK

SAMPLING SYNOPSIS

Take 30 smear samples and 10 dose rate measurements in the named areas. The smear samples are to include the bilge pump sumps and the area under the ladder on the hold deck. The tween decks are to be sampled once in each deck level in each hold.

SMEAR/ DOSE SAMPLES AND PAINT SAMPLES TAKEN (NUMBERED AND LOCATED ON PLAN VIEW)

AREA NR-2

CARGO HOLD NO. 4, B DECK TO HOLD DECK

SAMPLING SYNOPSIS

Sample and check the dose rates at the aft bulkhead principally and on the centerline of the vessel. The area under the access ladder and the general area on B deck should be emphasized. The hold 4 bilge sump should be checked.

AREA NR-3

CARGO HOLDS NO.6 AND 7 AND AFT, AND
NON ENGINEERING HOLD 5 LOCATIONS

SAMPLING SYNOPSIS

Sample the habitable areas and the non-habitable and non engineering areas on an equal basis.

AREA NR-4

STEWARDS STORAGE AREAS, P/S, C DECK TO HOLD DECK

SAMPLING SYNOPSIS

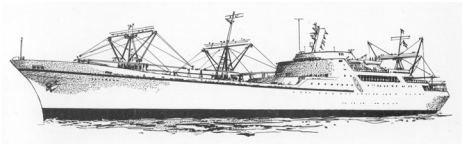
Sample and check the dose rate in the areas favoring the interior walls abutting the secondary area. Sample any sumps and sills, and interior doors. List the compartments sampled (4 total)

AREA NR-5

HOUSE AND WEATHER DECKS FROM A DECK TO TOP OF HOUSE

SAMPLING SYNOPSIS

Sample all public areas and all exposed weather decks from the main (A) deck to the top of the house. This should include the emergency generator room on the house top, the bridge, senior officers quarters P/S, the lounge and bar area, the passengers dining room and main galley, pool area, pursers area, and forward and aft main deck.



AREA NR-6

B DECK AND BELOW AREAS EXTERIOR TO REACTOR SPACE

SAMPLING SYNOPSIS

Sample the habitable spaces on B deck aft of the hold 4 bulkhead and including the crew quarters, galleys, and messes, paying particular attention to passageways, any sumps or closets and to door sills.

AREA NR-7

C DECK EXTERIOR TO REACTOR SPACES

SAMPLING SYNOPSIS

Sample the habitable spaces from the aft hold 4 bulkhead to the aft end of the vessel with particular attention to passageways, sumps and sills in living areas.

AREA NR-8

MACHINERY SPACES, HOLD 5 ENGINEERING SPACES (EXCEPT HOT CHEM LAB), SHAFT ALLEY AND STEERING GEAR ROOM

SAMPLING SYNOPSIS

Take 200 smears and 120 dose rate measurements and 25 paint samples in the area. Concentrate the efforts in the bilge areas and in the bilge piping in the area of the forward tank tops. Do not open and survey hot lab. Survey in hold 5 and engine room and adjacent spaces and survey hold 5 engineering work spaces. Sampling emphasis will be on the habitable areas (during normal operations) in the spaces.

AREA R-1/2

P/S CHARGE PUMP ROOMS (ENTER OFF OF ENGINE ROOM FORWARD BULKHEAD DOORS (KNOWN CONTAMINATED SPACE)

(NOTE THAT THIS ROOM MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

These small spaces will be checked but it is recognized that the emphasis will be on the checks that support removal of the equipment versus decontamination. There may be a drain in the starboard room and the port room may run to the starboard to drain. Sumps and drains must be sampled. Paint samples will be taken from the doors and floor (tank top).

AREA R-3/4

P/S STABILIZER SPACES (KNOWN CONTAMINATED SPACE)

(NOTE THAT THIS ROOM MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Emphasis will be on the starboard space where the contaminated line runs through the compartment. However, the compartments include a cross-flooding passageway so bottom compartments are suspect. Sample any sumps and contaminated line flanges. Sample paint in contaminated line flange areas and sump inner walls.

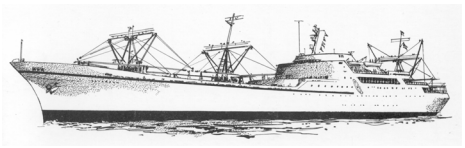
AREA R-5

HOLD 5/ENGINE ROOM HOT CHEMISTRY LABORATORY (KNOWN CONTAMINATED SPACE)

(NOTE THAT THIS ROOM MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

To be supplied



AREA R-7

LOWER SECONDARY AREA (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Take 60 smears and 80 dose measurements and 8 paint samples in this area with emphasis on ventilation systems and the lower secondary floor. Up to 4 core bore samples and up to 3 induced activity metal samples will be taken to check for induced activity. The metal samples will be concentrated at the CV wall and cupola base.

UPPER SECONDARY AREA (KNOWN CONTAMINATED SPACE)

(NOTE THAT THIS ROOM MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Take 60 smears, 20 dose rate measurements and 8 paint samples in this area with emphasis around the air lock, the cupola walls, and the area around the vertical access to the lower secondary area. The boundary to the lower secondary is at the top of the access ladder and to the CV at the entrance to the air lock. The contaminated ventilation system has been removed from this area. Up to 4 core bores will be done in this area and up to 3 metal samples will be taken from selected locations for induced activity.

AREA R-8

FORWARD CONTROL AREA (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Take 5 smears, 20 dose measurements and 3 paint samples from this area. The area may have been decontaminated and released when the ship was defueled.

AREA R-9

HP LABS (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Take 10 smears, 10 dose measurements, and 5 paint samples. This area is to be checked at the end of the program. Pay particular attention to the drains and floors.

AREA R-10A

CONTAINMENT VESSEL GENERAL AREA (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

Take 180 smears 160 dose measurements and 6 paint samples and up to 5 induced activity metal samples in the general areas of the CV, including the ventilation system interior and the upper cupola and CRDM mast. Emphasis will be on sumps, hide-out points and other likely contaminated areas. Any high-dose areas (in the areas of the steam generators, etc. will be identified and measured.

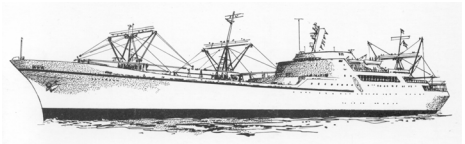
AREA R-10B

REACTOR VESSEL DOSE RATE THROUGH INSTRUMENT TUBES (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

This activity will be staged to obtain at least one direct dose rate measurement at the RV wall through one power range instrument tube. The area where access is required will be surveyed after the measurement is taken and any equipment or flanges which must be removed are replaced.



AREA R-10C/D

STEAM GENERATOR PRIMARY SIDE AND LET DOWN ORIFICE (KNOWN CONTAMINATED AREA)

(NOTE THAT THIS SPACE MUST BE VENTILATED AND AIR SAMPLED PRIOR TO ENTRY)

SAMPLING SYNOPSIS

This activity will be staged to obtain a CRUD sample from the primary side of the steam generator and other primary system locations in order to refine the vessel and steam generator activity calculations and dose rates. Any area where the primary system is opened will be surveyed and sampled after the primary system is resealed.